THE MARK-8 USER GROUP IS ALIVE AND RUNNING. IT'S ONLY 14
SEPT. AND WE ALREADY HAVE RECEIVED LETTERS FROM 30 PEOPLE. IT IS QUITE
POSSIBLE THAT WE MAY END UP WITH HUNDREDS OF PARTICIPANTS. THIS ISSUE
WILL INCLUDE A FEW THINGS THAT SEEM URGENT AND WE'LL SAVE THE GOOD
THINGS FOR FUTURE ISSUES AFTER WE ACCUMULATE SOME MORE PARTICIPANTS.

1. HOW DO YOU KEEP FROM PAYING $1.20 FOR THE 8008 CHIP?
   A. GET A SCHOOL DISCOUNT OF 20% FROM AN INTEL DISTRIBUTOR.
   B. TRY COOK, 25w178-39th ST., NAPERVILLE, IL 60540 $50
      (P. 110 RE OCT)
   C. B.R.G. ELECTRONICS, 3650 CHARLES ST., SUITE K, SANTA
      CLARA, CA 95050 TO STOCK THEM AGAIN AT $50. I GOT 2 FROM
      THEM BUT THEY SAY THEY ONLY HAVE ENOUGH LEFT FOR THEIR 1K
      8008 KIT. SEE P. 102 RE OCT AND 73 MAGAZINE
      P. 87 JUNE.
   D. TRY BILL GODBOUT ELECTRONICS: BOX 2673, OAKLAND AIRPORT,
      CA 94614 $50. SEE AD IN 73 MAG. P. 87, JUNE '74.

2. HOW MANY BUGS ARE THERE IN THE CONSTRUCTION ARTICLE?
   A FEW HAVE SHOWN UP SO FAR. J. TITUS, THE AUTHOR MENTIONS THESE:
   A. CONNECTIONS ON BOTTOM OF BOARD ARE IN PARALLEL. ARRANGE
      BOARDS IN ORDER SHOWN IN BOOK AND WIRE. THEN CUT OUT
      WIRES BETWEEN CONTACTS 9 THRU 16 BETWEEN INPUT MUX AND
      ADDR/MANUAL BOARDS.
   B. ON PAGE 6, 4TH PARAGRAPHS, LAST LINE, IT SHOULD READ "ON
      THE FOLLOWING INSTALL THE B JUMPERS AND RESISTORS
      R1-R4 AND R21."

PLEASE REPORT ANY OTHER BUGS OR CONSTRUCTION PROBLEMS YOU FIND.

3. HOW DO YOU REMOVE AN IC FROM THE PCB Without REMOVING THE
   FOIL TOO? I GIVE UP, HOW? EVEN MOLEX IC SOCKET PIN ARE HARD TO USE
   ON THE MEMORY BOARDS. IF ONLY THE COMPLICATED FOIL PATTERNS COULD
   HAVE BEEN ON THE BOTTOM SIDE INSTEAD OF THE TOP SIDE OF THE BOARDS.

4. WHAT DO YOU DO IF YOU WANT MORE INPUT PORTS?
   A. USE J. TITUS'S BUS IDEA ON PAGE 9 AND 10.
   B. REWIRE THE INPUT MUX BOARD AS SHOWN IN FIG. 1 FOR AN INPUT BUS
      EITHER TRI-STATE OR WIRED-OR.
   C. IF YOU NEED MORE THAN 8 INPUT PORTS, TRY THIS. THE AC COMES OUT
      AT T1 OF MEM CYCLE 2 ON AN INF INSTRUCTION. I BELIEVE IT WILL BE
      LATCHED INTO IC-889. BY INCLUDING THE PROGRAMMING INSTRUCTIONS
      LAI (LOAD IMMEDIATE)
      15 (DEVICE NUMBER)
      INF B (PORT BEING MIMPLEXED)
      AND USING A 7442 OR 74154 TO DECODE THE AC INFO, YOU CAN HAVE AS MANY
      INPUT PORTS AS YOU WANT. (MORE ABOUT THIS IN A FUTURE ISSUE.)

5. HOW DO I CONNECT A TELETYPE? A SCHEMATIC IS SHOWN IN FIG. 2.

6. HOW DO I BUILD A MODEM FOR A CASSETTE RECORDER? A GOOD QUESTION.
   HERE ARE TWO UNTRIED PARTIAL CIRCUITS I'VE FOUND. IF ANYONE HAS BETTER
   INFORMATION, PLEASE GET IT TO US SO WE CAN DISTRIBUTE IT. THIS SEEMS
   TO BE EVERYONE'S TOP PRIORITY PERIPHERAL.

7. HOW CAN I GET HELP OR MORE INFORMATION ON CONSTRUCTING MY MARK-8 OR
   HELP IN DEBUGGING? HEAD OUT TO THE NEAREST ENGINEERING COLLEGE. EVERY
   ONE HAS A WHOLE BUNCH OF MICROPROCESSOR PROJECTS GOING ON AND CAN PROB-
   ABLY HELP YOU OUT WITH DEBUGGING, SOFTWARE, AND ROM PROGRAMMING, ETC.
   LET THE REST OF US KNOW WHAT YOU FIND OUT.
8. WHAT HAVE THE PARTICIPANTS SAID SO FAR?

JIM FRY IS DEVELOPING A CURSOR BOARD FOR TV TYPEWRITER WITH PROGRAMMABLE CURSOR CONTROL AND IS TRYING TO IMPLEMENT AN ELABORATE INTERRUPT CAPABILITY.

GREG HUNTZINGER IS GOING TO USE THE MICRO-8 AND TV TYPEWRITER AS A TV TITLING SYSTEM FOR TV TAPING AND FOR COMPUTER ART.

ROBERT KELLY HAS 2 BAUDOT TTY'S HE WANTS INFO ON USING.

K. A. MCGINNIS WANTS TO OBTAIN CHEAP WIRE WRAP SOCKETS. HE ALSO WANTS TO KNOW IF ANYONE IS INTERESTED IN BUILDING 8008 BASED COMPUTERS. I AM IS ANYONE ELSE?

LAURENCE PLATE IS READY TO WRITE A BASIC AND WANTS TO INTERFACE A TRIG CALCULATOR

TERRY RITTER IS THE FIRST ONE TO SAY HIS MARK-8 IS RUNNING AND HAS SOME NEAT IDEAS ON PERIPHERALS.

LEE SORENSEN SAYS THE SCELBI-8H USER MANUAL (P. 101 HE OCT 74) IS VERY VALUABLE.

JONATHAN TITUS, THE MARK-8 AUTHOR IS GOING TO CONTRIBUTE INFO ON A REMOTE INTERRUPT MODULE AND A 2102 RAM MEMORY. HE ALSO TELLS US THAT HE HAS A CALCULATOR INTERFACE ARTICLE SCHEDULED FOR RE IN THE NEXT COUPLE OF MONTHS.

9. WHAT IS THE CABRILLO COMPUTER CENTER? WE ARE THE EDUCATIONAL COMPUTER INSTALLATION FOR CABRILLO HIGH SCHOOL. WE PRESENTLY HAVE A 4K PDP-8/E WITH A 32K DISK, OPTICAL MARK SENSE CARD READER, 2 TTY'S, A CENTRONICS 508 LINE PRINTER (DUE ANY DAY), A HOMEMADE PAPER TAPE READER AND PUNCH, HOMEMADE OSCilloscope GRAPHICS TERMINAL, AND A HOMEMADE SWITCH RELAY INTERFACE. WE WILL SOON BEGIN EXPANDING TO A PDP-8/E, ETUS 6 USER MULTILANGUAGE OS-8 TIME SHARE SYSTEM. WE WILL HAVE A COUPLE OF HOMEMADE 8008 SYSTEMS RUNNING SOON AND THE EE DEPARTMENT AT UNIV OF CA AT SANTA BARBARA IS INVESTIGATING THE POSSIBILITY OF LOANING US ONE OF THEIR VERY ELABORATE 8008 TRAINING SYSTEMS FOR EVALUATION IN THE HIGH SCHOOL ENVIRONMENT.

10. WHAT CAN WE EXPECT FROM THE NEWSLETTER IN THE FUTURE? NOTHING!!! UNLESS YOU ARE WILLING TO CONTRIBUTE, I AM WORKING ON 1) OBTAINING INFO ON SOFTWARE SOURCES. 2) GETTING PERMISSION TO RELEASE A BUNCH OF INFO FROM LAWRENCE RADIATION LABS. 3) A CONSTRUCTION ARTICLE ON MY SPECIALITY: #75 HIGH SPEED PAPER TAPE READERS. 4) A CONSTRUCTION ARTICLE ON A SCPE GRAPHICS TERMINAL. WE NEED BADLY: 1) MODEM INFO FOR CASSETTE RECORDERS. 2) SOURCES OF TTY'S CHEAP. 3) INFO ON THE RELIABILITY OF VARIOUS DISCOUNT IC SUPPLIERS. 4) CIRCUITS FOR CONVERTING BAUDOT TO ASCII AND VICE VERSA FOR CHEAP TTY'S. 5) MODIFICATIONS TO TV TYPEWRITER TO INCLUDE SCROLLING. PLEASE CONTRIBUTE A FEW MINUTES OF YOUR TIME TO SENG IN ANYTHING THAT OTHER BUILDERS MIGHT BE INTERESTED IN. DON'T LET THIS NEWSLETTER DIE LIKE SO MANY OTHERS HAVE BECAUSE OF THE PARTICIPANTS' RELUCTANCE TO CONTRIBUTE.

GOOD LUCK IN DEBUGGING AND MAY YOUR SOLDER BRIDGES BE FEW AND FAR BETWEEN.

KEEP THOSE CARDS AND LETTERS COMING IN.

HAL SINGER
MARK-8 USER GROUP EDITOR
CABRILLO COMPUTER CENTER
4350 CONSTELLATION ROAD
Lompoc, CA 93436
<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
<th>City, State, Zip</th>
</tr>
</thead>
<tbody>
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<td>216 1/2 AVENUE B</td>
<td>fort DODGE, IOWA 50501</td>
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<td>ANGEL BRAVO</td>
<td>10588 FELSON ST.</td>
<td>BELLFLOWER, CA 90706</td>
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<td>RICK BRENNON</td>
<td>601 SOUTH KNIGHT</td>
<td>PARK RIDGE, IL 60068</td>
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<td>SAN RAFAEL, CA</td>
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<td>15204 RICHWOOD COURT</td>
<td>BROOKEVILLE, MD</td>
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<td>EDWARDS, SPangler,</td>
<td>WYMORE &amp; KLAAS 1700 BROADWAY</td>
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<tr>
<td></td>
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<td>DENVER, CO 80202</td>
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<td>SAN MATEO, CA 94401</td>
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<td>W. S. MILLER</td>
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<td>BURLINGTON, NC 27215</td>
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<td>R. W. MOELL</td>
<td>5505 DAYWOOD CT.</td>
<td>RALEIGH, NC 27609</td>
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<td>TERRY RITTER</td>
<td>DIRECTIONAL ANTENNA CO.</td>
<td>2524 GLEN SPRINGS WAY 78741</td>
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<td>SANTA BARBARA, CA 93109</td>
</tr>
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<td>NEW YORK, NY 10003</td>
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<td>12511 JACKSON</td>
<td>GRANDVIEW, MO 64030</td>
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<tr>
<td>LEE L. C. SORENSON</td>
<td>10226 VICTORIA AVE</td>
<td>WHITTIER, CA 90604</td>
</tr>
<tr>
<td>JAMES UPCHURCH</td>
<td>BOX 1987</td>
<td>SEBRING, FL 33870</td>
</tr>
</tbody>
</table>
FSK DATA CONVERTER FOR CASSETTE RECORDER

A circuit scheme which allows an ordinary reel or cassette tape recorder to be used as a digital data recorder was submitted by Daniel Chin of Burlington, Massachusetts.

"The circuit design allows any single-track audio tape recorder with frequency response to 7kHz to be used as a digital recorder for many non-critical applications. This application provides a complete data recording system using two recorded frequencies on a single track. The two frequencies are obtained from two synchronized NE565S. Detection of the recorded frequencies requires a third NE565. A fourth circuit is used to generate and synchronize the system clock. The advantages obtained by using these techniques are elimination of the need for:

1. A timing channel to strobe off the data, or
2. A third frequency for null, while using the other two frequencies for 1 and 0.

This implementation, therefore, is one of the simplest ways to get a digital recording system on an audio recorder. It is shown in block diagram form in Figure 8–75.

The parameters chosen for the circuit design allow a digital recording bit rate of 800Hz or 100 8-bit characters per second. Though 100 characters per second is less than the 300-character-per-second speed of a high-speed paper tape reader, the low cost of this circuitry combined with the audio tape recorder should make this system very attractive from a cost performance viewpoint. This is especially true when compared with the normal Teletype speed of 10 characters per second.

The circuits will also work with the readily available low cost cassette recorders now available, which make compact as well as low cost information storage. A FSK system of recording is used, which allows the voice recording and reproduction electronics of the recorder to be unmodified for use in recording digital information. The retained electronics may also be used to record voice message identification of the various sections of the tape.

The intended use of this circuit is to convert an audio recorder for minicomputer programs written for engineering design applications. Such an application requires good information storage and retrieval over a wide range of storage time. Redundancy may be incorporated by using a two-channel recorder (stereo) and a FSK detector per channel. The outputs of the two detectors could then be ORed digitally to recovered recorded 1s and, thus, give a safeguard against dropouts.

Circuit Description

Four NE565s are used in three circuits to achieve the design. These are:

The FSK detector (Figure 8–76a) is used to detect 6.4kHz for a 1 and 4.8kHz for a 0. The data output is taken from a 5711 connected to pins 7 and 6 of the NE565. The recording method used is RZ FSK, which means that a zero is recorded as 4.8kHz for the entire bit period and one is recorded as 6.4kHz for about 60 percent of the period and 4.8kHz for the remaining 40 percent of the period. This 60 percent bit duty cycle insures that the clock will synchronize with a negative transition during the time that a 1 should be detected.
PHASE LOCKED LOOP APPLICATIONS

The clock generator (Figure 8–76b) is used to derive the 800Hz with no input. When the data pulses are extracted from the recorded data, the clock is synchronized to the data. The design allows up to 7 zeros in succession without causing the clock to go out of synchronization. This condition is easily met if odd parity is used to record the 8-bit characters. (One of the 8 bits is a parity bit and, thus, one bit out of 8 is always a one.)

The FSK generator (Figure 8–76c) provides the FSK signal for recording on tape. It consists of 2 oscillators locked to the basic 800Hz system clock but oscillating at 6.4kHz and 4.8kHz. The incoming data to be recorded selects either oscillator as the frequency to be recorded. Harmonic suppression of the square wave output is taken care of automatically by the high frequency roll off characteristic of the tape recorder."

filter is formed by connecting a capacitor or an RC network from pin 2 to ground, as shown in Figure 16. The resulting filter transfer functions are also shown in the figure where \( R_1 \) (+6 kΩ) is the internal impedance at pin 2. In this application, pin 3 is ac grounded through a bypass capacitor, \( C_B \), to insure proper ac bypass (\( C_B \geq 10 C_f \)).

In high frequency applications (\( f_s > 100 \) kHz) for FM demodulation, tone detection and frequency synthesis, it is recommended that pin 3 not be bypassed but connected to ground through a low-pass filter identical to that used at pin 2 (See Figures 22 and 23).

Figure 17. Circuit Connection For FSK Demodulation (Single Supply)

Figure 18. Split-Supply FSK Demodulation with RS232C Compatible Output

APPLICATIONS INFORMATION

FSK DEMODULATION

Figures 17 and 18 show a generalized circuit connection for FSK demodulation. The circuit is connected as a PLL system by ac coupling the VCO output (pin 15) to pin 6. The FSK input is applied to pin 4. When the input frequency is shifted, corresponding to a data bit, the polarity of the dc voltage across the phase detector outputs (pins 2 and 3) is reversed. The voltage comparator and the logic driver section convert this dc level shift to a binary pulse. One of the phase detector outputs (pin 3) is ac grounded and serves as the bias reference for the voltage comparator section. Capacitor \( C_f \) serves as the PLL
loop filter, and C2 and C3 as post-detection filters. The timing capacitor, C0, and the fine-tune adjustments are used to set the VCO frequency, f0, midway between the “mark” and “space” frequencies of the input signal. Typical component values for 300 baud (103-type) and 1200 baud (202-type) MODEM applications are listed below:

<table>
<thead>
<tr>
<th>Operating Conditions</th>
<th>Typical Component Values</th>
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<tbody>
<tr>
<td>300 Baud</td>
<td></td>
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<tr>
<td>Low Band: f1 = 1070 Hz</td>
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</tr>
<tr>
<td>f2 = 1270 Hz</td>
<td>R0 = 5.1 kΩ, C0 = 0.22 μF</td>
</tr>
<tr>
<td></td>
<td>C1 = C2 = 0.047 μF</td>
</tr>
<tr>
<td></td>
<td>C3 = 0.033 μF, C4 = 3 μF</td>
</tr>
<tr>
<td>High Band: f1 = 2025 Hz</td>
<td></td>
</tr>
<tr>
<td>f2 = 2225 Hz</td>
<td>R0 = 8.2 kΩ, C0 = 0.1 μF</td>
</tr>
<tr>
<td></td>
<td>C1 = C2 = C3 = 0.033 μF</td>
</tr>
<tr>
<td>1200 Baud</td>
<td>R0 = 2 kΩ, C0 = 0.14 μF</td>
</tr>
<tr>
<td>f1 = 1200 Hz</td>
<td>C1 = 0.033 μF, C3 = 0.02 μF</td>
</tr>
<tr>
<td>f2 = 2200 Hz</td>
<td>C2 = 0.01 μF, C4 = 0.1 μF</td>
</tr>
</tbody>
</table>

Figure 19 shows typical waveforms at different points in the circuit for a 150 baud data rate with “mark” and “space” frequencies of 1270 and 1070 Hz respectively. The top waveform is the phase detector output at pin 2, the middle waveform is the filtered signal at the comparator input (pin 1), and the bottom waveform is the logic output at pin 8.

**RS-232C COMPATIBLE OPERATION (See Figure 18):** For split-supply operation, the logic output section can function as a line-driver circuit, compatible with RS-232C specifications. This can be achieved by connecting a 300Ω series resistance to pin 8, and choosing a pull-up resistor RL in the range of 3 KΩ to 7 KΩ.

**ENABLE/DISABLE CONTROLS:** In FSK demodulation applications, the operation of the circuit can be “inhibited” by applying a disable logic signal to either pins 2, 3 or 5. Application of a negative inhibit pulse to pin 3 introduces a dc offset across the comparator inputs and sets the logic output (pin 8) to a “high” state. If the same pulse is applied to pin 2, then a “low” state occurs at pin 8. Applying either a 3-volt positive or negative “inhibit” pulse to pin 5 disables the phase detector section, and sets the logic output to a “low” state. The enable/disable controls are particularly useful when using the XR-210 in a carrier-level detection system. Here the circuit can be activated only when the input signal exceeds a pre-set threshold value.

**FSK GENERATION**

A typical circuit connection for this application is shown in Figure 20. The coarse setting of the frequency is determined by the choice of C0 across pins 13 and 14. Normally, C0 is chosen to give a free running frequency, f0, approximately 5% lower than the “space” frequency, f1. Then, the “space” and “mark” frequencies f1 and f2 are set by the choice of resistors RT and RX as:

\[
f_1 = f_{\text{space}} = f_0 \left(1 + \frac{0.1}{R_T}\right) \text{ Hz}
\]

\[
f_2 = f_{\text{mark}} = f_1 \left(1 + \frac{0.3}{R_X}\right) \text{ Hz}
\]

where the resistor values are in kΩ. “Space” frequency is set prior to the “mark” frequency with the selection of C0 and the fine-tune resistor, RT, with pin 10 open circuited. “Mark” frequency is then determined by the appropriate choice of RX from pin 10 to ground.

The VCO output available at pin 15 is a symmetrical squarewave with a 2.5 Vp-p output amplitude. The duty cycle asymmetry of the VCO output is typically less than 2%.

**Figure 19. Demodulated Waveforms for 150 Baud Data Rate, f1 = 1070 Hz, f2 = 1270 Hz**

- Top: Pin 2 0.5 V/div.
- Center: Pin 1 5.0V/div.
- Bottom: Pin 8

**Figure 20. Circuit Connection For FSK Generation (<100kHz)**

**Figure 21. High Frequency FSK Generation Using VCO Section Only**
MAIL FOR THE USER GROUP HAS BEEN ARRIVING AT A RAPID RATE. WE NOW HAVE 100 PARTICIPANTS AND 5 TO 10 NEW LETTERS ARRIVE EVERY DAY. IT HASN'T BEEN EASY KEEPING UP, SO THE MAJORITY OF THIS NEWSLETTER WILL BE A ROSTER WITH COMMENTS FROM THE PARTICIPANTS.

#1. BUGS IN CONSTRUCTION ARTICLE OR ON PC BOARDS.
SEE NEWSLETTER #1 AND NOTE THE FOLLOWING:
A) ON LED REGISTER BOARD, C2 GOES FROM B+ TO B+ AND SHOULD GO FROM B+ TO GND.
B) ON ADDRESS LATCH BOARD, THERE SHOULD BE A JUMPER FROM IC1 PIN 5 TO IC2 PIN 1.
C) ON MEMORY BOARDS, DO NOT PUT FRONT TO BACK JUMPERS IN HOLES SHOWN BELOW EVEN THO THE HOLES ARE DRILLED SINCE YOU WILL SHORT OUT THE MEMORY OUTPUT LINES.

#2. SOURCES FOR OBTAINING 8008.
A) BILL GODBOUT - TERRY RITTER WAS VERY PLEASED - SEE ROSTER.
B) RGS ELECTRONICS - $75, SEE ROSTER.
C) ELECTRONIC COMPONENT SALES - VERY QUESTIONABLE, IF THEY EXIST AT ALL. PRESENT INFO INDICATES OPERATOR OF COMPANY HAS 12 ALIASES AND HAS SWINDLED PEOPLE FOR OVER $400,000 BUT SOME MATERIAL IS BEING DELIVERED NOW AND A FEW PEOPLE HAVE REPORTED REFUNDS.
D) M&R ENTERPRISES, P.O. BOX 1011, SUNNYVALE, CA 94088 8008 CPU $60, CPU, ALL RESISTORS AND CAP FOR MARK-8 AND 15 7400'S, $75.
E) ROBERT W. COOK - SEE HIS LETTER IN LAST PART OF NEWSLETTER.
F) SEE MARTIN RESEARCH DATA IN BACK OF NEWSLETTER.
G) JAMES S. HEATON CO, INC. 3772 KATTELLA AVE., LOS ALAMITOS, CA 90720 DISTRIBUTOR FOR MICROSYSTEM INTERNATIONAL'S MF8008R 2ND SOURCE CHIP @ $95 BUT WRITE FOR SINGLE UNIT PRICE.
H) KA COMPONENT SALES - SEE FLYER IN BACK OF NEWSLETTER -- NOTE THAT NEW 8008 CPU PRICE IS $66.
I) ELECTRONIC DISCOUNT SALES, 138 N. 81ST ST., MESA, ARIZONA 8008 CPU FOR $59.45

#3 SOURCES OF OTHER COMPONENTS:
A) SEE S. LIEBERMAN'S APPRAISAL OF HOBBY IC SUPPLIERS IN ROSTER.
B) SEE FLYER PROVIDED BY KA ELECTRONICS IN BACK OF NEWSLETTER.
C) FOR MOLEX CONNECTORS TRY FORCE ELECTRONICS, 343 HINDRY AVE., INGLEWOOD, CA 90301
D) SIGNETICS IC'S, HAMILTON ELECTRO SALES, 10912 W. WASHINGTON BLVD., CULVER CITY, CA 90230, 213-670-7171. WRITE THEM AND YOU WILL NEVER RECEIVE AN ANSWER - TELEPHONE AND YOUR IC'S WILL BE SENT OUT COD UPS THAT SAME DAY.

#4 KITS
IF ANYONE HASN'T BOUGHT PARTS YET, IT WOULD BE WORTH SERIOUSLY EVALUATING RGS ELECTRONIC'S KIT, INFO IN BACK OF NEWSLETTER OR THE SCHELBI, SEE ROSTER AND INFO IN BACK. I'D VERY MUCH LIKE TO SEE THEIR MANUALS BUT AM UNWILLING TO SPEND THE MONEY. IF ANYBODY WOULD LOAN ME A COPY FOR A COUPLE OF DAYS I'D APPRECIATE IT.
OUTSTANDING NEWS
A) A CALCULATOR INTERFACE ARTICLE IS SCHEDULED FOR RE IN SEVERAL
MONTHS BY J. TITUS.
B) A CASSETTE TAPE UNIT FOR THE TV TYPEWRITER (TVT) IS SCHEDULED FOR
THE JANUARY RE BY ROGER L. SMITH.
CASSETTE TAPE INTERFACE
MAYBE MR. SMITH'S ARTICLE WILL SOLVE OUR PROBLEMS. I'LL KEEP COPYING
ARTICLES UNTIL THEN. ROBERT COOK SENT THE REPRINT OF THE SIGNETICS
FSK CIRCUIT AND THE ECONOMY MODEL TAPE SYSTEM CIRCUIT REPRINT.
TTY INTERFACE
ROBERT COOK SENT IN THE CIRCUIT REPRINT INCLUDED. ALSO INCLUDED IS
A REDRAWING OF THE ILLEGIBLE CIRCUIT PRINTED IN THE LAST ISSUE.
STANDARDIZATION
WHAT A TOUGH ONE THIS IS! PLEASE SEND IN ANY AND ALL COMMENTS. IT IS
ESSENTIAL THAT WE GET SOMETHING ESTABLISHED SOON FOR:
1) TTY INTERFACE INCLUDING PAPERTAPE FORMAT
2) TVT INTERFACE
3) CASSETTE TAPE INTERFACE
4) HIGH SPEED PAPER TAPE READER AND PUNCH INTERFACE
5) SCOPE GRAPHICS TERMINAL DRIVER
6) A/D AND D/A INTERFACES
7) SWITCH-RELAY INTERFACE
8) PROGRAMMABLE TIMER
9) ETC
SOME OF THIS WILL BE FORCED BY: 1) INTEL 2) RGS 008A
3) SCHELI COMPUTERS 4) PRO LOG CORP., 852 AIRPORT ROAD, MONTERY,
CA 93930
5) DIGITAL EQUIPMENT CORP., MAYNARD, MASS 01754
6) PLEASE REPORT OTHER MANUFACTURERS USING 8008 CHIPS.
7) LARGE USERS OF 8008 SYSTEMS SUCH AS: LAWRENCE RADIATION LABS,
LIVERMORE, CA
THE PROBLEM IS TO OBTAIN AND SORT THRU ALL OF THIS, SEE HOW IT TIES
IN TO THE MARK-8 AND ESTABLISH SOMETHING QUICK. IT SEEMS THAT THERE ARE
TWO STANDARD CONFIGURATIONS WE MUST DEAL WITH: 1) MARK-8 BUILT EXACTLY
AS SPECIFIED IN THE RE ARTICLE. 2) MARK-8 MODIFIED TO INCLUDE EXPANDED
I/O CAPABILITY.
I'D LIKE TO PROPOSE THE CONFIGURATION SHOWN IN FIGURE 1 AS THE I/O
MODIFIED STANDARD. THIS IS LIKE THE POPULAR CONFIGURATION IN USE BY THE
HUNDREDS AT LAWRENCE RADIATION LABS. THEY HAVE STANDARD MODULES, CHASSIS,
ETC. FOR THIS CONFIGURATION AND AN ENORMOUS AMOUNT OF STANDARD SOFTWARE.
EXAMPLE: A 256 WORD PROGRAM THAT GIVES COMPLETE TTY CONTROL OF THE 8008
FEATURING: OCTAL LOADING OF H & L, 2) EXAMINE AND DEPOSIT FROM KEYBOARD
INTO MEMORY 3) START A PROGRAM IN MEMORY 4) LOAD A PROGRAM FROM
PAPER TAPE (WHO NEEDS A FRONT PANEL?) I HAVE THIS ONE AND AM TRYING TO
GET FORMAL APPROVAL TO RELEASE IT.
ANOTHER CONFIGURATION TO LOOK AT WOULD BE INTEL'S INTELLEC 8. I AM
LOOKING INTO WHAT THEY RECOMMEND AS A STANDARD. LET'S HAVE YOUR IDEAS
QUICK SO WE CAN AGREE ON SOME STANDARDS BEFORE EVERYBODY GOES THEIR OWN
WAY.
THESE SEEMS TO COVER EVERYTHING TO DATE. HOPE YOU WILL BE PATIENT
WITH THE TYING AND THE DUPLICATING. IT IS A VERY TIME CONSUMING JOB
AND WE DON'T HAVE THE BEST EQUIPMENT TO WORK WITH. I HOPE YOU FIND
THE INFORMATION VALUABLE AND AGAIN, PLEASE SEND IN ANYTHING THAT MIGHT
BE OF USE TO OTHERS. I CAN'T PUT OUT A NEWSLETTER WITHOUT YOUR HELP. THE
THE NEXT ISSUE WILL BE ABOUT A MONTH AWAY. I HAVE TO GET BOTH MY
8008 PROJECTS RUNNING PLUS BUILD A PDP-8 SCOPE DRIVER INTERFACE.
IF ANYBODY NEEDS A CROSS ASSEMBLER TO ASSEMBLE CODE ON A PDP-8
LET ME KNOW.

HAL SINGER
MARK-8 NEWSLETTER EDITOR
CABRILLO COMPUTER CENTER
4350 CONSTITUTION
LOMPOC, CA 93436
BILL AMES, 304 MOSHER JORDEN, ANN ARBOR, MICH. 48104 IS A COMPUTER ENGR. STUDENT AT THE UNIV. OF MICHIGAN. HE IS INTERESTED IN A CASSETTE RECORDER INTERFACE, AND WANTS TO MODIFY THE MARK-8 TO USE 16K SO HE CAN WRITE A HIGH LEVEL COMPILER (BASIC, FORTRAN, OR PL/1 SUBSET). HE WOULD LIKE TO KNOW IF ONE CAN SIMPLY INCREASE THE CLOCK FREQUENCY AND SUBSTITUTE A 8008-1. HE PLANS TO DEVELOP A HORSE CODE SENDING AND RECEIVING PROGRAM (HE'S W40WBU); A HIGH PRECISION FLOATING POINT PACKAGE WITH FUNCTIONS, AND EVENTUALLY THE COMPILER. HE WANTS A SOURCE OF VERY CHEAP 1101'S AND DOESN'T MIND FALLOUTS SINCE HE IS GOING TO CHECK THEM WITH THE MARK-8. IN HIS SECOND LETTER, BILL INDICATES THAT 4K IS SMALL FOR A GOOD BASIC (IT TAKES 4K OF 12 BITS IN A PDF-8 SO 6K IN THE MARK-8 IS MORE REALISTIC) BUT HE IS THINKING OF PUTTING THE OP-CODE ONTO A CASSETTE, AFTER EDITING, ORDERING, ETC., POSSIBLE WITH A COMPILE COMMAND. HE WANTS TO KNOW IF IT IS POSSIBLE TO CONNECT A 741 OP AMP SO A POSITIVE SIGNAL WOULD PRODUCE A 1 AND A NEGATIVE ONE A 0 FOR USE IN AN ALPHA-WAVE BIOFEEDBACK ANALYSIS MONITOR, AND WHERE CAN HE GET ROM'S PROGRAMMED.

RON ANGSTADT, RDE 3 BOX 281, KITZTOWN, PA 19530 PLANS TO USE HIS MARK-8 FOR HOME SECURITY, TV GAMES, AND INVENTORY ON FOOD SUPPLIES.

BILL ARNOLD, 216 1/2 AVE. B, FORT DODGE, IOWA. 50501 TEAMS COMMUNICATION SERVICE, SAYS HE CAN FORSEE GREAT USE OF THE MARK-8 WITH HIS BUSINESS OF DESIGN AND MAINTENANCE OF COMMUNICATIONS SYSTEMS AND ANTENNAS.

CRAIG A. BAKER, 1310 PEORIA, APT. 1, AURORA, CO 80011

OTTO BARTH, ELBA TOOL CO., INC., 601 ESTES AVE., SCHAUMBURG, IL 60172 HASN'T STARTED A MARK-8 YET AND WANTS TO KNOW WHERE TO GET RELIABLE COMPONENTS. HE IS A NOVICE IN COMPUTERS AND WANTS SOME SUGGESTIONS AS TO HOW TO GET STARTED. HE WOULD LIKE TO USE THE COMPUTER FOR SCORING AND TIMING SKI RACES.

HARRY B. BATeman, 5638 SOUTH FOX CIRCLE #102, LITTLETON, CO 80120

ANGEL BRAVO, 10333 FELSON ST., BELFLOWER, CA 90706 WANTS TO USE THE MARK-8 TO GAIN EXPERIENCE IN DEVELOPING SOFTWARE.

RICK BRENnan, 601 S. KNIGHT, PARK RIDGE, IL 60068

JAMES CALLAS, SAN RAFAEL, CA 94908 HOPES TO USE THE SYSTEM FOR INFORMATION STORAGE AND RETRIEVAL AND IS PARTICULARLY INTERESTED IN MODEMS AND TAPE STORAGE.

DAVE CHAPMAN, 3420 S. PERKINS RD., MEMPHIS, TN 38118 IS A DRAFTSMAN AND IS KEENLY INTERESTED IN COMPUTER AIDED DESIGN. HE WANTS TO PUT TOGETHER A VERY LOW COST CAD WITH CASSETTE STORAGE, DIGITAL PLOTTER, AND A GRAPHICS DIGITIZER, AND WOULD LIKE TO COMMUNICATE WITH ANYONE WITH SIMILAR INTERESTS.

C. TOM CHILDRESS, JR., 1006 APPLE DRIVE., BICOX, MS, 39532 WILL USE THE MARK-8 AS A DATA HANDLING MACHINE WITH A KEYBOARD, TVI, CASSETTE TAPE, TELEPHONE INTERFACE, I/A AND A/D CONVERTERS. HE PLANS TO USE 1K OF 1101 MEMORY AND THEN INCREASE SIZE IN 4K INCREMENTS USING 2102'S. HE HAS ORDERED THE MARTIN RESEARCH BOOK AND AN 8008.

STEPHEN CiarCia, UNIVERSAL OIL PRODUCTS, 41 HILLTOP DR., WEST HARTFORD, CN 06107 IS AN A/D SYSTEM DESIGNER AND IS RESEARCHING THE 8080 FOR HIS COMPANY AND IS COLLECTING IDEAS FOR HIS OWN 8008 SYSTEM.
ROBERT W. COOK, 25W178 39TH ST., NAPERVILLE, IL 60540 HAS THE AD IN RE
FOR THE 8008. HE IS TRYING TO COLLECT ENOUGH ORDERS TO PLACE A QUANTITY
ORDER.

EDWARD DEGRAFF, 6611 WENZ AVE., APT. O, HODGKINS, IL 60527 PLANS TO
BUILD THE MARK-8 AND CONNECT IT AS AN EXPANSION TO HIS HP-35. HE IS A
CHEMICAL ENGINEER AND HAS APPLICATIONS INVOLVING HEAT AND MASS BALANCES
AND WANTS TO BUILD THE MARK-8 INTO A SUITCASE SO IT CAN BE USED ON SITE.

LARRY, DENISE, 3375 AZTEC RD., APT. 32C, DORAVILLE, GEORGIA 30340

STEPHEN L. DIAMOND, 311 CARL ST., SAN FRANCISCO, CA 94117

CHARLES DITE, 82 DAVID ST., SOUTH RIVER, NJ 08082 SAYS THAT HE IS NEW TO
THE COMPUTER FIELD AND CAN USE ALL THE HELP HE CAN GET. (LET PEOPLE
KNOW WHAT YOU NEED CHARLES, YOU’LL GET LOTS OF HELP.)

BURLTON DORF, 315 OIVINGTON AVE., BROOKLYN, NY 11209 WANTS TO INTERFACE A
CALCULATOR CHIP AND A CASSETTE RECORDER.

CHARLES ECHARD, 7820 JACKSON ROAD, BEAUMONT, TX 77706 WILL USE THE
MARK-8 AS A GENERAL PURPOSE COMPUTER AND FOR DATA ACQUISITION.

PAUL N. EVEN, 4637 ROSEHILL ST., PHILADELPHIA, PA 19120 HAS AN ANTIQUE
REMINGTON TYPEWRITER, AN HP #561B 11 DIGIT PRINTER, AND A PAPER TAPE
PUNCH HE WILL BE INTERFACING AND IS INTERESTED IN BUILDING A PAPER TAPE
READER, OSCILLOSCOPE DISPLAY AND CASSETTE RECORDER. HE IS WILLING
TO TRADE PROGRAMS ON PAPER TAPE. HE SUGGESTS USING 14 PIN DIP SOCKETS
AND WIRE WRAP DIP SOCKETS PIGGYBACK FOR I/O CONNECTIONS (VERY CHEAP),
AND USING THE INPUT MUX CIRCUIT IN FIG. 2A, AND USING OUTPUT
LATCHES TO DRIVE THEIR OWN DISPLAYS AS IN FIGURE 2B.

M. PAUL FARR, 3723 JACKSTADT, SAN PEDRO, CA 90731 IS ETCHING HIS OWN
BOARDS, AND PROVIDED THE 2ND SOURCE 8008 DISTRIBUTOR.

F. DALLAS FOGG, 1385 HIGH STIE DR., APT. 101, ST. PAUL, MN 55121 WANTS
TO USE THE TVT, CASSETTE MAG TAPE, A 256 WORD PROM. HE WANTS INTERRUPT
ADDRESS POINTERS AND A TAPE LOAD ROUTINE IN PROM. AND WANTS TO DEVELOP A
KEYBOARD DEBUGGING ROUTINE, AND A MORSE CODE DECODER WITH ITS DIS-
PLAY ON THE TVT.

JIM FRY, 4249 N. LOCKWOOD, TOLEDO, OH 43612 (DIGI-TEL ELECTRONICS) IS
WORKING ON A PROGRAM TO HANDLE INTERRUPTS WITHOUT LOSING THE REGISTER
OR FLAG INFORMATION AND A HARDWARE REPLACEMENT FOR THE TVT CURSOR BOARD
WHICH WILL ALLOW THE COMPUTER TO INIVIDUALLY ADDRESS ANY CHARACTER OR
LINE IN THE DISPLAY AND READ OR WRITE INTO THAT LOCATION.

FRANK GEHERTY, 826 WILLOWGLEN ROAD, SANTA BARBARA, CA 93105

KEITH GOERING, 720 S. ASHBY, CHANUTE, KS 66720 MENTIONED THE 02 ERROR
ON THE LED BOARD.

DON GOLENSKE, BOX A-375, CAMARILLO, CA WANTS TAPES FOR FORTRAN, BASIC,
AND PL/1 AND WANTS TO USE THE MARK-8 FOR NUMBER CRUNCHING.

DR. GEORGE L. HALLER, 1500 GALLEON DR., NAPLES, FL 33940 USES A SCELBI
COMPUTER AND HAS ORDERED A 33 KO TTY. HE SAYS ACTON TECHNICAL SERVICES,
919 CRYSTAL SPRINGS AVE., PENSACOLA, FL 32505 HAS A SUPPLY OF THESE AT
REASONABLE PRICES. HE ALSO SENT IN THE SORTING PROGRAM IN FIGURE 3.
G. F. HUMM, 4751 LOUISIANA AVE., ST. LOUIS, MO 63111 MENTIONED THE CALLED BOARD ERROR AND POINTED OUT THE JUMPER MISSION ON THE ADDRESS LATCH BOARD.

DON HANCOCK, HANCOCK'S LABORATORY, PO BOX 312, TALLAHASSEE, FL 32303 IS INTERESTED IN TEXT STREAMS, WORD PROCESSING, AND COMPUTER PRINTING OF ACADEMIC MATERIAL.

LLOYD G. HANSON, EE, CONSULTING ENGINEER, LAKELAND INSTRUMENT LABS, ROUTE 2, BOX 52-A, ANGOLA, IN 46703 WANTS TO GET TOGETHER WITH OTHER HAMS IN THE GROUP ON 15 OR 20 ONE DAY AND PASS AROUND INFORMATION (W9YLB). HE MENTIONS DODD DIGITAL DESIGN, 234 WAPLES PARK, FAIRFAX, VIRGINIA 22030 AS A DISTRIBUTOR OF TECHNICAL LITERATURE AND ASCII INTERFACE CARDS. THEIR CATALOG ON "SERIES 100" REQUIRES 50 CENTS IN STAMPS. SEE THE FOLLOWING MOTOROLA DOCUMENT #AN-520: "CRT DISPLAY WITH DYNAMIC MOS RAM." ELECTRONIC DESIGN #19, SEP 14, 72; ELECTRONIC DESIGN #14, JULY 5, 72 PAGE 112; "IMPROVED DOT MATRIX GENERATOR," ELECTRONIC DESIGN, #4, JAN 4, 74, "7X9 CRT DISPLAY." PCB BOARDS CAN BE OBTAINED FROM SEMTRONICS, RT 3, BOX 1, BELLAIRE, OH 43906. NOTE THE MARTIN RESEARCH INFO SUPPLIED BY LLOYD IN THE BACK OF THE NEWSLETTER.

RUDOLF HAUSDORF, 1961 REDONDO AVE., SALT LAKE CITY, UTAH 84108

IRVIN F. HAVENS, 9 HARVEY LANE, WESTBORO, MASS. 01581 DR. HOWARD, ELECTRICAL ENGR. DEPT., UNIV. OF CA, SANTA BARBARA, CA 93106. THEY ARE BUILDING A VERY ELABORATE 8008 BASED TRAINING SYSTEM WITH OCTAL DIGIT INPUT AND OUTPUT. ALL REGISTER INFORMATION BROUGHT OUT DURING WAIT AND HALT, AND A VERY ELABORATE INTERRUPT STRUCTURE.

GREG HUNZINGER, 2332 OAKLAND ST., AURORA, CO 80010 WORKS FOR METRO STATE COLLEGE IN THEIR TV STUDIO AND IS BUILDING THE TV TO INTERFACE WITH THEIR TV SYSTEM. HE WANTS TO ADD CASSETTE TAPE STORAGE SO HE CAN DO ALL KINDS OF WEIRD T'ilTING DURING TAPEING OF A PROGRAM AND WOULD LIKE TO ATTEMPT SOME COMPUTER ART.

J. L. ISENHOWER, PO BOX 7352, LONG BEACH, CA 90807

PRIMUS E. JACKSON, JR., 947 18TH ST., SOUTH, ST. PETERSBURG, FL 33712


JIM KASSEBAUM, RT 3 BOX 517, NEWBERG OR 97132 (TEKTRONIX) WAS THE FIRST ONE TO MENTION THE THRU BOARD JUMPER PROBLEM ON THE MEMORY BOARDS.

EDWARD KELLY, JR. PUBLIC ACCOUNTANT, 300 BARNSTABLE ROAD, HYANNIS, MA 02601

ROBERT W. KELLY, 5805 MT. TERMINAL DR., WACO, TX 76710 HAS ALSO ORDERED THE MARTIN RESEARCH BOOK AND 8008. HE PLANS TO USE THE MARK-8 FOR CALCULATION OF ENGINEERING PROBLEMS AND GENERAL RECORDS. HE AS OBTAINED TWO TI-77/80 TTY'S (BAUDOT) AND WANTS INFORMATION ON INTERFACING THEM.

PAUL LENTZ, 7072 HANOVER PERRY, APT. U-1, GREENSBURG, PA 20770
MIKE LINDSEY, 2405 FAIRGREEN DRIVE, PITTSBURGH, PA 15241, IS AN EE STUDENT AT UNIV. OF PITTSBURGH AND IS DOING SOFTWARE DEVELOPMENT FOR THE MARK-8 BY USING A PDP-10 SIMULATION PROGRAM. HE WOULD LIKE TO SEE CASSETTE TAPE, CORE MEMORY, A FORTRAN IV, AND A TRUE X-Y VIDEO DISPLAY.

DANIEL C. LINGROTH, 35 OFFICER'S COURT, LEWISTON, IDAHO 83843.

LOOMIS LABORATORIES, ROUTE 1, BOX 121, PRAIRIE POINT, MISS. 38953

J. MOCROD, 330 VEREDA LEYENDA, GULF BAY, CA 93017

K. A. McGINNIS, PO BOX 1267, SAN MATEO, CA 94409. WANTS TO KNOW IF ANYONE IS INTERESTED IN 8080'S. He IS BUILDING A SMALLER VERS. OF THE MARK-8 AND WANTS TO INTERFACE A CASS. REORDER. HE MENTIONED KA ELECTRONIC SALES AND COMPONENTS SALES AS POSSIBLE SUPPLIERS.

WILLIAM R. MAINS, 139 - 17TH ST., PASO ROBLES, CA 93446 IS WAITING TILL THE RIGHT TIME TO BUILD UP AN EDUCATIONAL SYSTEM FOR THEIR HIGH SCHOOL USING EITHER AN 8080 OR 8085 MICRO-PROCESSOR.

M & R ENTERPRISES, PO BOX 1011, SUNNYVALE, CA 94086 HAS A 2518, 2518, & 6 EACH OF 2574 KIT AVAILABLE FOR $42/30 & 2008 CPU'S FOR $35 AND IS ATTEMPTING TO PUT TOGETHER A COMPLETE KIT OF PARTS FOR THE TGT.

DAN MARTIN, BOX 653, MALTA, MONTANA 59538 IS A STUDENT IN HIGH SCHOOL AND IS BUILDING THE TVT AND MARK-8. HE HAS A CIRCUIT FOR 8 INPUTS AND 24 OUTPUTS THAT HE WILL SOON SEND IN.

A. F. MASSENBURG JR., 2511 SHALLOWFORD ROAD N.E., APT. 18, ATLANTA, GA 30345

JOHN K. MICHALIS, 58 LATHROP ST., BUFFALO, NY 14212 IS BUILDING A MARK-8 WITH THE TVT AND DESIRE INFORMATION ON BUILDING A CASS. RECORDER.

W. S. MILLER, 2843 WAGNER DR., BURLINGTON, NC 27215 WANTS A MARK-8 WITH A TYPEWRITER AND CASS. TAPE INTERFACE.

R. W. MOELL, 5805 DAYWOOD CT., RALEIGH, NC 27609

DR. JOHN K. NICHOLS, OHIO GUMMET, 10610, PENNSYLVANIA STATE UNIVERSITY, MIDDLETOWN, PA 17057

TOM PARROUSE, 13607 SANFORD, RIVIERA BEACH, FL 33408 IS ORDERING PARTS TO CONSTRUCT A MARK-8 WITH A CASS. RECORDER AND PUNCH. THE PC LIGHTS, CRT, CONSOLE, EXPANDED MEMORY, AND TAPE AND DISK DRIVES.
CABELL A. PEARSE, 3523 TILDEN STREET, N.W., WASHINGTON D.C. 20008 INTENDS TO USE HIS MARK-II AS AN INSTRUMENT CONTROL UNIT AND IS INTERESTED IN ANY UTILITY SOFTWARE ROUTINES AVAILABLE.

LAURENCE L. PLATE, 2325 SKYLINE WAY, SANTA BARBARA, CA 93109 LISTS AS ONE OF HIS PROJECTS THE WRITING OF A BASIC. HE IS NOW SORT OF RETIRED AND WAS THICK IN COMPUTERS IN MILITARY RESEARCH AND DEVELOPMENT. FOR REMOVING IC'S HE SUGGESTS USING KWIh-WICT (SIZE #2), A FINE IRON, AND A PRESSURE CLIP. HE WOULD RATHER USE IC SOCKETS. HE IS WILLING TO ANSWER QUESTIONS ON SOFTWARE PROBLEMS.

LARRY PLESKAC, 938 PAULA ST., ESCONDIO, CA 92027 WOULD LIKE TO SEE A PAPER TAPE PUNCH AND READER, CASSETTE TAPE, A CALCULATOR INTERFACE, AND A GRAPHIC DISPLAY MODE FOR THE TVI. HE IS ADDING OCTAL READOUT DISPLAY, CPU STATE LAMPS, PROCESSOR CYCLE LAMPS, AND FLAG LAMPS TO HIS MARK-II.

TED J. POULOS, 18 CUSHING ROAD, BROOKLINE, MASS. 02146 WILL USE HIS MARK-II TO GAIN PRACTICAL EXPERIENCE IN PROGRAMMING IN ASSEMBLY LANGUAGE. HE HAS BUILT THE TVI AND WANTS TO ADD A CASSETTE RECORDER.

RADIO-ELECTRONICS, SUITE 1105, 200 PARK AVENUE SOUTH, NEW YORK, NY 10003

JOHN G. RAICHE, 10406 - 55TH AVE. SOUTH, SEATTLE WASHINGTON, 98178

DALE REID, 1127 DRAKE ST., MADISON, WISCONSIN 53715

RGS ELECTRONICS, 3650 CHARLES ST., SUITE K, SANTA CLARA, CA 95050 HAS ANNOUNCED THEIR 008A KIT. THEY ARE WORKING ON THE FOLLOWING ADDITIONS: KEYBOARD, (50), CASSETTE RECORDER ADAPTER, TV ADAPTER. PRICE OF THE 008A IS $300 CASH. SEE ENCLOSED SHEET FOR DETAILS. THEY WOULD BE GLAD TO DEMONSTRATE IF YOU WOULD LIKE TO DROP IN. THEY ARE AGAIN STOCKING THE 8008 BUT AT $75. REGARDING RELIABLE SUPPLIERS, RAY STEVENS, THE OWNER, RECOMMENDS HIS OWN COMPANY OF COURSE; & BILL GODDOUT. HE KNOWS OF AT LEAST ONE PERSON THAT GOT BURNED BADLY BY ELECTRONIC COMPONENT SALES. THEY ALSO INCLUDE A 1 YEAR MEMBERSHIP IN THEIR PROGRAM EXCHANGE GROUP WITH THE KIT OR MANUAL ($25) PURCHASE.

R. RILEY, BOX 4310, FLINT, MI 48504

TERRY F. RITTER, VICE PRESIDENT, DIRECTIONAL ANTENNA CO., 2524B OLEN SPRINGS WAY, AUSTIN, TX 78741 FINISHED DEBUGGING HIS MARK-II ON 9 SEPT. HE SUGGESTS USING OUTPUT PORT #5 AS INPUT TO A 74193 PROGRAMMABLE DELAY TIMER. (MORE DETAILS PLEASE). HE IS GOING TO CONNECT A TTY, COMPUTER KEYBOARD, AND CASSETTE TAPE I/O. HE PURCHASED HIS 8008 FROM BILL GODDOUT AND RECEIVED IT IN A WEEK, AIRMAIL, AND WITH A SOCKET. SUSPECTING IT TO BE DEFECTIVE, HE REQUESTED A REPLACEMENT AND IT ARRIVED IN FIVE DAYS, AGAIN BY AIRMAIL. HE COULDN'T BE HAPPIER WITH THEM AS A SUPPLIER. AN ORDER WITH SCALBI HAS BEEN IN FOR A MONTH AND A HALF WITH NO NOTICEABLE RESULTS. HE NOTES THAT IT IS POSSIBLE TO BUILD A BETTER INPUT BOARD BUT HAS NOT FURNISHED A SCHEMATIC AS YET. HE SUGGESTS USING SOFTWARE FOR ASCII TO BAUDOT CONVERSION. HIS LINE OF ATTACK IS: 1) KEYBOARD INTO COMPUTER (DONE) 2) KEYBOARD LOADING AND TTY DUMP SOFTWARE 3) 1K ROM FOR BASIC SOFTWARE 4) CASSETTE TAPE DUMP 5) 12K CORE MEMORY SYSTEM. HE SPENT ABOUT 20 HOURS FULLY DEBUGGING HIS UNIT AND CAN SUGGEST LINES OF ATTACK IF ANYONE ELSE SHOULD HAVE PROBLEMS.

F. B. ROBERTSON, 1406 CREEK HOLLOW DRIVE, SEABROOK, TX 77586

Nolen F. Roberson, 12511 JACKSON AVE., GRANDVIEW, NO 64030. IS A STUDENT AT PARK COLLEGE AND IS USING THIS PROJECT FOR HIS SENIOR LAB. AND RESEARCH PROJECT. HE WANTS TO INTERFACE WITH A CALCULATOR CHIP.
SOLIAL COMPUTER CONSULTING, INC., 1322 KEAR - BOSTON POST ROAD, MILFORD,
ON NOVEMBER 6 OR THEIR BASIC LITERATURE PACKAGE. THEY OFFER KITS STARTING
WITH BARE BOARDS AND GOING ALL THE WAY TO AN ASSEMBLED 4K COMPUTER.
THEY ALSO FEATURE SOFTWARE AND A CRT AND CASSETTE RECORDER INTERFACE.
A COPY OF THEIR INFO SHEET FOR THE CASSETTE RECORDER IS INCLUDED. THEIR
MINIMUM PRICE IS NOW $10. THEIR EXPERIENCE WITH HOBBIIST OUTLET 1101'S
HAS A FAILURE RATE OF 10 TO 40%. ABOUT 80% OF THE FAILURES WERE FOUND
IN NICKING THREE HOURS AFTER TEMPERATURE CYCLING. THE REMAINDER FAILED
LATER, USUALLY WITHIN SEVERAL WEEKS BUT SOME AFTER SEVERAL MONTHS. THEY
SUGGEST THAT IF YOU ARE GOING TO USE CHEAP MEMORY COMPONENTS THAT YOU
HAD BETTER BE READY FOR LOTS OF FRUSTRATIONS. THEY CAN SUPPLY A LIMITED
NUMBER OF INTEL 1101'S IN GROUPS OF 8 CHIPS FOR $45. THEY ALSO CAUTION
THAT IF YOU ARE USING CHEAP IC'S FROM HOBBIIST SUPPLIERS, CHECK THEM BEFORE
YOU SOLDER THEM INTO THE BOARD. TO REMOVE IC'S FROM A BOARD, THEY SUG-
GEST SACRIFICING THE IC BY CLIPPING THE LEADS ON THE TOP OF THE BOARD AND
THEN SUCKING OUT THE SOLDER AND REMOVING LEADS FROM THE HOLES.

GRANT RUNYON, 114A NIRVANA ROAD, SANTA BARBARA, CA 93101 IS BUILDING A
TVT FOR USE IN THE HIGH SCHOOL FOR OFF-LINE PREPARATION OF PROGRAMS TO
BE INPUT TO THEIR DATA GENERAL TIME-SHARE BASIC SYSTEM.

WILLIAM E. SEVERANCE, JR., CENTER LOVELL, MN 55016 IS CURRENTLY BUILD-
ING THE TVT AND EXPECTS TO START THE MARK-8 IN DECEMBER. HIS PLANS
INCLUDE EXPERIMENTING WITH SOFTWARE DEVELOPMENT (HE SPECIALIZED IN
PDF-10 ASSEMBLY LANGUAGE PROGRAMMING IN COLLEGE), AND DESIGN OF ADD-ONS
SUCH AS A CALCULATOR INTERFACE, FSK MODEM FOR AUDIO CASSETTE STORAGE,
AND A PROM PROGRAMMER. HE MENTIONS THAT IT IS VERY IMPORTANT THAT WE JOIN
TOGETHER IN STANDARDIZATION OF I/O AND SOFTWARE FORMAT FOR FULL INTER-
CHANGE OF INFORMATION.

WM J. SCHENKER MD, 1515 NEWELL AVENUE, WALNUT CREEK, CA 94596

RONALD E. SEEBER, 10 B ADAMS ST., AVON PARK, FL 33825

DON SINGER, ROUTE 1, BOX 12388, GASTON, OR 97119

ROGER L. SMITH, SMITH ENTERPRISES, 4502 E. NANCY LANE, PHOENIX, AZ
85040 ANNOUNCED THAT HE HAS AN ADD-ON CIRCUIT BOARD TO BE ADDED TO THE
TV TYPEWRITER TO ENABLE ONE TO TRANSMIT AND RECEIVE DATA AS WELL AS REC-
CORD IT ON A CASSETTE TAPE RECORDER. THE RECORDING FEATURE WOULD BE
HANDY IN CONJUNCTION WITH A MARK-8 AS A BULK STORAGE MEDIUM. IT IS
SCHEDULED FOR THE DECEMBER RE.

LEE L. C. Sorenson, 1026 VICTORIA AVE., WHITTIER, CA 90604 FOUND THE
SCELBI-88 USER MANUAL VERY VALUABLE ($10 FROM SCELBI). HE ALSO MENTIONS
THE FIRST OF A TWO PART 1978 ARTICLE IN ANALYTICAL CHEMISTRY, VOL 46, #11,
PAGE 2174 SEPT. 78.

WAYNE SPIGGEN, 1820 SE 2ND PLACE, GRESHAM, OR 97030

PETER SPERRY, BOX 1927, HUNTER COLLEGE, 695 PARK AVENUE, NY, NY 10021
IS PRESENTLY INVOLVED IN BUILDING A MARK-8 FOR USE IN A CHEMICAL INSTRU-
MENTATION CLASS. HE IS GOING TO INTERFACE A SILICON LD10-11 A/D
CONVERTER. HE SPOTTED A CASSETTE RECORDER TO ITS INTERFACE IN A RECENT
ISSUE OF ELECTRONICS.
E. KENNETH TAYLOR, COMMUNICATIONS CONSULTANT, W&WT, 8528 WEST HARGIS ST., LOS ANGELES, CA. 90034 IS STILL HAVING TROUBLE FINDING TVI PARTS AND IS STARING TO ACQUIRE MARK-X PARTS.

JONATHAN A. TITUS, TITUS LABS, P.O. BOX 242, BLACKSBURG, VA 24060 HAS A CALCULATOR INTERFACE SCHEDULED FOR USE IN THE NEXT COUPLE OF MONTHS AND IS WILLING TO CONTRIBUTE SOME ITEMS SUCH AS A REMOTE INTERRUPT MODULE, EXPANSION OF MEMORY USING 2102 RAMS AND AN ASYNCHRONOUS ITY INTERFACE. HE IS PARTICULARLY HAPPY SO MANY PEOPLE HAVE ACTUALLY UNDERTAKEN CONSTRUCTION OF THE MARK-X. HE HAS A VERY INTERESTING MICRO-PROCESSOR ARTICLE IN EDN. AUG 20, 74, "HOW TO DESIGN A MICRO-PROCESSOR BASED CONTROLLER SYSTEM."

JAMES UPCHURCH, BOX 1987, SEERING, FL 32870 WANTS A GOOD SOURCE OF MOLEX CONNECTORS.

CPT. MACK C. WARD JR., 3215 BARKSDALE RD., FAYETTEVILLE, NC 28301 HAS COMPLETED SOME RESEARCH ON BCU ALGORITHMS THAT HE WILL PROVIDE TO THE GROUP. HE INTENDS TO USE THE MARK-X FOR TINKERING FOR THE MOST PART. HE IS NOW DEVELOPING A SOFTWARE ROUTINE FOR HANDLING HIS END OF THE MONTH BILLS AND IS WORKING ON A LEAST SQUARES REGRESSION ANALYSIS PROGRAM.

KIRK WARREN, 5025 THACHER ROAD, OAKLAND, CA 94603

P. S. WEISS, 1020 WASHINGTON BLVD., OAK PARK, IL 60302

DARRELL D. WOOD, 1404 S. 57TH ST., MILWAUKEE, WIS. 53214 IS PLANNING ON SENDING US SOME DIAGRAMS AND PLANS FROM OTHER BOOKS THAT DEAL WITH X-Y PLOTTERS AND STRIPE RECORDERS. HE IS WORKING ON A CHEAP X-Y PLOTTER.

MAX L. WYMORE, EDWARDS, SPANGLER, WYMORE & KLASS, ATTORNEYS AND COUNSELORS, 1200 UNITED BANK CENTER, 1700 BROADWAY, DENVER, CO 80202
Figure 1A

(I/O Instr Assignments

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<th>INP2</th>
<th>105</th>
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<td>107</td>
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<td>133</td>
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<td></td>
<td>Flags</td>
<td>INP3</td>
<td>107</td>
</tr>
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</table>

0 For Other Devices

Flag Assignments

DA TP MT | TTV Rec | TTV En
Figure 18: TTY Interface
(See also Fig 1A)

Order COM 2502 from
Energy Electronic Products Corp
6060 Manchester Ave
LA, CA 90045 for $13.20

or Celestial Electronics
1618 James St
Syracuse, NY 13203 for $9.95

Note: See Page 5 for an updated diagram.
Figure 2A  Paul Even's Input Multiplexer Circuit

Figure 2B  Paul Even's Output Display Driver

Figure 3  Dr. George Haller's Sorting Program

```
000 000 056  LHI
001 001  
002 066  LLI
003 000  
004 026  LCI
005 0XX  One less than number of numbers
006 307  LAM
007 240  NDA sets C Flag
010 060  INL
011 277  CPM
012 140  JTC
013 030  
014 000  
015 021  DCC
016 110  JFZ
017 006  
020 000  
021 377  hlt
030 317  LBM
031 061  DCL
032 307  LAM
033 371  LBM
034 060  INL
```
DELIVERY—Microcomputer Design is scheduled for publication on October 15, 1974. Prepublication orders will be shipped postpaid on that date, by United Parcel Service (by mail in non-UPS areas). Orders received after October 15 will normally be shipped within five days of receipt.

8008 OFFER—As advertised, one 8008 microprocessor is included with the book at a special promotional price, which is competitive with the price usually paid for the 8008 alone. The MF8008R supplied is manufactured by Microsystems International, Ottawa, Canada, and is identical to the Intel part. (See second-source announcement in the Electronic Design survey of microprocessors, September 7, 1974, page 84.) Each chip is tested and guaranteed. An 8008 manual will be shipped to purchasers with the book.

EARLY 8008 SHIPMENT—A person who orders Microcomputer Design before the publication date, October 15, 1974, and who wishes to receive the 8008 in advance, can make arrangements for early shipment of the microprocessor. Advance payment for the book, at $100.00, will be required.

CONTENTS OF THE BOOK—See the CHAPTER OUTLINE. The book is an original work, going far beyond the materials available from the microprocessor manufacturers. Release of the book, or sections thereof, before the publication date is not possible. Microcomputer Design is a copyright publication protected under the laws of the United States.

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Martin Research Ltd. is not authorized to sell the 8008 microprocessor alone. The price for the book-plus-8008 combination is the same for quantity orders as for single orders. In computing quantity rates on books, credit is given to copies of the book previously bought by the same purchaser. Prices subject to change without notice. Non-exempt Illinois purchasers, please add 5% state sales tax. Terms: for recognized corporate purchasers, net 30 days. Martin Research reserves the right to request prepayment, or to delay shipment pending clearing of checks.

FURTHER QUESTIONS—Please do not hesitate to contact Martin Research.

OTHER SERVICES—Martin Research is available for consultation services involving microcomputer design.

Martin Research will be introducing a microcomputer module suitable for instruction, breadboarding, and prototyping in the fourth quarter of 1974. Contact us for details.

THANK YOU for your interest in MICROCOMPUTER DESIGN.
1. INTRODUCTION
What a microcomputer is and how it is used. Why microprocessor applications are growing. Cost of microprocessors as compared to random logic designs. Focus of this book: practical microcomputer design, with examples and schematics.

2. THE 8008 CPU

3. THE 8080 CPU
Description. Speed, added capabilities of instruction set. Comparison with 8008 for cost-effectiveness.

4. OTHER CPUs
General descriptions of other currently available microprocessors.

5. 8008 MAIN TIMING LOGIC
Block diagram of full microcomputer. CPU clock design.* State decoding techniques.* Cutting manufacturer's prototype CPU chip count 20-50%.*

6. BUS STRUCTURES
Bidirectional bus drivers: advantages for systems design.*

7. MICROCOMPUTER INPUT/OUTPUT TECHNIQUES
Input multiplexer design.* Bus-structured input design.* I/O strobe lines.* Peripheral strobe decoding techniques.*

8. INPUT DESIGN APPROACHES
Three-state devices.* Inputs from FIFOs; using FIFOs to absorb data bursts; interfacing to microprocessor.* UARTS.* Conditional input concepts.* Expanding number of input ports.*

9. OUTPUT DESIGN APPROACHES

10. COMBINED INPUT/OUTPUT TECHNIQUES
When an input is an output. Table lookups.* Byte-swapping techniques.*

11. ADDING INSTRUCTIONS TO 8008
Simple hardware to provide one-byte 8008 instructions: output any register with one byte.* One-byte WAIT instruction.* SIN, COS, SQUARE ROOT instructions.*

12. EXPANDING 8008 CAPABILITIES

13. RANDOM ACCESS MEMORY
Design and cost criteria. Static RAMs.* Dynamic RAM.*

14. READ-ONLY MEMORY (ROM)
Comparison of types; suitability in different applications. Field-programmable ROMs for system characterization.* ROM programmers.*

15. DIRECT MEMORY ACCESS
Floating memory address lines.* Keeping track of external addresses. Avoiding interference with normal program flow.

* SCHEMATIC DIAGRAMS INCLUDED.
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* SCHEMATIC DIAGRAMS INCLUDED.
THIS IS AN INTERFACE THAT ALLOWS THE USER TO UTILIZE A LOW COST AUDIO TAPE CASSETTE RECORDER AS A PERIPHERAL DEVICE FOR STORING PROGRAMS OR DATA FOR THE SCHELBI-8H MINI-COMPUTER. THE DATA OR PROGRAMS CAN THEN BE RELOADED BACK INTO THE MEMORY OF A SCHELBI-8H WHENEVER DESIRED. THE SYSTEM IS ABOUT FIVE TIMES FASTER THAN A TYPICAL TELETYPE PAPFP TAPE SYSTEM. IT THEREFORE INCREASES THE EFFICIENCY WITH WHICH PROGRAMS CAN BE LOADED INTO THE COMPUTER, OR SAVED FOR FUTURE USE. THE LOW COST OF THE UNIT MAKES IT AN EXTREMELY ATTRACTIVE ADDITION TO ANY SCHELBI-8H MINI-COMPUTER SYSTEM.

TECHNICAL INFORMATION

THE SCHELBI AUDIO MAGNETIC TAPE INTERFACE UTILIZES AN ASYNCHRONOUS RECORDING TECHNIQUE THAT GREATLY SIMPLIFIES THE RECORDING AND PLAYBACK PROCESS WHILE SIGNIFICANTLY INCREASING THE RELIABILITY OF THE SYSTEM.

IN THE RECORDING MODE THE INTERFACE ACCEPTS 4 BITS (HALF OF A SCHELBI-8H WORD) IN PARALLEL FROM AN OUTPUT PORT AS DATA BITS FOR TRANSMISSION TO THE TAPE RECORDER. TWO ADDITIONAL BITS ON THE SAME OUTPUT PORT (OF THE REMAINING 4 AVAILABLE) ARE USED TO CONTROL OPERATION OF THE INTERFACE/TAPE RECORDER. ONE OF THESE TWO BITS IS USED TO ACTIVATE A SMALL RELAY ON THE INTERFACE CARD. THE CONTACTS OF THE RELAY MAY BE USED TO AUTOMATICALLY START OR STOP THE TAPE RECORDER. THE SECOND BIT INFORMS THE INTERFACE WHEN IT IS TO GO TO THE WRITE MODE.

WHEN THE INTERFACE RECEIVES THE 4 DATA BITS TO BE WRITTEN ON THE TAPE RECORDER, THE INTERFACE ADDS A "START" BIT TO THE DATA AND THUS TRANSMITS A GROUP OF 5 BITS OF INFORMATION (START BIT PLUS 4 DATA BITS) TO THE TAPE RECORDER USING A TWO-TONE FSK TECHNIQUE AT A NOMINAL RATE OF 650 BAUD. THE FSK TONES ARE NORMALLY 1300 HZ FOR A "0" AND 2600 HZ FOR A "1" CONDITION. DURING THE TIME THAT THE DATA IS BEING SERIALLY TRANSMITTED TO THE TAPE UNIT, A CONTROL SIGNAL GOING TO AN INPUT PORT OF THE SCHELBI-8H COMPUTER IS USED TO INFORM THE COMPUTER THAT THE INTERFACE IS "BUSY." WHEN THE DATA HAS BEEN TRANSMITTED THE BUSY FLAG IS CLEARED AND THE INTERFACE IS READY TO ACCEPT THE NEXT 4 BITS FROM THE COMPUTER.

THE INTERFACE ALSO CONTAINS A DELAY CIRCUIT THAT ENABLES THE TAPE RECORDER UNIT TO REACH NORMAL OPERATING SPEED BEFORE THE FIRST GROUP OF BITS IN A BLOCK OF DATA ARE TRANSMITTED.

IN THE RECEIVE MODE THE INTERFACE ACCEPTS DATA IN ASYNCHRONOUS SERIAL FASHION. DATA COMING FROM THE TAPE RECORDER IS FFTD TO A FSK DISCRIMINATOR. THE OUTPUT OF THE DISCRIMINATOR IS FILTERED, SHAPED, AND LEVEL SHIFTED TO PROVIDE A "TTL" SIGNAL TO ONE LINE OF AN INPUT PORT ON A SCHELBI-8H. THIS LINE IS NORMALLY ON THE SAME INPUT PORT AS THAT USED TO RECEIVE THE "BUSY" FLAG. IN THE RECEIVE MODE A TYPICAL TAPE READ PROGRAM CHECKS THE INPUT DATA LINE UNTIL IT DETECTS A START BIT. AFTER THE START BIT HAS BEEN DETECTED APPROPRIATE DELAYS ARE USED TO ALLOW PROPER SAMPLING OF THE NEXT 4 DATA BITS. THE 4 DATA BITS ARE ORGANIZED INTO HALF A SCHELBI-8H WORD AND THE PROCESS REPEATED UNTIL A BLOCK OF FILE OF DATA HAS BEEN RECEIVED AND PLACED IN MEMORY. STANDARD SCHELBI PROGRAMS USE A "CHECK-SUM" TECHNIQUE TO VERIFY THE RECEPTION OF CORRECT DATA. THE USE OF THE VERY SHORT LENGTH BIT GROUPS IN AN ASYNCHRONOUS FASHION COMPENSATES FOR SIGNIFICANT VARIATIONS IN TAPE SPEED WHICH IS OFTEN A PROBLEM WITH LOW COST TAPE RECORDERS AND MAKES
THE SCHELHI AUDIO MAGNETIC TAPE SYSTEM A REMARKABLY RELIABLE AND YET LOW COST METHOD FOR STORING AND RETRIEVING PROGRAMS OR DATA.

THE INTERFACE CIRCUITRY IS CONTAINED ON TWO PRINTED CIRCUIT CARDS MEASURING 4 1/2 BY 6 1/2 INCHES THAT PLUG INTO 22 PIN P.C. SOCKETS. THE UNIT IS PACKAGED IN AN ALUMINUM MINI-BOX WITH TWO 11 PIN MALE I/O CONNECTORS AND APPROPRIATE CONNECTORS FOR POWER. POWER REQUIREMENTS ARE APPROXIMATELY 250 MA. AT +5 VOLTS. THE POWER SHOULD BE DERIVED FROM THE SAME SOURCE AS THAT USED BY THE SCHELHI-KH MINI-COMPUTER.

THE INTERFACE REQUIRES ONE SPECIAL "SYNC" SIGNAL FROM THE SCHELHI-KH MINI-COMPUTER. THIS SIGNAL IS NORMALLY ROUTED FROM THE COMPUTER THROUGH A SPARE PIN ON THE INPUT PORT I/O CONNECTOR THAT IS USED WITH THE INTERFACE.

TYPES OF RECORDERS TO USE WITH THE INTERFACE

THE SCHELHI AUDIO MAGNETIC TAPE INTERFACE HAS BEEN DESIGNED TO OPERATE WITH LOW TO MEDIUM COST CASSETTE TAPE RECORDERS THAT HAVE THE FOLLOWING MINIMUM SPECIFICATIONS: CAPSTAN SPEED CONTROL WITH MAXIMUM VARIATION OF PLUS OR MINUS 5%, FREQUENCY RESPONSE PLUS OR MINUS 3 DB OVER THE RANGE OF 300 TO 6000 HERTZ, AN AUXILIARY INPUT FOR RECORDING AND AN EARPHONE JACK FOR PLAYBACK. AS AN OPTION, RECORDERS THAT ALLOW A BUTTON ON A MICROPHONE TO BE USED TO START AND STOP TAPE MOTION, AND THAT HAVE A SUBMINIATURE JACK PROVIDED FOR THIS FUNCTION, CAN BE USED WITH THE RELAY PROVIDED ON THE SCHELHI INTERFACE TO PLACE THIS FUNCTION UNDER CONTROL OF THE COMPUTER. IN ADDITION, RECORDERS WITH A MANUAL "RECORD VOLUME" CONTROL ARE PREFERRED OVER THOSE WITH AUTOMATIC RECORD GAIN CONTROL AND RECORDERS WITH CONTINUOUSLY ADJUSTABLE TONE CONTROLS ARE PREFERRED OVER THOSE THAT HAVE NO TONE CONTROL, OR THAT HAVE SWITCH SELECTED TONE RANGES. THESE TONE AND GAIN CONTROLS CAN OFTEN BE USED TO "PEAK" A RECORDING UNIT SO THAT THE BIT ERROR RATE IS AT A MINIMUM.

IN ADDITION, A GOOD QUALITY CASSETTE TAPE SHOULD BE USED WHENEVER THE RECORDER IS USED FOR STORING DATA OR PROGRAMS.

IT SHOULD BE NOTED THAT THE SCHELHI-8H AUDIO MAGNETIC TAPE INTERFACE DOES NOT REQUIRE ANY MODIFICATIONS TO THE TAPE RECORDING UNIT - WHEN THE RECORDER IS NOT BEING USED WITH THE SCHELHI-8H MINI-COMPUTER IT CAN BE USED AS A GENERAL PURPOSE TAPE UNIT.

SINCE THE QUALITY OF THE CASSETTE TAPE AS WELL AS THAT OF THE TAPE RECORDER WILL HAVE AN OVER-ALL EFFECT ON THE RELIABILITY OF THE TAPE SYSTEM, IT IS VIRTUALLY IMPOSSIBLE TO SPECIFY A BIT ERROR RATE FOR SUCH A SYSTEM. HOWEVER, EXTENSIVE TESTING AND USAGE OF A VARIETY OF TAPE RECORDERS COMMONLY AVAILABLE IN THE $50.00 TO $75.00 RANGE HAS SHOWN THE SYSTEM TO BE REMARKABLY RELIABLE FOR THE COST AND QUITE ADEQUATE FOR THE PURPOSES FOR WHICH IT WAS DESIGNED. BIT ERROR RATES ARE TYPICALLY IN THE RANGE OF 1 IN 100,000 TO 1 IN 1,000,000. THE USE OF "CHECK-SUM" TECHNIQUES ALLOWS THE OPERATOR TO VERIFY THE CORRECT READING OF BLOCKS OF DATA. THE ADDITION OF SOFTWARE ERROR CORRECTING TECHNIQUES CAN FURTHER INCREASE THE OVER-ALL RELIABILITY OF THE SYSTEM IN SPECIAL APPLICATIONS.

A BLOCK DIAGRAM OF THE SCHELHI AUDIO MAGNETIC TAPE INTERFACE IS INCLUDED FOR REFERENCE.
BLOCK DIAGRAM

SCELBI AUDIO TAPE INTERFACE
Home tape recorder stores binary data

With just two simple circuits—one a voltage differentiator, the other a Schmitt trigger—you can use an ordinary tape recorder to record or play back binary data.

In the diagram the differentiator removes the low frequency and dc components of the binary data to be recorded and transforms the data to a series of positive and negative pulses. The values of R1, R2 and C1 were chosen to match the input impedance of the recorder and to minimize data-source loading. The time constant of the differentiator, (R1 + R2)C1, is about one-fourth of the bit time.

Zener diodes Z1 and Z2 force the amplitude of the recorded information to be essentially constant.

The Schmitt trigger, containing Q1 and Q2, differentiates between data pulses and any ringing in the waveform. Potentiometer VR1 is adjusted for the particular tape recorder to detect only the peaks and valleys in the playback waveform corresponding to bit edges. Transistor Q3 and associated components serve as a buffer between the Schmitt trigger and the output. The opposite polarity signal may be obtained at the output simply by connecting R8 to the collector of Q2 instead of Q1.


Dear Inquirer:

I placed an ad in Radio Electronics offering an Intel 8008 for $80 because I have an opportunity to obtain 8008's at a quantity price if I can obtain a few more people who are interested. If you are interested in placing an order for one through me, you may do so in one of the following ways. First you may send me $80 and as soon as I have the chips I will send yours to you postpaid and insured. Second you may send me an order and request that it be sent to you COD, in which case the price will be $88 in addition to which you will have to pay the COD fee when it arrives, which I understand is about $1. I would much prefer to have cash orders and would also be willing to discuss a further discount on quantity orders.

I can provide no warranty in addition to that provided by Intel, however that should be sufficient and I will assist you if necessary to obtain satisfaction. I also cannot assure delivery of the 8008's in the event that there are insufficient orders, however since only a few are necessary it seems as if there will be no problems. I hope to place an order by October and I will keep you notified of any developments if you place an order. I hope we can be of mutual benefit to each other.

Sincerely,

Robert W. Cook

25W178-30th Street
Naperville, Illinois 60540
Interfacing a teletypewriter with an IC microprocessor

by Steven K. Roberts
Cybertronic Systems, Louisville, Ky.

The lengthy software service routine generally required to interface a teletypewriter and an IC microprocessor, such as the Intel 8008, can be eliminated by the circuit shown here. A shift register and some control logic are all that it takes, bringing total component cost to only about $6.50.

In the 8008 system, synchronization with the central-processing unit is accomplished through this microprocessor's READY line, making modification of the teletypewriter itself unnecessary. The hardware configuration given in the figure is designed for a 10-character-per-second Model 28 Teletype, which uses the five-level Baudot code. If the intended application will not easily accommodate data storage in the Baudot code, conversion may be accomplished with a read-only memory, such as National's MM5221TM. (A Model 33 Teletype presents no decoding problem.)

During the time that the input parallel data is valid, the circuit receives the START pulse, which sets the BUSY flip-flop and takes the READY line low. The BUSY flip-flop also removes the reset from the cycle counter and enables the LOAD flip-flop, which is set on the next clock pulse. This action loads the data at the input to the shift register and increments the cycle counter once.

On the succeeding clock pulse, the ENABLE flip-flop is set, and the data in the register begins to shift to the right. For each shift pulse, the cycle counter is incremented by one until it reaches a binary count of 8. Then, the BUSY and ENABLE flip-flops are both reset, and the READY signal is restored to the microprocessor so that the central-processing unit can resume operation.

In the data character presented to the shift register, bit H, which is constantly held low, corresponds to the teletypewriter START pulse. Similarly, the register's A and B bits are tied high, corresponding to the teletypewriter STOP pulse. Since the STOP signal must be applied to the teletypewriter for approximately 1.5 times longer than the other pulses, the BUSY flip-flop is reset on the falling edge of the clock, during the time that bit A is present at the register's QH output. The serial output of the register switches the 60-milliampere teletypewriter current loop through the transistor.

The clock signal for the circuit is derived from the IC timer that is free-running at approximately 75 hertz. For teletypewriters that operate at 6 characters per second, the clock frequency should be about 45.5 hertz.

Software bypass. Digital interface circuit provides synchronization between a teletypewriter and a microprocessor chip through the latter device's READY line. Normally, a long software routine is needed to make the interface. The input data is in the parallel Baudot code, and the output is for a 10-character-per-second teletypewriter. A free-running IC timer is used to produce the clock signal.
The RGS Electronics 008A Microcomputer Kit includes everything necessary to build the computer EXCEPT the cabinet, screws, nuts and assorted hardware, and the line cord and fuses. At this time, the kit is built on a 60-socket wire-wrap board measuring 8⅛" x 7⅛" x 1 1/8"; in the future, it will be built on p.c. boards. The manual for the wire-wrapped kit includes information on where to obtain wire-wrap tools and wire.

The kit includes the 8008 CPU chip, and either 2102's or 2602's for the memory, which is 1024 x 8 bits and is expandable. The kit also includes all the other TTL IC's necessary to the operation of the kit, and all the power supply parts except the fuse. The power supply is capable of +5 volts at 5 amps maximum, and -9 volts at 60 milliamps. The front panel LEDs and switches are also provided.

The front panel on a working 008A can be used to load memory and to debug programs. The manual contains, in addition to all the construction information, a short course on programming the 8008, and directions for interfacing to most peripheral devices. The 008A kit has an I/O bus, instead of the arrangement of I/O ports more usual with the 8008. This bus will handle up to 256 peripheral devices; the I/O instructions have been changed to reflect this change in structure.

The manual includes membership for one year in a software exchange program: we send you any new programs we develop, and you the users send us any programs you develop; we will act as a clearinghouse, making all the programs available to everyone. This service is available with purchase of the manual alone, as well as with the computer kit.

PRICES

008A Microcomputer Kit $375.00
(We offer a 20% discount on orders over $250.00, so the actual price for cash is $300.00.)

008A Microcomputer Manual $25.00
(Cost of manuals purchased separately may be applied to the cost of kits purchased later, without a manual.)

ORDER FROM: RGS Electronics, 3650 Charles St., Suite K, Santa Clara, California 95050, Telephone: (408) 247-0158

NO C.O.D.s!
I hadn't planned to do another newsletter for several more weeks but mail has been coming in so rapidly that I have to or I'll never keep up. We now have over 180 participants. Who knows how much bigger it will become?

**Bugs** - Page 4 input mux parts list should read C1,3,4 0.1 MF disk C2 100 MF 10 volt electrolytic (by Robert Cook) IC3 on CPU board has no ground. Connect insulated wire from pin 4 to ground rail and check for change-state output on pins 10 and 11. (I'm not sure I understand this one.) In connecting the bus, notice that foil does not connect all of the inner and outer holes. (By Terry Ritter)

Address for Martin Research, 1825 S. Halsted St, Chicago, IL 60608

Sources for 8008 and other parts - no new ones have appeared. We have reached a size where our organization should be able to get a very attractive quantity discount on common items we all need such as 8008 and 8080 chips, memory chips, etc. Robert Cook is already into this. Perhaps he will check it out in detail and let us know what we can do.

Outstanding news - Steve Ciarcia has designed and tested a four chip modification to TVT to add complete scrolling capability. The circuit is now in the mail and will be published in the next newsletter.

Don Singer, Forest Grove High School, Forest Grove, Oregon has a basic cross assembler that runs on a data general time share basic system and could be easily modified for other basics.

Articles worth looking up - "Microcomputers--From the Users Viewpoint" by Hyman Olken, Research/Development, Oct 74 describes the Lawrence Radiation Labs 8008 system of modules and their use at the labs.

Comments from current participants

---------------------------------------------

Steven Ciarcia has developed the scrolling system for TVT, promises to put together a cassette recorder interface that will really work using a system called Harvard Biphase and he will be developing a spacewar gaming system.

Dave Chapman sent a copy of MP Publishing Co., Box 378 Belmont, Mass 02178 articles ECS-2 ($2.50) on an audio cassette mass storage system. Unless I didn't get the whole thing, it would appear nearly impossible to get a running unit from the Info There. ECS-6 is supposed to be a tape controller but isn't published yet. He wants to know where he can find a cheap digital plotter (I'd like to know where to find cheap stepping motors?) and wants to build a TV graphics terminal with vector and character generators. He included an ad for zipper, a cassette system by Progressive Systems, 215 FIRST STREET.

Robert Cook has placed his first quantity order for 8008s and should be delivering them by now. He is still accepting orders at $80. He is interested in 8080s (please find out how much they would cost us in a quantity order. Robert.)
James Fry ordered an 8008 from Electronic Discount Sales and their price has gone up to $69.45. He says they were very slow. Also stay away from Hap as advertised in PE as $2.00 gets you nothing. He wants to know if anybody can comment on KGS's book. He was very impressed with MP Publishing's first two efforts and recommends James Electronics, P.O. Box 822, Belmont CA 94002 as fast. James will meet any competitor's prices if the ad is sent in and promises 3-5 day delivery on most unlisted ICS. He is still working on his TVT modifications and his description gives it all the features of a Hazeltine 3000. He made some boards that can be used for module development with the TVT since they accept the same molex connectors and have pads for 16 ICS. He can get more made for $3.00 each. He suggests that we all send letters in to thanking them for the TVT and Mark-8 articles and suggest they have more and a regular computer column.

Maury Goldberg will soon finish his Mark-8 and will interface it with a floppy disc and an intelligent terminal he owns. His part time business is liquidating manufacture's excess inventories. He has a lot of parts for the Mark-8 available. Write him at Syracuse Management Services, 1618 James Street, Syracuse, NY 13303. He wants to know if there is any interest in a kit of parts.

Dan Golenskie is interested in 8080's. He says 2107A-8 4K RAM's are priced at $12 each in lots of 100. Can anyone design the refresh clocks etc.?

Robert Kelly is in favor of the Lawrence Rad Labs Tri-State Input Bus Configuration.

Sumner S. Loomis, Loomis Labs is assembling a Mark-8 which will be used as a programmable control center for another computer that uses CMOS logic and 4 calculator chips. It will be interfaced with an analog computer, digital voltmeter, 11 x 17 plotter, Bowmar printer, baudot tty, IBM card read and several cassette recorders. He promises to contribute some of this information soon. He has some comments on the memory board. Use molex socket pins and stand them up as far from the board as possible. Do not install the thru board wires until you have checked each row of memory sockets for shorts and inspect every joint with a 10 power magnifying glass. Trying to debug a memory with software is a long, hard, (& intermittent) road.

Ken A. McGinnis wants everyone to get together and agree on a memory element such as the 2602 so we could order enough to get the price down. The Intel 8212 8 bit latch would be neat to. He also sent a price information list from Control Logic, Inc for their 8008 modules distributed by Inter-Link Systems, P.O. Box 517, Cupertino, CA 95014. These are the Lawrence Rad Lab modules. Write for literature.

Tom Parouette is excited about 8080 systems and is in the planning stage of a punched card reader and/or punch. He is pleased with solid state systems as a supplier.

Cabell A. Pearse suggests solid state systems for IC sockets, B&F for wire-wrap wire, Heirnul, P.O. Box 1307 Colton, CA 92324 for 1101 and 2102. He was impressed with the SC11BI-8H user manual and likes the MP Publishing Co Experimenters Computer System series. Write Box 378-P, Belmont, Mass 02178 for a free catalog describing series.
LAURENCE PLATE SUGGEST CLEANING IC PAD HOLES BY USING WIK-IT ON ONE SIDE TO REMOVE EXCESS SOLDER, THEN USE SOLDERING IRON AND #22 WIRE TO CLEAR HOLE. HE SUGGESTS ONLY ONE BOARD OF 1101'S AND USE OF HIGHER DENSITY CHIPS FOR THE REST OF THE MEMORY. THE NEED FOR STANDARDS IS SO ESSENTIAL THAT IS PROPOSING SANTA BARBARA AS THE UNOFFICIAL MARK-8 CAPITOL OF THE WORLD AND THE OBVIOUS PLACE FOR A CONFERENCE. (PERHAPS HE AND I CAN GET TOGETHER AND WRITE DOWN OUR IDEAS FOR STANDARDS AND PRINT THEM FOR COMMENT.)

TED J. POULOS IS STRUGGLING TO DEBUG HIS MARK-8 AND IS PROMOTING HIS COMPANY, DIGI-CRAFT ELECTRONICS FOB 94, BROOKLINE MASS 02145. A CATALOG WILL BE AVAILABLE IN MID NOV AND HE NOW HAS 1101'S AT $21 POSTPAID AND MOLEX CONNECTORS & MATING WAFER PIN ASSEMBLIES FOR 50 AND 25 CENTS.

R. RILEY SAYS THE ARRL HANDBOOK AND BACK ISSUES OF OST HAVE MODEM PLANS. ALSO MOTOROLA APPLICATION NOTE AN-4-91 FREE FROM MOTOROLA. HE RECOMMENDS INTERNATIONAL ELECTRONICS FOR IC'S AND MENTIONS THAT OST HAS PUBLISHED PLANS FOR A BAUDOT TO ASCII CONVERSION.

TERRY RITTER HAS A RUNNING MARK-8 AND SENT DETAILS ON HIS KEYBOARD INTERFACE AND A LISTING OF SIMLOADER, A OCTAL KEYBOARD DATA ENTRY PROGRAM. DETAILS WILL APPEAR IN THE NEXT ISSUE. HE RECOMMENDS NOT USING MOLEX CONNECTORS SO THE UNIT CAN BE PLACED ON 5 DIFFERENT SIDES FOR TROUBLE-SHOOTING. A PULSE DETECTING PROBE IS ESSENTIAL FOR TROUBLE-SHOOTING AND BACK LIGHT THE BOARDS TO CHECK FOR SOLDER BRIDGES. HE WILL GLADLY HELP WITH TROUBLESHOOTING TIPS BUT ONLY IF YOU ENCLOSE A SASE. WHOEVER DOES THE 8080 ARTICLE SHOULD MAKE IT MUCH EASIER TO BUILD. HE HAS HAD FREQUENT PROBLEMS WITH THE SWITCHES EVEN THO THEY WERE GOOD QUALITY. EXTRA DEBOUNCING MAY HAVE TO BE ADDED. FOR ADDING CIRCUITS TO THE BOARD TERRY SUGGESTS MOUNTING THE IC'S ON THE BOARD TOP DOWN WITH GLUE WITH WIRES CONNECTING THE PINS AND PC RUNS. HE IS NOW WORKING ON A HARDWARE ROM AND TTY DRIVER.

DR. WILLIAM SCHENKER SAYS BILL GODBOUT HAS AN EXCELLENT REPUTATION AS A SUPPLIER IN THE BAY AREA AND THAT FIVE OF THEM IN THE BAY AREA HAVE ORGANIZED A LOOSE GROUP AROUND TVT CONSTRUCTION. HE IS IN A COMPUTER SCIENCE PROGRAM WHICH HAS A STRONG LIASON WITH LAWRENCE RAD LABS AND SHOULD BE ABLE TO OBTAIN INFORMATION. HE IS MOSTLY INTERESTED IN 8060 SYSTEMS AND MAY BE WORKING INTO COMPUTER APPLICATIONS FOR DIAGNOSTIC MEDICINE AND HEALTH CARE DELIVERY SYSTEMS.

ROGER SMITH'S ARTICLE ON ADDING A UART TO THE TVT TO DRIVE A TTY AND CASSETTE RECORDER LOOKS GOOD AND WILL APPEAR IN THE DEC RE. HIS RECORDING METHOD USES A TONE FOR 1'S AND NO TONE FOR 0'S.

PETER SPERRI SENT IN A COPY OF THE ELECTRONICS MAG TAPE INTERFACE.

JONATHAN TITUS SUGGESTS BENDING THE 1101 LEADS HORIZONTALLY THAT DON'T NEED TO GO THRU THE BOARDS AND SOLDERING THEM LIKE A FLAT PAK. ALSO TEST THEM FIRST. TO EXPAND THE INPUT TO A BUS SYSTEM, REMOVE THE 7442 DECODER ON INPUT MUX BOARD AND RUN 2 JUMPERS, FROM IC PAD 8 TO 1 AND 2 TO 16. INPUT PORT 0 BECOMES THE INPUT BUS PORT AND 1 IS NOT USED. HE WILL HAVE MORE ON THIS IN FUTURE ISSUES OF RE. HE SUGGESTS WESTERN DIGITAL'S BAUDOT UART FOR BAUDOT TTY'S. HE GAVE PERMISSION TO PRINT THE VERY NICE TROUBLESHOOTING PROBE CIRCUITS.

DARRELL WOOD SENT IN THE ARTICLES ON CASSETTE INTERFACES.

MAX L. WYMORE IS A PATENT ATTORNEY AND IS BUILDING THE MARK-8 AND TVT TO GAIN COMPUTER EXPERIENCE.
A. C. ACTON, BOX 31, MIDLAND, MI 48640 IS INTERESTED IN INVESTIGATION AND SIMULATION OF INDUSTRIAL MINICOMPUTER APPLICATIONS ESPECIALLY IN REGARD TO INSTRUMENTATION, PROCESS MONITORING AND SERVO CONTROL AND WANTS TO INTERFACE TO TVI, HAM-RGAGE TTY, GRAPHIC PLOTTERS, AND SERVO ACTUATORS.

VICTOR W. AMOTH, 228 FOX ROAD, MEDIA, PA 19063 WILL USE TVI FOR I/O, WANTS A CASSETTE TAPE INTERFACE AND WILL TRY TO RUN HIS MODEL RAILROAD IF HE CAN WORK OUT SENSORS FOR IT.

EDWARD E. ANDERSON, 813-23 ST., COLUMBUS, GEORGIA 31904 WILL USE THE TVI, WANTS TO INTERFACE A CASSETTE AND CALC CHIP AND WANTS TO WORK ON A BASIC AND FORTRAN COMPILER.

JEFFERY AUGENSTEIN MD/PHD, 1400 NW 10 AVE. SUITE 2M, MIAMI, FL 33136 IS WITH THE UNIV OF MIAMI, AUDIOLOGY RESEARCH LABS AND THEY HAVE LABORATORY APPLICATIONS FOR THE MARK-8.

DR. G. G. BALAZS, DIRECTOR, COMPUTER CENTER, VIRGINIA MILITARY INSTITUTE, LEXINGTON, VIRGINIA 24450

DAVID A. BARKER, 1101 GRAD HOUSE WEST, WEST LAFAYETTE, IND 47906

C. S. BAUER, IEMS DEPT., FLORIDA TECH. UNIV., PO BOX 25000, ORLANDO, FLORIDA 32816 SUGGESTS THAT THE GROUP COULD CONSIDER SERVING AS AN EXCHANGE MEDIUM FOR INFORMATION ON SOURCES AND PRICES FOR COMPONENTS. THEY ARE TRYING TO LOCATE "ZERO-INSERTION FORCE" IC SOCKETS.

EUGENE M. BEHRENS, 20631 S.W. 116 ROAD, MIAMI, FL 33157

RICHARD C. BEMIS, 402 S. HUMBOLDT, DENVER, CO 80209 SAYS THAT WE MAY BE NIBBLING AT THE TOP OF A VERY LARGE ICEBURG WITH THE USER GROUP. (IT APPEARS THAT YOU ARE RIGHT RICHARD.) HE SUGGESTS THAT A FLOPPY DISK WILL BE NECESSARY TO REALIZE THE MARK-8'S FULL POTENTIAL AND SUGGESTS LOOKING AT THE COMPUCORP ALPHA CALCULATOR AS AN EXAMPLE OF WHAT CAN BE DONE WITH A SOPHISTICATED PROGRAMMABLE CALCULATOR TYPE LANGUAGE IN A SMALL MACHINE.

J. P. BERNIER, 1005 GRENOBLE, STE FOY, QUE 10, GIV 228. (QUEBEC, CANADA) WORKS IN DIGITAL DEVICES AND ACQUISITION SYSTEMS BOTH STATIC AND DYNAMIC AND HE SUGGESTS INSPECTING THE BOARDS VERY CAREFULLY FOR SHORTS, USE MOLEX SOCKET PINS FOR ALL ICS, AND HE ORDERED 60 PIN CONNECTORS INSTEAD OF USING THE BUSS WIRES.

JAMES RILEY BODDIE, PATIO APT. 216, 420 N. DEAN ROAD, AUBURN, ALABAMA 36830 IS A GRAD STUDENT IN EE AT AUBURN UNIV. HIS SYSTEM WILL INCLUDE 1K, KEYBOARD, AND A CRT CHARACTER DISPLAY. HE IS INTERESTED IN PROGRAMMING GAMES AND HOUSEHOLD CONTROL FUNCTIONS.

FRED A BOGGS, 1803 ROSE ST., PORT TOWNSEND, WASH. 98368
JAY BOWDEN, 1613 ENCINO DR., ESCONDIDO, CA 92025 IS A FRESHMAN AT PALOMAR COLLEGE, SAN MARCOS, CA AND HOPES TO BE ABLE TO PROGRAM OPERATIONS IN A SYMBOLIC INSTRUCTION CODE USING MATH OPERATORS AND CERTAIN HIGH LEVEL LANGUAGE STATEMENTS.

DAVE BOWLES, 4501 GLEN HAVEN ROAD, SOQUEL, CA 95073 IS INTERESTED IN ACCOUNTING AND STOCK AND INVENTORY CONTROL FOR A SMALL BUSINESS, CONTROL OF A MUSIC SYNTHESIZER, MODULATION TRANSFER FUNCTION DATA REDUCTION, AND A SYSTEM FOR OPTICAL IMAGE INTENSIFYING SYSTEMS.

DENNIS BURKE, 108 N. HIDALGO AVE., ALHAMBRA, CA 91801 WANTS TO KNOW WHAT KIND OF PROGRAMS ARE AVAILABLE TO USERS AND IS INTERESTED IN GRAPHICS AND FILE TYPE COMPUTING. HE IS WORKING ON HIS OWN TV DISPLAY WHICH WILL WORK ON ANY SCOPE OR MODIFIED TV DISPLAY, WILL DISPLAY 512 CHARACTERS WITH A VIDEO FREQUENCY UNDER 1 MEG AND A 60 Hz REFRESH RATE. PARTS COST IS UNDER $100. HE MENTIONS 256 WORD PROMS AT $37.50 FROM POLY PAKS AND WANTS TO KNOW IF THERE IS ANY INTEREST IN 8080'S.

W. H. BURTNER, RR 2 BOX 267, VALPARAISO, IND. 46383 IS WAITING TO START UNTIL THE BUGS ARE OUT AND IS VERY MUCH INTO MUSIC SYNTHESIZERS AND WOULD LIKE TO DEVELOP THE MARK-8 AS A SORT OF HIGH CLASS SEQUENCER AND CONTROLLER FOR A KIT SYNTHESIZER HE HAS COMPLETED.

VINCENT BUSCEMI, NEWFIELD HIGH SCHOOL, MARSHALL DRIVE, SELDEN, NY 11784

JOHN N. CALHOUN, PROGRAMMING ANALYST, SYSTEMS & PROGRAMMING DEPT., EDUCATIONAL TESTING SERVICE, 1947 CENTER STREET, BERKELEY, CA 94704

JOHN T. CRAIG, VARIAN DATA MACHINES, 2722 MICHELSON DRIVE, IRVINE, CA, 92664

JAN VAN DIJK, 2062 NW RAMSEY DR., PORTLAND, OREGON 97229

JAMES A EBY, RR #1, BOX 337A2, HARBOURTON-WOODSVILLE RD., PENNINGTON, NJ 08534

V. ECHEVERRIA, 4235 BANKS, NEW ORLEANS, LA 70119

ROGER B. FRANK, DIGITAL EQUIPMENT CORP., PO BOX 969, LOS ALAMOS, NM 87544 HAS HAD AN 8008 SYSTEM RUNNING FOR ABOUT 14 MONTHS WITH ABOUT 16K OF SEMICOND. MEMORY, ROM BOOTSTRAP, HIGH SPEED TAPE READER, CASSETTE TAPE, AND TTW WITH SOFTWARE SUPPORT INCLUDING AN EDITOR AND ASSEMBLER WITH A COMPLEX MONITOR. HE DEVELOPED HIS SYSTEM AS A HOBBY WHILE A DESIGN ENGINEER FOR ANOTHER COMPANY AND IS PURSUING THRU CHANNELS THE POSSIBILITY OF CONTRIBUTING THIS INFORMATION TO THE GROUP.

MAURY GOLDBERG, CLETELEON COMMUNICATIONS CORP., 1618 JAMES ST., SYRACUSE, NY 13203

BILL GOUGH, 310-B SOUTH COLLINS, ARLINGTON, TX 76010 IS BUILDING A 4K MARK-8 WITH TVT AND HAS BEEN A PROGRAMMER FOR 15 YEARS WITH DIGITAL ELECTRONICS AS A HOBBY. HE HAS SOME ELABORATE IDEAS FOR A VERBAL RESPONSE UNIT USING 2 COMPUTER CONTROLLED CASSETTE TAPE RECORDERS.
DAVID W. GROSS, 924 NE CROXTON AVE., GRANTS PASS, OREGON 97526 IS A
SOPHOMORE IN HIGH SCHOOL AND HAS BEEN SERIOUSLY INTERESTED IN COM-
PUTERS FOR THE LAST TWO YEARS. HIS MARK-8 IS NEARLY FINISHED AND HE
IS STILL HAVING TROUBLE FINDING THE SHIFT REGISTERS FOR THE TVT.

R. G. GUENTHER, DDS, 100 MAIN ST. WEST, HAMILTON, ONTARIO CANADA,
L8S 1B3

STEVEN L. GUERRA, PO BOX 429, SIERRA BLANCA, TX 79751

W. A. GUINN, 480 JAMUL CT., CHULA VISTA, CA 92011 WANTS HIS CHILDREN
to use the system in doing their school work and is interested in a
portable system and wants to do environmental control for his house
and green house.

DAVID R. HANUS, 402 ARNOLD BLVD. #29, ABILENE, TX 79605 BUILT
the TVT and it ended up costing far more than it was suppose to so he
is cautious about starting the MARK-8 too soon. He would use it for
inventory lists, compiling lists of cross-referenced parts, and with
the aid of a calculator interface, to further his education in
physics. He has found HAMILTON-AVNET and CRAMER SUPPLY OF DALLAS
helpful in obtaining signet ICs.

TERRY G. HARRIS, 417 NORTHWESTERN DRIVE, GRAND FORKS, N. DAK. 58201
wants to build the CRT I/O in re and would use his MARK-8 for meal
planning and sorting data for particular items of interest.

GREGORY W. HART, 8948 RAMSTAD AVE., FAIR OAKS, CA 95628

JAMES HOPKINS, 29 GRANDVIEW AVE., PITMAN, NJ 08071 PLANS TO DEVELOP
A SCIENTIFIC NOTATION PACKAGE USING 5 WORDS PER NUMBER. HE IS INTER-
ESTED IN DEVELOPING A DETAILED USER MANUAL WITH DISCUSSION AND USES
OF ALL ARITHMETIC AND LOGICAL OPERATIONS.

JOHN JAMES, 1597 MONUMENT ST., CONCORD, MA 01742 PLANS TO BUILD OR
PROGRAM A 2-WAY MORSE CODE TRANSLATOR, COMPUTER TERMINAL, AND DO DATA
ACQUISITION AND PROCESSING OF VOICE SIGNALS.

C. K. JOHANSEN, ORION RESEARCH INC., 380 PUTNAM AVE., CAMBRIDGE, MA
02139

DOUGLAS W. KILGORE, 803 JAMES DRIVE, RICHARDSON, TX 75080

MORRIS KRIEGER, 37 EIGHTH AVE., BROOKLYN, NY 11217 FEELS THAT THERE ARE
GOING TO BE SUBSEQUENT MODELS, EITHER LARGER, BETTER, OR FASTER AND IS
GOING TO WAIT AND SEE WHAT THE FUTURE HOLDS.

JAMES M. LAMIELL, 1615 COLORADO BLVD., DENVER, CO 80220

J. E. LENCOSKI, 327 GRANT AVE., MIDDLESEX, NJ 08846

Page 36
ANDREW W. LEPP, 1517 ALTA VISTA, OWOSSO, MICHIGAN 48867 IS IN GRAD SCHOOL IN COMPUTER SCIENCE AT THE UNIVERSITY OF ARKANSAS.

JEFF LESINSKI, 1241 STALEY ROAD, GRAND ISLAND, NY 14072 IS CONSTRUCTING A 2K MARK-8 WITH TVT, TWO OUTPUT BOARDS, AND THE SIGNETIC PHASE LOCK LOOP AUDIO CASSETTE I/O. HE PLANS TO ADD A CALCULATOR AND CLOCK CHIP, DUAL COMPUTER CONTROLLED CASSETTE DRIVES AND A D/A CONVERTER AND MODEM. HE IS 3RD YEAR GRAD STUDENT IN COMPUTER SCIENCE AT STATE UNIV OF NY AT BUFFALO AND IS INTERESTED IN ARTIFICIAL INTELLIGENCE BUT IS REGAINING INTEREST IN HARDWARE BECAUSE OF MICROCOMPUTER DEVELOPMENTS. HE HOPES TO USE THE MARK-8 TO DEMONSTRATE FEASIBILITY AS A MASS PRODUCED HOME APPLIANCE AND IS CURRENTLY WRITING AN ASSEMBLER AND SIMULATOR IN FORTAN.

PHILIP E. LEVINSON, 875 NASSAU ROAD, UNIONDALE, LI, NY 11553

STEVEN LORENZ, 163 WEST MAIN ST., NEWARK, DE 19711 IS A SENIOR AT UNIV OF DELAWARE IN EE AND IS USING THE MARK-8 AS A SENIOR DESIGN PROJECT.

JOHN M. MOCOY, 420 WALLACE AVE., LOUISVILLE, KY 40207

JOHN W. NALL, COMPUTER RESEARCH SPECIALIST, FLORIDA STATE UNIV, COMPUTER CENTER, MATH BLDG. RM 110, TALLAHASSEE, FL 32306

ALAN F. NEEL, 1435 JUDSON, BOULDER, CO 80303 WOULD LIKE A LIST OF RECOMMENDED PARTS SUPPLIERS AS HE IS HAVING TROUBLE FINDING SOME OF THE PARTS.

ROBERT W. OILER, 355 1/2 S. STATE ST., WESTERVILLE, OHIO 43081 WORKS IN TV REPAIR AND IS TRYING TO THINK UP WAYS TO MAKE HIS JOB EASIER USING THE MARK-8.

MARK PETERSON, TEACHING SPECIALIST, UNIV OF MINNESOTA, DULUTH, DEPARTMENT OF INDUSTRIAL EDUCATION, DULUTH, MN 55812 IS PRESENTLY USING A GE 312 AND IS INTERESTED IN USING THE MARK-8 AS A MINICOMPUTER/REMOTE ENTRY TERMINAL COMBINATION.

C. A. PICKARD, 199 N. PURDUE, OAK RIDGE, TENN. 37830

GARY T. POST, 475 B BROOKS, LEMOORE, CA 93245

W. A. RIGGERT, DDS, 10300 WEST NINE MILE ROAD, OAK PARK, MICHIGAN INTENDS TO USE THE MARK-8 FOR STANDARD BUSINESS PROCESSING AND SEVERAL VERY SPECIALIZED DENTAL PROGRAMS AND WANTS INFO CONCERNING CASSETTE TAPE DRIVES AND LOW-COST SLOW PRINT MECHANISMS.

J. R. ROEHRIG, 28 HICKORY RD., WELLESLEY, MASS., 02181 HAS A CASSETTE TAPE UNIT RUNNING THAT WORKS REASONABLY WELL BUT HIS PROBLEM IS GETTING GOOD TAPE. EVEN WITH "SCOTCH" HE GETS 2 ERRORS PER PAGE ON THE TVT.

R. N. RUBINSTEIN, 310 LENOX RD., BROOKLYN, NY 11226
RMCS WELDON RYE USN. TACRON ONE NAB CORONADO, SAN DIEGO, CA 92155 HAS SOME TTY EQUIPMENT, A VIDEO MONITOR AND A SCOPE HE WILL USE AS PERIPHERALS AND IS AN ACTIVE HAM AND MARS MEMBER AND CAN SEEUSES FOR THE MARK-8 IN THAT FIELD.

ALBERT SARDO, 2032 SW EXPRESSWAY, SAN JOSE, CA 95126 HAS JUST STARTED STUDYING EE AT SAN JOSE STATE COLLEGE AND IS HOPING TO DEVELOP A HIGH LEVEL LANGUAGE IN THE FUTURE FOR THE MARK-8 AND WILL USE IT FOR STATISTICAL AND MATHEMATICAL WORK.

MICHAEL G. SCOTT, ROUTE 1, BOX 105, KIRON, IOWA 51448 IS A JUNIOR IN HIGH SCHOOL AND ON HIS PRESENT SALARY, IT WILL BE A WHILE BEFORE HE CAN TACKLE THE MARK-8. HE IS WORKING ON A DEVICE THAT READS, WRITES, AND REMEMBERS OCTAL CODES AND CONVERTS THEM TO THEIR BINARY COUNTERPARTS.

MARK SEBERN, 218 MOSSMAN RD., SUBURY, MA 01776

CHARLES SIBBITS, 413 N. BLACK HORSE PIKE, RUNNEMEDE, NJ 08078 IS A 3RD YEAR STUDENT IN RADIO AND TV REPAIR AT CAMDEN COUNTY VOCATIONAL SCHOOL. HE WANTS TO ADD A CALCULATOR TYPE KEYBOARD FOR FASTER ENTRY AND A ROM FOR NONVOLATILE PROGRAM STORAGE. HE IS PRIMARILY INTERESTED IN BUSINESS DATA PROCESSING AND ANY SOFTWARE AVAILABLE FOR THIS PURPOSE.

DAVID SILACI, D. QUON, 1405 48TH AVE. #3, SAN FRANCISCO, CA 94122

RAYMOND J. SMITH, WKYC-TV, 1403 EAST SIXTHS/ ST., CLEVELAND, OHIO 44114

ROBERT W. THOMAS, 910 SONMAN AVE., PORTAGE, PA 15946 IS INTERESTED IN A HIGH SPEED CRT INTERFACE AND MASS STORAGE DEVICES AND WILL USE THE MARK-8 TO CONTROL A ZONED HEATING SYSTEM, A FIRE AND BURGLAR ALARM SYSTEM IN HIS HOME, A HOME FINANCIAL SYSTEM, AND INVENTORY OF FOOD AND SUPPLIES.

PETER VICKERS, 162 NEHOIDEN ST., NEEDHAM, MA 02192

JAMES R. VOIGT, 1903 N. 23RD ST., SHEBOGGAN, WIS 53081

JOHN E. WAHL, APT. B-2, 3334 ZION, EL PASO, TX 79904

JERRY WALKER, 761 CLAYTON, SAN FRANCISCO, CA 94117

JOSEPH WEINRAUB, 46-16 65TH PLACE, WOODSIDE, NY 11377 IS MAINLY INTERESTED IN COMPUTER GRAPHICS AS HE IS PROFESSIONALLY A PROGRAMMER AND PRIVATELY, A FILM-MAKER AND IS INTERESTED IN ANY INFORMATION IN THIS AREA.

STEVEN J. WINICK, APT. 210, 8401 MANCHESTER RD., SILVER SPRING, MD 20901

WORD PROCESSING SYSTEMS, 10955 GRANADA LANE SUITE 302, OVERLAND PARK, KANSAS 66211

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Putting data on an ordinary audio recorder

Here's a way to use any single-track audio recorder to record digital data. The system, useful in many non-critical applications, makes only one requirement on the recorder (either reel-to-reel or cassette)—a frequency response to 7 kHz.

The circuit uses four phase-locked loop ICs, giving you a complete data-recording system with two recorded frequencies on a single track. Further, the circuit needs no timing channel to strobe-off the data, nor does it need a third frequency for null.

The parameters chosen for the circuit give you a digital recording rate of 800 Hz, or 100 8-bit char./s. Because an FSK recording system is used, you need not modify the recorder's voice recording and playback electronics. In fact, you can record voice messages to identify various sections of the tape. To incorporate redundancy of the stored data, simply use a 2-channel (stereo) recorder. An FSK detector on each channel, with the data outputs OR'd, recovers recorded I's and thus protects against dropouts.

The FSK detector detects 6.4 kHz as an I and 4.8 kHz as a 0. Because of the key FSK recording scheme, a 0 is recorded as 4.8 kHz for the entire bit period, while an I is recorded as 6.4 kHz for about 60% of the period and as 4.8 kHz for the remainder of the period. This 60% bit-duty-cycle ensures that the clock will synchronize with a negative transition during the time that a 1 should be detected.

The system runs at 800 Hz. When the data pulses are extracted from the recorded data, the clock is synchronized to the data. The clock will stay in sync with up to seven successive 0's. You can meet this condition by using odd parity so one bit out of eight is always a 1.

The FSK generator consists of two oscillators locked to the 800-Hz system clock, but oscillating at 6.4 kHz and 4.8 kHz. The incoming data to be recorded selects either oscillator as the frequency to be recorded. The high-frequency rolloff characteristic of the recorder automatically takes care of harmonic suppression of the square-wave output.

For more information on Signetics' phase-locked loops, write Signetics Corp., 811 E. Arques Ave., Sunnyvale, Calif. 94086.

Circle Reader Service #212

(Editor's note: this idea is credited to Daniel Chin, Burlington, Mass. and is used courtesy of Signetics Corp.)
The output of a teletypewriter resembles the opening and closing of a switch. In the interface circuit, this switching waveform is first filtered slightly to remove bounce, and then it is used to gate a unijunction oscillator. If a teletypewriter driver is used instead as the input device, its drive current is fed to the base of a transistor that simulates the teletypewriter's switching action.

The circuit's output is a sawtooth waveform having a frequency of 6 kilohertz. It is applied to the recorder's auxiliary input (high-impedance low-sensitivity input). If the recorder does not have this input, it can be simulated by placing a 470-kilohm resistor in series with the microphone input.

The recorder-to-teletypewriter interface circuit (b) detects the recorder's output, and then rectifies and filters it so that a positive voltage is developed whenever a tone is present. A bleeder resistor is placed across the recorder output lines to produce the proper decay when the tone is removed. This decay voltage is then used to drive a two-transistor driver that operates the teletypewriter. The output of this detector circuit can also be used to drive a reed relay to produce switch closures like those of a standard teletypewriter output.

It should also be noted that both interface circuits run off of a 9-volt supply, which can often be taken from the recorder's battery pack.
Simple f.m. modulator/ demodulator for a magnetic tape recorder

by B. D. Jordan
Institute for Advanced Studies, Dublin

This unit offers an extension of the facilities of a domestic tape recorder to permit its use as an instrumentation recorder employing f.m. principles. The design involves no modification of the tape recorder and thus allows a wide field of application with various makes and types of machines.

Magnetic tape as a medium for recording v.f.f. signals or signal levels, suffers at least two serious limitations when using direct recording methods. First, the frequency response rarely extends below about 50Hz and, second, amplitude instability occurs, caused mainly by surface inhomogenieties in the tape. For the purposes of handling analogue data, where the d.c. component of the signal must be preserved, it is necessary to incorporate some form of signal modulation into the recording process. Most of the commercially available instrumentation tape recorders employ f.m. modulation and many of these have specifications that include a frequency response of d.c. to 2MHz as well as a great many other facilities that may not be required.

The instrument described was designed to provide a tape recorder with f.m. modulation giving a frequency response of 100Hz to 800Hz for recording v.f.f. phenomena and utilizing a domestic recorder at a tape speed of 9.1cm/sec. At this tape speed the tape recorder has a frequency response of about 50Hz-6kHz. The carrier frequency was chosen to lie in the midband region, i.e. 3kHz so that amplitude variations in the tape recorder output would not be excessive within the expected range of frequencies to be handled. In order to minimize the effect of wow and flutter due to the transport system, a reasonably large depth of modulation is desirable. A frequency deviation of about ±30% of the carrier was found to be satisfactory.

An integrated phase locked loop, Sigmatic type NJ565, was used as both modulator and demodulator. Fig. 1 illustrates the principle of the phase locked loop. An f.m. signal, $f_s$, is fed to a phase comparator whose reference, in this case the output of a voltage controlled oscillator, $f_C$. The phase comparator is a balanced multiplier which produces the sum, $(f_s + f_C)$ and difference $(f_s - f_C)$ frequencies of the input f.m. signal and the voltage controlled oscillator output. When the loop is in lock, the v.c.o. delivers the input frequencies so that $f = f_s$ and the output of the phase comparator contains a d.c. component which is proporional to the difference between the input signal and the v.c.o. output. A low pass filter removes the sum frequency component and the remaining d.c. voltage is amplified and used to control the v.c.o. frequency in such a manner as to maintain $f = f_s$. It is this controlling or error voltage which constitutes the demodulated signal.

The modulator

One of the outstanding features of the NE 555 is the high linearity and wide dynamic range of the v.c.o. These characteristics make the device particularly attractive as a modulator. For this purpose the loop can be opened by disconnecting the v.c.o. output from the phase comparator reference input. The modulating signal can then be applied directly to the v.c.o. input, or if required, advantage can be taken of the high gain d.c. amplifier, by applying the modulating signal to the input of the phase comparator. The reference input should be returned to earth in this mode of operation. The low pass filter can be omitted by disconnecting $C_1$.

The Fig. 2 shows the complete circuit. The v.c.o. is a relaxation type of oscillator the free running frequency, $f_s$, being determined by the external capacitor, $C_1$, and the charging current controlled by $R_1$. The frequency $f_s$ can be calculated from the expression

$$f_s = \frac{1}{4R_1C_1}$$

$C_1$ can be any value, but $R_1$ has an optimum value of about 4kΩ so as to maintain minimum linearity error. So for our system with $f_s = 3kHz$, $C_1 = 0.021µF$. The conversion factor $K$ for the v.c.o. is given by

$$K = \frac{500}{V_c} \text{ radians/sec/volt}$$

In our case $f_s = 3kHz$ and $V_c = 6V$. $K = 2kHz$ per volt. Therefore in order to limit the depth of modulation to ±30% (±900Hz maximum frequency deviation), the control voltage at the v.c.o. input must not exceed 0.9V peak to peak. The gain of the d.c. amplifier can be varied by means of the feedback resistor $R_2$. Thus the depth of modulation can be fixed for a given input by means of $R_2$.

Demodulator

In this mode of operation the phase locked loop is closed by reconnecting the v.c.o. output to the phase comparator reference input. The low pass filter is formed by connecting $C_2$ between pin 7 and the power rail. The capture range, $f_r$ of the p.l.l. (i.e. that range of frequencies about $f_s$ over which the loop can acquire lock) is given by

$$f_r = \frac{32nf_s}{\pi \sqrt{V_c}}$$

$C_1$ is the time constant of the l.p.f. filter formed by $C_2$ and an internal resistance of 3.8kΩ. The tracking range $f_r$ of the p.l.l. is that range of frequencies about $f_s$ over which the v.c.o. once having acquired lock, will maintain lock with the input signal and is given by

$$f_r = \frac{8f_r}{V_c}$$

This is the best copy I can make. Look it up in the library if you are interested in it.
Fig. 2. The complete modulator/demodulator circuit.

Fig. 3. The system frequency response.

To eliminate the residual unwanted sum frequency component present in the demodulated output, a balanced T filter is incorporated in the output. This was found to be most effective when tuned to 2f. This is followed by a low pass active filter which has a cut-off frequency at 800Hz. Because the demodulator of the p.i.l. output is referenced to the positive power rail there is always a standing d.c. potential of about 0.125 V, below the positive power rail. This can be cancelled out by means of the level shifting facility incorporated in the active filter.

**Performance and testing**

The system was tested using an Akai Model XV tape-recorder at a tape speed of 9.1 cm/sec and a carrier frequency of 3 kHz. Fig. 3 shows the frequency response of the system. This test was made by recording an f.m. signal produced by applying tones of 5 mV peak to peak from 1 kHz to 1.5 kHz to the input. This recording was then played back and the demodulated signals were measured with an oscilloscope. A d.c. test was made by applying d.c. levels from −5 mV to +5 mV to the input. On playback the linearity error of the reproduced levels was less than 0.5%.

A two-channel system was constructed on a printed circuit board and mounted together with power supply in an instrument case measuring 10 x 7 x 6 in. No special layout precautions were found to be necessary. The system was incorporated in a 2-channel d.c. photometer.
LOGIC PROBE

This is an extremely simple probe which will detect extremely short pulses, logic levels, and open circuits for standard TTL and DTL circuits.

The first two NAND gates, A and B, buffer the input signal and then drive the following two NAND gates which then indicate the logic level present by lighting the correct output lamp. The first input NAND gate also drives two monostable circuits (74123), one of which is set to trigger on a positive-going edge and the other is set to trigger on a negative-going edge. The Q outputs of the monostables are ANDed with two diodes which are then connected to a lamp. When either of the Q outputs go to 0, indicating that the monostable has been triggered, the lamp lights indicating a logic level transition.

The resistor and diode input network will disable the lamp driver NAND gates when no definite input is present at the probe tip. When all the lamps are off it indicates an open circuit at the probe. This makes the probe very useful for detecting open input pins on integrated circuit packages. Open output pins will give a definite logic level. The red and the clear lamps indicate the logic level present at the input. The flashing of the green lamp will indicate a logic level transition. The monostables are now set for about a 10 to 25 millisecond pulse.

LOGIC PROBE

10 mF/10 V

+ 5

74123

"PULSE"

10 KΩ

+ 5

Parts values same as above

1 K, 1.5 K or 2.2 KΩ; select for best lamp response

Pin numbers shown for signals to 74123. Use 5 V, 20 mA lamps as indicators. Color for distinguishing the states.
LOGIC PULSER PROBE

The Logic Pulser Probe shown in the schematic is an extremely useful tool for anyone testing and designing digital logic circuits. It will provide both a logic 1 and a logic 0 pulse to DTL and TTL type circuits from a normally high impedance state. It is no longer necessary to determine what type of a pulse is needed at a circuit node since the probe will provide a pulse of the opposite logic level. Most probes do not have this feature.

The bounceless switch configuration triggers both of the monostables (74123), but the period of monostable A is twice as long as that of monostable B. A enables the NAND gate and B then strobes each, which then turn on the output transistors in sequence. This causes the probe to go from the normal high impedance or off state to a logic 1 followed by a logic 0 and finally a return to the off state. The off state does not affect the logic circuits under test.

Pulse widths are easily changed by changing the values of the resistor-capacitor network for each monostable. It is best to keep the pulses short and the period of A should be twice that of B to give equal times to both logic level pulses. The 33 ohm resistor may be added for current limiting if needed and the complete circuit may be constructed to fit into a small pocket-sized flashlight case.
SORRY ABOUT THE DELAY BETWEEN THE LAST TWO ISSUES. I HAVE HAD MANY
COMMITMENTS THE LAST TWO MONTHS PLUS A SERIOUS ILLNESS IN THE FAMILY.
OTHERWISE ANOTHER ISSUE WOULD HAVE BEEN OUT WEEKS AGO.

IT CERTAINLY ISN'T BECAUSE PEOPLE HAVEN'T BEEN SENDING IN MATERIAL.
THERE IS MORE MATERIAL THAN I COULD POSSIBLY CONDENSE INTO THIS ISSUE.
HOPE EVERYONE CONTINUES TO SEND IN MATERIAL. WE ESPECIALLY NEED FIRM
PROPOSALS FOR STANDARDIZING I/O AND FORMATS FOR CASSETTE TAPE, PAPER
TAPE DEVICE INTERFACES, ETC.

I MUST ALSO APOLOGIZE ABOUT THE PRINTING QUALITY. SEVERAL THINGS
HAVE COMBINED TO MAKE THE PRESENT FORMAT NECESSARY, ONLY ONE OF WHICH
IS COST. I HAD NOT ANTICIPATED 270 MEMBERS. EVERY ISSUE I HAVE HAD TO
MAKE THE DECISION WHETHER TO SPEND SEVERAL ADDITIONAL WEEKS TRYING TO
PREPARE AND PRINT COPY OR GET WHAT IS AVAILABLE OUT TO YOU. GETTING
BUG REPORTS AND NAMES AND ADDRESSES TO YOU IN A HURRY HAS SEEMED MOST
IMPORTANT. I HOPE YOU HAVE BEEN CONTACTING OTHER BUILDERS IN YOUR AREA
AND CORRESPONDING WITH THE ONES OUTSIDE OF YOUR AREA.

POPULAR ELECTRONIC'S PUBLICATION OF THE 8080 MICROCOMPUTER ARTICLE
IN THE JAN 75 ISSUE WILL PROBABLY MAKE EVERYONE WONDER IF HE DID THE
RIGHT THING IN STARTING THE MARK-8. THE KIT PRICES ARE NEARLY UNBE-
LIEVABLE. HOWEVER IT IS STILL ABOUT TWICE THE COST OF A MARK-8 WHICH
PUTS IT OUT OF THE PRICE RANGE OF MOST EXPERIMENTERS ESPECIALLY IF THEY
PUT ENOUGH MEMORY ON IT TO BE ABLE TO RUN ANY DECENT SOFTWARE.

A QUESTION FOR THE MARK-8 USER GROUP PARTICIPANTS IS HOW DO WE
FIT INTO THE BIG PICTURE? CERTAINLY WE NEED TO SET UP I/O STANDARDS SO
THAT DEVICES CAN INTERFACE TO EITHER COMPUTER. WILL A SEPERATE GROUP
FORM AROUND THAT CONFIGURATION OR DO WE STAY TOGETHER? SURE IS
HARD KEEPING UP WITH ELECTRONICS NOW DAYS -- BUT IT IS SURE FUN TRYING TO.

WHAT KIND OF FUTURE DO YOU WANT FOR THE USER GROUP?

DECISION HAS TO BE MADE BY MARK-8 USERS AS TO WHAT IS TO HAPPEN
IN THE FUTURE. IN OFFERING THE NEWSLETTER SERVICE THRU THE SASE ROUTE
MY OBJECTIVES WERE:

1) PROVIDE A NON-COMMERCIAL LOW COST MEANS FOR BUILDERS TO RECEIVE
PROMPT BUG REPORTS AND SOURCES FOR PARTS.
2) TO ALLOW BUILDERS TO GET TOGETHER AND HELP EACH OTHER WITH PROB-
LEMS.
3) INVOLVE MYSELF IN THE ACTION SO I KNOW WHAT IS GOING ON.

THESE OBJECTIVES HAVE BEEN MET QUITE SATISFACTORILY. SEVERAL PAR-
TICIPANTS HAVE MENTIONED THAT THE BUG REPORTS HAVE ALLOWED THEM TO GET
THEIR SYSTEMS RUNNING WITH MINIMAL PROBLEMS. WE NOW HAVE A WIDE RANGE
OF PARTS SUPPLIERS SUPPLYING COMPONENTS AT VERY ATTRACTIVE PRICES.
PARTICIPANTS HAVE BEEN CONTACTING OTHERS AND GETTING TOGETHER ON
MUTUAL PROBLEMS. I HAVE CERTAINLY BEEN KEPT INVOLVED IN THE ACTION.
FOR THE FUTURE, THESE COMMENTS:

1) IT SEEMS ESSENTIAL TO MAKE SOME REASONABLE CHARGE FOR MEMBERSHIP
SO THAT PRINTING CAN BE IMPROVED AND THE NL'S CAN BE SENT BULK MAIL.
2) As much as I enjoy doing the Newsletter, it absorbs an enormous amount of time. Thus it seems necessary to set up a way of sharing the editorship with other participants. The Cabrillo Computer Center can still serve as a clearing house for incoming mail and a distribution point for outgoing NL's. Information sent in by participants can be forwarded to the current editor for the upcoming issue.

3) It may be desirable to have two relatively independent newsletters or at least separate editors for a Hardware section and a Software section. Steve Diamond, 311 Carl St., San Francisco, CA 94117 has expressed an interest in organizing the software end.

   Please jot down your desires and suggestions as to what you want to see happen in the future. I'll try to summarize them in NL #5 and publish a decision as to what will happen in the future. As one reader pointed out, "This thing is the tip of an iceberg." I wonder what's really underneath?

Bugs
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Robert Cook provided us with an up-to-date list of bugs. His MK-8 is running so it should be accurate and complete. There are a few other things mentioned by other users that have been added.

1. p. 5, paragraph 4, last line: change to "Resistors R1-R4 and R21."
2. Connections on the bottom of the boards are in parallel. Arrange the boards in order shown in the book and wire, then cut out wires 9 thru 16 between input multiplexer and addr/manual boards.
3. p. 4, input multiplexer parts list should read: "C1, C3, C4 - 0.1 MF disk, C2 - 100 MF 10 V. electrolytic."
4. The 8 holes at the top of the memory board where the output leads cross the ground lead should not!!! be connected thru the board.
5. Install a jumper on input multiplexer board between IC3 pin 14 and +5 volts.
6. On LED board, C2 goes from B+ to B+ and should go from B+ to ground.
7. On address latch board there should be a jumper from IC1, pin 5, to IC2 pin 1.
8. IC3 on CPU board has no ground. Connect insulated wire from pin 4 to ground rail and check for change of state output on pins 10 and 11. (This may apply only to some board sets.)

Note:

In connecting the 41 wire bus from board to board, notice that the two sets of holes are not all connected and those that are connected are only on one side. Check each connection to be sure you have a complete circuit.

All of the operations involved in manually loading and reading memory are independent of the 8008. In order to minimize danger of damage to the 8008, check out all of this circuitry before inserting the 8008. You may have to decouple the crystal clock, otherwise it may run at 10 MHz. R3 may be too small. (Pleskac)

Though not an error, it might be well to remind people to install front-to-back jumpers on the memory board when not using the "b jumpers 1st board only. (William Severence)

A picture in the manual shows trimputs. This must be the first prototype that used a multivibrator clock instead of the crystal clock.
FUTURE MAGAZINE ARTICLES - IT IS VERY HARD TO SECOND GUESS THIS ONE. THE NEXT WILL HAVE A WRITETUP ON SOUTHWEST TECH. PROD. VIDEO TERMINALS, PROBABLY SMITH’S TVT MODEM ARTICLE WILL APPEAR IN THE NEXT ISSUE AND MR. TITUS STILL IS WORKING ON HIS TRACTOR INTERFACE. MR. TITUS HAD HIS INPUT BUS EXPANSION SCHEMES PUBLISHED IN THE DECEMBER ISSUE. WHY DON'T SOMEONE DESIGN A MEMORY BOARD EXPANSION USING 4K DYNAMIC RAMS AND GET IT INTO AT? I NOTICE INTERNATIONAL ELECTRONICS UNLTD IS ADVERTISING A 16 BIT COMPUTER KIT. THEY SURE ARE AWEOME ABOUT IT.

COMPUTER HOBBYIST - STEVEN STALLINGS, HAL CHAMBERLIN & RICHARD SMITH PUBLISHED THEIR TRIAL ISSUE OF THE "COMPUTER HOBBYIST" AND IT'S GOOD. THE 1ST ISSUE CONTAINS PART 1 OF A WRITETUP ON AN 8008 GRAPHICS DISPLAY, A SURPLUS SUMMARY INCLUDING A RUNDOWN ON ALL THE TELETYPES AND WHAT THEY SHOULD COST, AND NOTES ON THE INSTRUCTION SET OF THE 8008. IT LOOKS LIKE THESE GUYS HAVE THINGS TO SAY AND IF THEY HAVE ENOUGH RESPONSE THEY WILL PUBLISH MONTHLY FOR 50 CENTS AN ISSUE. WRITE TO THEM AT THE COMPUTER HOBBYIST, BOX 295, CARY, NC 27511.

YOU MAY WANT TO CONTACT STEPHEN B. GRAY, AMATEUR COMPUTER SOCIETY, 260 NORTON AVE., DARIEN, CN 06820. I DON'T KNOW WHAT HE IS UP TO YET BUT HOPE TO FIND OUT SOON.

TOOLS YOU MUST HAVE - IF YOU HAVEN'T ORDERED A "SOLDAPULL" FROM EDSYN YET, DO IT! THEIR BEST COSTS $9.95 AND YOU SHOULD ORDER A FEW EXTRA TIPS @ $1.50. IF YOU HAVEN'T USED ONE, I GUARANTEE THAT IT WILL BE ONE OF YOUR MOST PRIZED TOOLS IN JUST A FEW DAYS. IT MAKES IC REMOVING A CINCH. WRITE TO: EDSYN, 15954 ARMINTA ST., VAN NUYS, CA 91406.

BOOKS YOU NEED - MOST EVERYONE HAS OBTAINED THE INTEL 8008 USER MANUAL. ANOTHER ONE WORTH GETTING IS THE MICROSYSTEMS INTERNATIONAL MF8008 APPLICATIONS MANUAL, BULLETIN 80007. IT CONTAINS THE INFORMATION IN INTEL'S BOOK AND ALSO INCLUDES CIRCUITS, PC BOARD DRAWINGS AND CIRCUIT DESCRIPTIONS FOR A MODULAR MICROPROCESSOR USING THE MF8008. ALSO INCLUDED IS A USER'S GUIDE AND LISTING FOR MONITOR 8, AN EDITOR, SYMBOLIC ASSEMBLER, AND DEBUGGING SYSTEM WITH THE ABILITY TO LOAD AND DUMP PROGRAMS IN SEVERAL FORMATS AS WELL AS SET AND CLEAR BREAKPOINTS. WRITE TO MICROSYSTEMS INTERNATIONAL, 450 SAN ANTONIO ROAD, PALO ALTO, CA.

THE SCHELBI USER MANUAL IS VERY WELL PREPARED INTRODUCTION TO ASSEMBLY LANGUAGE PROGRAMMING FOR THE 8008 AND IS WELL WORTH THE COST OF $10. ORDER FROM SCHELBI COMPUTER CONSULTING, INC., 1322 REAR, BOSTON POST ROAD, MILFORD, CN 06460.

SEVERAL PARTICIPANTS HAVE WARNED OTHERS TO SAVE THEIR MONEY ON THE RGS USER MANUAL. IT MAY BE OF VALUE SOMEDAY WHEN THEY COMPLETE IT BUT IS ONLY WORTH A SMALL FRACTION OF THE $25 THEY ARE CHARGING FOR IT NOW.

NO ONE HAS RECEIVED THE MARTIN RESEARCH BOOK YET AS FAR AS I KNOW. IT SHOULD BE VALUABLE AND I HOPE WE CAN GET PEOPLE TO PASS IT AROUND. THEIR ADDRESS IS MARTIN RESEARCH, LTD., 1825 S. HALSTED, CHICAGO, IL 60608.

WRITE FOR THE SEMTRONICS PC BOARD CATALOG. ENCLOSE AN SASE AND YOU WILL RECEIVE A LISTING OF ALL THE PC BOARDS AVAILABLE FOR MOST OF THE MAGAZINE ARTICLES YOU'VE SEEN AND BEEN INTERESTED IN FOR THE LAST FEW YEARS. HE HAS TVT AND MARK-8 BOARDS. PERHAPS YOU CAN GET HIM TO SUPPLY THE MARK-8 BOARDS REVERSED (I.E., TOP PATTERN ON BOTTOM AND BOTTOM ON TOP). WRITE TO SEMTRONICS, RT. 3 BOX 1, BELLAIRE, OHIO 43906. HE ALSO DOES CUSTOM ETCHING.

A LOT OF PEOPLE STILL HAVEN'T FIGURED OUT HOW TO GET DATA SHEETS ON IC DEVICES. WRITE TO THE FOLLOWING COMPANIES AND ASK FOR THE FOLLOWING BOOKS. IT WON'T HURT TO LIE A LITTLE ON YOUR ADDRESS OR HAVE IT SENT TO YOUR COMPANY. (I.E. BROWN'S COMPUTER CONSULTING SERVICE, ETC.)
NATIONAL SEMICONDUCTOR CORPORATION, DATA LIBRARIAN, 2900 SEMICONDUCTOR
DRIVE, SANTA CLARA, CA 95051 ASK FOR:
A) DIGITAL INTEGRATED CIRCUITS MANUAL
B) MOS INTEGRATED CIRCUITS MANUAL
C) LINEAR INTEGRATED CIRCUITS MANUAL
D) INTERFACE INTEGRATED CIRCUITS MANUAL
E) TRANSISTORS MANUAL F) LINEAR APPLICATIONS (COSTS $2.50)
G) O.E.M. PRICE SCHEDULE
FAIRCHILD SEMICONDUCTOR CORP. 464 ELLIS ST., MOUNTAIN VIEW, CA 94040
A) TTL DATA BOOK B) LINEAR INTEGRATED CIRCUITS DATA CATALOG
C) LINEAR IC APPLICATIONS HANDBOOK D) O.E.M. PRICE SCHEDULE
SIGNETICS, PO BOX 3004, MENLO PARK, CA 94025 ASK FOR:
A) LINEAR IC DATA BOOK B) 8000 SERIES TTL DATA BOOK
C) 7400 SERIES TTL DATA BOOK D) MOS SERIES DATA BOOK
E) O.E.M. PRICE SCHEDULE
MOTOROLA SEMICONDUCTOR, 5005 E. MCDOWELL RD., PHOENIX, AZ 85008
A) MOTOROLA SEMICONDUCTORS PRICE LIST
WEATHERFORD, 6921 SAN FERNANDO RD., GLENDALE, CA 91201
A) DESIGNING WITH TTL FROM'S AND ROM'S
SEND DETAILED ORDER INFORMATION FOR OTHERS YOU HAVE THAT YOU HAVE FOUND
USEFUL.

INFO FROM AND ABOUT SUPPLIERS - NOTE: ANYTHING YOU READ HERE IS SIMPLY
INFO OBTAINED FROM PARTICIPANTS OR SUPPLIERS AND IT IS UP TO YOU TO
VERIFY THE ACCURACY OF THE INFORMATION AND THE INTEGRITY OF THE COM-
PANIES.

MAURY GOLDBERG, CELETRON COMMUNICATIONS CORP., 1618 JAMES ST., SYRACUSE,
NY 13203. SOME OF YOU RECEIVED A FLYER FROM MAURY. IT FEATURED 2102-S-2
MIL SPEC AT $9.99 EA, 8 FOR $75.32 FOR $280. HE IS WORKING WITH TECH-
NIQUES TO PROVIDE A 4K BOARD. HE ALSO HAS THE COM 2502 UART FOR $9.95
AND WILL SUPPLY A DIAGRAM FOR A TTY INTERFACE FOR THE MARK-8. HE IS
WILLING TO PUT TOGETHER AN IC KIT FOR THE MARK-8 IF THERE ARE ENOUGH
PEOPLE INTERESTED.

KA ELECTRONIC SALES, 1220 MAJESTY DRIVE, DALLAS, TX 75247 WILL SUPPLY
THE MF8008 (MICROSYS INTERNATIONAL 8008 - WORD IS THE MF8008 USUALLY
RUNS MUCH FASTER THAN THE INTEL) FOR $66.

DUE TO AN UNFORTUNATE COMBINATION OF TIMING AND LOCATION, M&R ENTERPRISES
PO BOX 1011, SUNNYVALE CA 94088 WAS INDIRECTLY CONNECTED WITH ELECTRON-
IC COMPONENT SALES. THERE IS NO CONNECTION WHATSOEVER. I MUST
APOLOGIZE TO MARTIN J. SPERGEL FOR IMPLYING THAT THERE MIGHT BE SOME
CONNECTION. HE HAS TALKED TO ME SEVERAL TIMES AND HAS SOME COLOSSAL BUYS
FOR MARK-8 BUILDERS AND CAN COME UP WITH MORE IN THE FUTURE. IF YOU ARE
STILL SUSPICIOUS, HE SUGGESTS THAT YOU CONTACT HIM FOR A BANK REFERENCE.
His COLOSSAL BUYS IS THE MF8008 FOR $60 OR A PARTIAL KIT INCLUDING THE
MF8008, 15 7400'S, AND ALL OF THE RESISTORS AND THE 1 CAPACITORS FOR
THE MARK-8 FOR $75. HE WILL SUPPLY A COMPLETE KIT OF PARTS FOR ROGER
SMITH'S TTY AND CASSETTE TAPE INTERFACE FOR THE TVT UNLESS $35 MINUS
THE SWITCH AND PC BOARD. HE SUGGESTS THAT THOSE INTERESTED IN BUILDING
IT SEND AWAY TO TECHNIQUES QUICKLY FOR THE PC BOARD OR IT WILL BE A LONG
WAY. HE HAS 100 KITS OF PARTS AVAILABLE AND IT WILL BE AFTER THE FIRST
OF THE YEAR BEFORE HE WILL HAVE MORE. ALSO SEE HIS FLYER IN THE BACK
OF THE NEWSLETTER FOR TVT IC'S. HE HAS 2102'S FOR $10 AND MOLEX SOCKETS.
WOULD YOU LIKE A 150 MHZ TSCM FOR AROUND $600 OR A TV CAMERA AND
ORDER VERY CHEAPLY? WRITE MARTIN AND SEE HOW HE IS DOING ON ACQUISI-
TION. WRITE HIM IF YOUR INTERESTED IN A MIDI KIT INCLUDING MF8008,
ALL 7400'S, RESISTORS, 1 CAPS, & 8 PRIME QUALITY 1101'S. THE
MIDI KIT COULD BE AROUND $125 IF ENOUGH PEOPLE ARE INTERESTED.
HE HAS 1702A PROMS FOR $40.
A FLYER WAS SUPPLIED BY MNH-APPLIED ELECTRONICS. ADAM TRENT HAS DONE BUSINESS WITH HIM AND WAS VERY PLEASED WITH SOME ITEMS BUT WARNED THAT A TTL REJECT ASSORTMENT CONTAINED NO GOOD DEVICES. CHECK WITH DR. MICHAEL N. HAYES, THE OWNER REGARDING WHAT YOU CAN EXPECT AND ASK HIM TO SUPPLY ALL OF HIS BACK CATALOGS AT THE SAME TIME.

SOME OF THE OLD STANDBY SUPPLIERS THAT PARTICIPANTS KEEP MENTIONING ARE INTERNATIONAL ELECTRONICS UNLIMITED, POLY PACS, BILL GODBOUR, JAMES, BABYLON, SOLID STATE SALES. SOME OF THE INFO IS A LITTLE CONTRADICTORY BUT THEY ALL ARE RELIABLE AND YOU CAN EXPECT SOMEWHERE AROUND 5% FAILURES. THAT MAY NOT BE SO BAD ANYWAY BECAUSE NEW DEVICES JUST MIGHT CONTAIN THE SAME PERCENTAGE OF BAD ONES. IN ANY CASE, KEEP TRACK OF THE COMPANY YOU BOUGHT THE IC’S FROM AND TRY TO CHECK THEM BEFORE YOU SOLDER THEM IN AND MAKE THEM SEND YOU AN EXCHANGE ON THE BAD ONES. A HIGH PRIORITY INTERFACE UNIT FOR THE MARK-8 WILL BE A UNIVERSAL IC TESTER. THIS, TEAMED WITH A MINI ENVIRONMENTAL UNIT, SHOULD MAKE SURPLUS IC CHECKING A SNAP.

MANY OF YOU HAVE ALREADY HEARD THE UGLY STORY ABOUT ELECTRONIC COMPONENT SALES. A LARGE ARTICLE APPEARED IN OCT 14, 1974 ELECTRONIC NEWS. RUMOR HAS IT THAT A STANFORD STUDENT WITH 12 ALIASES PLACED THAT AD AND HAS ACCUMULATED MORE THE $400,000 IN SMALL ORDERS, MANY FROM LARGE FIRMS. THE POST OFFICE AND FBI ARE AFTER HIM. I HAVE HEARD SEVERAL REPORTS THAT HE HAS STARTED TO DELIVER AND OR REFUND MONEY BUT THIS MAY REALLY BE BAD NEWS. IF HE DELIVERS ANYTHING, HE CAN SIT ON THE OTHER ORDERS SINCE HE DIDN’T SAY WHEN HE WOULD DELIVER. IF HE GET TO YOU, SEND A LETTER ASKING FOR IMMEDIATE DELIVERY OR REFUND. YOU MAY BE ABLE TO SALVAGE YOUR MONEY. IT SURE MAKES ONE REALIZE HOW VULNERABLE HE IS WHEN HE SENDS HIS CASH AWAY. BETTER STICK WITH WELL RECOMMENDED SUPPLIERS UNTIL YOU CHECK THESE OTHER GUYS OUT CAREFULLY.

PEOPLE’S COMPUTER COMPANY - BOB ALBRECHT HAS ALWAYS HAD ABOUT A 5 YEAR VISIONARY JUMP ON EVERYONE ELSE REGARDING THE COMPUTER FIELD. HE WAS INTO EDUCATIONAL COMPUTING BEFORE SCHOOL’S THOUGHT THEY COULD AFFORD A COMPUTER. HE HAS BEEN BRINGING RECREATIONAL AND EDUCATIONAL COMPUTING TO THE PEOPLE FOR THE LAST THREE YEARS THRU HIS PEOPLE’S COMPUTER COMPANY. (PCC) THE BEST WAY TO FIND OUT WHAT THEY ARE DOING IS TO SUBSCRIBE TO THE PCC NEWSPAPER, 11” X 17”, AT LEAST 24 PAGES AND FILLED WITH EXCITING AND ENTERTAINING INFO. BOB HAS AGREED TO MAKE THE MARK-8 USERS AN OFFER THEY JUST CAN’T REFUSE. TELL HIM YOU READ ABOUT IT IN THE NEWSLETTER AND YOU CAN GET A REGULAR $5 YEARLY SUBSCRIPTION (STARTS WITH SEPT 74 ISSUE) OR A RENWAL FOR ONLY $3. ( 5 OR MORE ISSUES A YEAR ) IT’S THE BEST $3 YOU CAN SPEND. I RECOMMEND THAT YOU GET THE 9 BACK ISSUES FOR $6. BOB SAYS THE $3 DEAL EXPIRES JAN 1, 75. HE THINKS MICRO-COMPUTERS ARE THE WAVE OF THE FUTURE AND IS NEGOTIATING A DEAL WITH INTEL TO GET SOME 8080 AND 8008 SYSTEMS AND HOPES TO WRITE SOME ASSEMBLY LANGUAGE BOOKS. IF THEY ARE ANYWHERE AS GOOD AS HIS BASIC LANGUAGE BOOKS THEY WILL BECOME CLASSICS.

A SOLUTION TO THE MEMORY BOARD IC SOCKET PROBLEM - ADAM TRENT SUGGESTS USING AUGAT SOCKET PINS FOR THE MEMORY BOARD. (I TRIED IT AND IT WORKS GREAT! SEE MNH FLYER IN BACK FOR SURPLUS AUGAT BOARDS. I USED A DIAG- ONAL PLIERS TO LIFT THE PINS OUT OF THE MOUNTING BOARD. YOU DON’T EVEN HAVE TO REMOVE THE WIRE WRAP WIRE. LIFT THE PIN, GIVE IT A FEW BACKWARD TWISTS AND OUT IT COMES. THESE CAN BE TAPPED INTO THE MEMORY BOARD HOLES AND EASILY SOLDERED. THIS IS A MUST FOR AT LEAST ONE OF THE 1K MEMORY BOARDS SO YOU CAN GET THE 1101’S CHECKED OUT AND BURNED IN. )
POWER SUPPLIES

1) THE PRECISION SYSTEMS POWER SUPPLY IS GREAT BUT NO CIRCUIT DIAGRAM IS PROVIDED. YOU DON'T REALLY NEED ONE BUT IT WOULD BE NICE TO KNOW WHAT ALL THAT EXTRA GARBAGE IS THERE FOR.

2) CELETRON ELECTRONICS, 1618 JAMES ST., SYRACUSE, NY 13202 WILL SUPPLY A LOW COST KIT DESIGNED BY STEVE CIACIARA.

3) FIGURE A SHOWS CIRCUITS RECOMMENDED BY NATIONAL FOR A 5 VOLT AND -9 VOLT SUPPLY.

4) IF YOUR REGULATOR GOES, SO DO ALL YOUR ICS INCLUDING THE ALL IMPORTANT CPU CHIP. YOU NEED A CROWBAR! (THIS SHORTS OUT THE SUPPLY ON OVERVOLTAGE.) TWO CIRCUITS ARE SHOWN IN FIGURE B.

TERRY RITTER, DANTCO, 2524B OLEN SPRINGS WAY, AUSTIN TX 78741, 512-441-0036 HAS PROVIDED 14 PAGES OF DETAILED INFO. SOME THINGS ARE INCLUDED HERE AND OTHERS WILL HAVE TO WAIT FOR FUTURE NL’S. HE WAS THE FIRST TO SAY HE GOT HIS MARK-8 RUNNING SEVERAL MONTHS AGO. HE IS NOW Frustrated WITH THE "DISAPPEARING DATA" PROBLEM OF SEMICONDUCTOR MEMORY AND IS THINKING ABOUT STANDBY POWER SYSTEMS. 1101’S ARE SUPPOSE TO RETAIN DATA AT -2, +5 VOLTS BUT 30% OF HIS IEU ONES DO NOT. HE PROPOSES THIS TEST FOR "GOOD" 1101’S: STORE DATA, CHECK IT, THEN RETURN TO -9 TO -2 V FOR 5 MIN. THEN RETURN TO -9 V AND CHECK FOR STORED DATA ERRORS. HE SPENT 40 HOURS REMOVING BAD IC’S FROM A MEMORY BOARD. HE STRONGLY SUGGESTS MR. TITUS’S "FLATPACK" MOUNTING SCHEME. (THE AUGAT SOCKET PIN TRICK WORKS WELL TO.) HE SUGGESTS USING CIRCUIT STICK ADHESIVE IC PADS ON THE TOP OF THE MEMORY BOARDS IF YOU TRY TO SOLDER IN MOLEX SOCKET PINS. THE OUTER HOLES APPEAR OVER THE PC RUN AND ALLOW CONNECTION TO BE MADE BY SOLDERING THRU THE HOLE TO THE RUN. HE IS SERIOUSLY WORKING ON THE CASSETTE TAPE INTERFACE AND THINKS A GOOD DEAL OF THE WORK CAN BE DONE WITH SOFTWARE RATHER THAN HARDWARE.

M. PAUL FARR, 3723 JACKSTADT, SAN PEDRO, CA 90731 POWERED UP HIS MARK-8 ON 6 NOV. IT RAN PERFECTLY AFTER HE FOUND A SHORT BETWEEN PINS 1 AND 13 OF 1C10 ON THE CPU BOARD. (IT APPEARS OBVIOUS THAT WE HAVE FOUND ALL OF THE ERRORS.) PAUL IS A CHEMIST FOR RALSTON PURINA - VAN CAMP DIV. AND HAS HAD ELECTRONICS AS A HOBBY FOR YEARS. HIS MARK-8 CONSISTS OF THE INITIAL 6 BOARDS HE ETCHED HIMSELF AS WELL AS AN EXTRA OUTPUT LATCH AND MEMORY BOARD. HE USED 1101’S FROM IEU WITH APPARENTLY OUTSTANDING SUCCESS. HE ETCHED THE BOARDS WITH EDGE CONNECTORS AND REVERSED THE FOIL PATTERN SIDES ON THE MEMORY BOARDS AND WISHES HE HAD DONE SO ON ALL OF THE REST OF THE BOARDS. HE IS OFFERING THE REVERSE ETCHED MEMORY BOARDS UNDRILLED AND UNTRIMMED FOR $6.00 EA. HE IS OFFERING TO HELP ANYONE IN THE L.A. SAN PEDRO AREA AS A PERSON WHO HAS A MARK-8 RUNNING. HIS UNIT IS BEAUTIFUL AND WELL WORTH GOING OUT OF YOUR WAY TO LOOK AT.

ROBERT COOK, 25W178-39TH ST., NAPERVILLE, IL 60540 GOT HIS MARK-8 RUNNING ON 5 OCT. HE USED 1101’S FROM IEU AND HAS FOUND 5 BAD ONES SO FAR. HE IS BUILDING THE MODEM CIRCUIT FROM THE 4/18/74 ELECTRONICS MAG. AND WILL REPORT ON RESULTS.

LARRY PLESKAC, 959 PAULA ST., ESCONDIDO, CA 92027 ALSO GOT HIS MARK-8 RUNNING ON 5 OCT. HE SAYS HE HAD PROBLEMS WITH POLY PAC IC’S AND EXCELLENT LUCK WITH I.E.U. ZERO INSERTION FORCE IC SOCKETS CAN BE PURCHASED FROM TEXTool P R O D. INC., 1410 PIONEER DR., IRVING, TX 75061, 214-259-2676. ADVANCED MICRO DEVICES AM 2807 IS A DIRECT REPLACEMENT FOR A 2524. HIS CIRCUITS FOR OCTAL READOUT AND STATE DISPLAY ARE INCLUDED IN FIGURE C.

DON GOLENSEKIE, BOX A-375, CAMARILLO, CA 93016 SAYS 2107-8 4K RAM’S ARE $12 IN LOTS OF 100. IF WE COULD FIND SOMEONE TO DESIGN A PC BOARD AND REFRESH CLOCKS, ETC, 4K OF MEMORY COULD BE HAD FOR ABOUT $120.
STEVE CIARCIA, 41 HILLTOP DR., WEST HARTFORD, CT 06107 HAS A LOT OF INTERESTING THINGS GOING. HE STOPPED BY SCELBII'S OFFICE AND TOOK A LOOK AT THEIR KITS AND PC BOARDS AND TALKED TO THE MANAGEMENT. HE WAS SO IMPRESSED WITH THEIR DESIGN AND QUALITY THAT HE BOUGHT AN UNPOPULATED BOARD SET FOR $130 AND SHOULD HAVE HIS MACHINE RUNNING NOW. HE ALSO DESIGNED THE SCROLLING MODIFICATIONS TO THE TVI (SCROLLING MEANS ALL LINES POP UP AND THE BOTTOM LINE IS CLEARED OUT WHEN A LINE FEED OCCURS AT THE BOTTOM OF THE SCREEN). THE SCHEMATIC IS SHOWN IN FIG. 1. IT IS SET UP FOR MANUAL SCROLLING NOW BUT IT WOULD BE A TRIVIAL MODIFICATION TO DETECT LINE FEEDS OR CONTROL CHARACTERS AND SCROLL. TRY THE MODS ON YOUR TVT AND SEND IN A FINISHED CIRCUIT THAT DOES IT ALL. THE 10K AND 50K POT ADJUSTMENTS ARE CRITICAL SO MAKE THEM 10 TURN TRIMMERS.

STEVE WRITES, "I'VE FINALLY DEVISED A WAY TO SUCCESSFULLY SCROLL, RESET THE CURSOR, AND PROVIDE AN ERASED LINE WITH ONLY A 4 CHIP ADDITION TO THE BASIC TVT. THE PRESENT SETUP WILL ALLOW SCROLLING UP OR DOWN, RESETING THE CURSOR TO TOP LEFT OR BOTTOM LEFT, AND WILL ADD A BLANK LINE AT THE BOTTOM. FOUR PC BOARD TAPES WILL HAVE TO BE CUT. IC1 (7408) IS INSERTED BETWEEN IC10 OF THE DERIVED TIMING BOARD AND THE OUTPUT CONNECTOR. IT'S PURPOSE (WITH IC2 & 3) WHEN TRIGGERED BY THE FRAME SYNC AFTER A SCROLL COMMAND IS TO DELAY THE PHASE 1 & 2 CLOCKS TO THE MEMORY DEPENDING ON THE SETTING OF THE 10K POT ON IC3, THE SCREEN WILL SCROLL UP OR DOWN ON COMMAND. THE TAPES ON IC4-1 AND 13 (CURSOR BOARD) MUST ALSO BE CUT. IC3-9 NORMALLY IS CONNECTED TO IC4-1 (UP) FOR THE CURSOR TO RESET TO TOP LEFT BUT WILL RESET TO BOTTOM LEFT IF CONNECTED TO IC4-13 (DOWN). WITH CURSOR CLEAR SWITCH IN THE NORMAL POSITION (AND NO SCROLL COMMAND) THE TVT OPERATES AS ALWAYS. IN THE DOWN AND SCROLL POSITIONS, THE CURSOR WILL RESET TO BOTTOM LEFT, THE TVT WILL SCROLL UP ONE LINE AND PROVIDE A BLANK BOTTOM LINE ON A SCROLL COMMAND. CHANGING SW POSITIONS AND IC3 TIME CONSTANT AND TRIGGERING EDGE OF IC4 WILL DO THE SAME THING IN THE OTHER DIRECTION.

STEVE ALSO PROMISES TO PROVIDE US WITH A HARVARD BIPHASE CASSETTE TAPE UNIT INTERFACE THAT WILL WORK. WRITE HIM AND GIVE HIM SOME WORDS OF ENCOURAGEMENT AND THE CASSETTE TAPE PROBLEM MAY DISAPPEAR.

A CLEVER CONCEPT FOR HOBBYISTS HAS BEEN INITIATED IN DENVER. A SMALL GROUP OF DEDICATED GUYS HAVE GOTTEN TOGETHER AND ARE SHARING RESOURCES. THEY ARE THE DIGITAL GROUP, PO BOX 6928, DENVER, CO 80206 AND BETWEEN THEM THEY HAVE AN ENORMOUS RANGE OF RESOURCES. ANYONE NEAR THE DENVER AREA SHOULD CONTACT THEM. THEY ARE WORKING ON AN ELABORATE CASSETTE TAPE INTERFACE THEY INTEND TO SHARE WITH THE REST OF USE WHEN THEY GET IT WORKING. THEY INTEND TO DEVELOP A BASIC WHICH WILL MAKE EVERYONE OVERJOYED. THEY MENTIONED MANY OTHER THINGS THEY HAVE IN THE WORKS. PERHAPS THEY WILL GIVE US AN UPDATE OF WHAT WE CAN SHARE IN SOON. THEY HOPE TO HAVE THEIR OWN PROGRAMMER SOON AND PRESENTLY HAVE ACCESS TO ONE. THEY HAVE BEEN PROVIDING ME WITH REPRINTS OF MAGAZINE ARTICLES ABOUT MICROCOMPUTERS. I'LL GIVE A BIBLIOGRAPHY AND REVIEW WHEN ROOM PERMITS. MAYBE WE CAN GET THEM TO WRITE A NEWSLETTER EDITION.

J. M. LAMIET, 1615 COLORADO BLVD., DENVER, CO 80220 BUILT A 16 BIT MICROPROGRAMMABLE MACHINE WITH 1K MEMORY. HE IS WILLING TO SHARE INFORMATION. HE STUDIED EE AS AN UNDERGRAD AND IS NOW A JUNIOR AT THE UNIV. OF COLO. MED. SCHOOL. (IT'S AMAZING HOW MANY DOCTORS AND MEDICALISTS ARE INTO HOBBY COMPUTERS!). HE IS PRESENTLY INVOLVED USING DATA GENERAL NOVAS IN MONITORING EKG'S AND IS WILLING TO SHARE EXPERIENCES WITH OTHERS.
GREGORY HART (WASENV), 8948 RAMSTAD AVE., FAIR OAKS, CA 95628 PLANS TO CONSTRUCT A MORSE CODE DECODER, RTTY SPEED CONVERTER, AND BALDUT TO ASII CONVERTERS.

BURTON DURF, 315 OVINGTON AVE., BROOKLYN, NY 11209 EXPRESSED INTEREST IN THE MITS TERMINAL BUT CAN'T BELIEVE THE HIGH PRICE AND WONDERED IF ENOUGH PEOPLE WERE INTERESTED. IF WE COULDN'T GET A PRICE BREAK (THE SOUTHWEST TECH PROD. TVT'S APPEAR TO BE MUCH BETTER & CHEAPER).

RONALD E. SEIBEL, 10 B ADAMS ST., AVON PARK, FL 33825 SUGGESTS NEWSLETTER SUBSCRIPTIONS PLATED THRU PC BOARDS. HAS A 4004 AND WANTS TO KNOW WHAT TO DO WITH IT. RECOMMENDS SOLID STATE SYSTEMS FOR A/D AND D/A CONVERTERS, AND WONDERS ABOUT THE COST OF TAPE READERS AND PUNCHES, DISC MEMORIES, OTHER MICROPROCESSORS, AND HOW MUCH PLATED THRU HOLES WOULD ADD TO THE COST OF THE PC BOARDS.

WILLIAM SCHENER, M.D., 1515 NEWELL AVE., WALNUT CREEK, CA 94596 HAS HOOKED UP WITH DR. KEN McGINNIS OF SAN MATEO AND THEY MAY DO SOME MEDICAL COMPUTER WORK TOGETHER. HE ALSO HEARD FROM SENIOR MED STUDENT MARK SPOHR. HE MAY BECOME INVOLVED IN SETTING UP AND PART TIME TEACHING A BIO-MEDICAL/COMPUTER MEDICINE CURRICULUM AT THE LOCAL JUNIOR COLLEGE.

DR. WILLIAM LENNON, NORTHWESTERN UNIVERSITY, COMPUTER SCIENCE LAB DIRECTOR, EVANSTON, IL 60201 SAYS THEY ARE CURRENTLY CONNECTING AN 8008 PROCESS CONTROLLER AND AN INTELLEC 6090 TO THE COMPUTER NETWORK. HE WANTS TO ENCOURAGE FORMATION OF AN ACTIVE 8008 GROUP WITHIN THE DIGITAL EQUIPMENT USER GROUP. HE SUGGESTS BONUS-WIK MADE BY EASY ELECTRONIC CO., PO BOX M-33, FREMONT, CA FOR GETTING SOLDER AWAY FROM IC'S BEFORE REMOVAL.

J P BERNIER, 1005 GRENOBLE, STE FOY, QUE 10, 61V 228 WANTS TO STANDARDIZE I/O AND CASSETTE FORMAT. (EVERYONE DOES BUT NO ONE WANTS TO SAY WHAT IT WILL BE.)

LARRY PLATE, 2320 SKYLINE WAY, SANTA BARBARA, CA 93109 IS USING HOELE SOCKETS FOR ALL IC'S AND HAS AN ELABORATE "MICRO-SOLDERING" SCHEME WORKED OUT. HE EXPRESSED CONCERN OVER HOW THE MARK-3 BOX IS USED. (MY PURPOSE IN COMPILING IT WAS TO ALLOW ANYONE TO CONTACT ANYONE ELSE, INCLUDING SUPPLIERS. I DON'T THINK ANYONE REALLY READS.)

GARY T. POST, 475 B BROOKS, LEMOURE, CA 95245 WAS IMPRESSED WITH THE TABLE OF CONTENTS FOR THE MARTIN BOOK (ENOUGH GUY'S HAVE ORDERED IT SO WE SHOULD GET IT SHARED AROUND WITH LITTLE DIFFICULTY. LET'S GET 300 PAGES AT 5 CENTS PER PAGE ----). HE THINKS WE CAN GET SOME SUPPLIERS TO PROVIDE MEMORY CHIPS, ETC. CHEAP IF WE CAN SHOW THEM THAT WE REPRESENT A LARGE MARKET. THE IDEA OF DUREN ELECTRONICS HAS A CIRCUIT TO ADD A PERSONAL CODE TO ANY WORD. HE SUGGESTS THINKING ABOUT SUCH A WAY OF SWITCHING FOR SEGMENT'S LABEL. HE WANTS A STANDARD CASSETTE FORMAT. HOW CAN HE CORRESPOND TO "ELECTRONIC ENGINEERING"? HE TOOK THE SAME KIND OF HOELE CONNECTORS FOR THE MARK-3 BOX FOR THE TVD AND WILL USE A FAN TO BLOW THE HEAT OUT AND HOPES THE NEXT PROJECT LIKE THE MARK-3 IS PLANNED A LOT BETTER.
ROBERT W. THOMAS, 910 SONNAN, PORTAGE, PA 15133 INQUIRED FOR AN INPUT BUS USING 74125'S THAT WOULD AVOID THE USE OF THE SPECIAL SIGNIFICANT IC'S. IT IS QUITE SIMILAR TO THE KG'S FIT I/O IMPLEMENTATION SINCE MR. TITUS PROPOSED AND PUBLISHED A I/O EXPANSION SCHEME THAT WILL PROBABLY BE ADOPTED BY MOST PEOPLE. HIS IS NOT INCLUDED HERE. WRITE HIM FOR A COPY IF YOU ARE INTERESTED.

C. S. BAUER, IEMS DEPT., FLA TECH UNIV., PO BOX 25000, ORLANDO, FL 32816 IS STILL LOOKING FOR ZERO INSERTION FORCE IC SOCKETS. (TRY CIRCUIT DESIGN, BOX 24, SHELTON, CT 06484 #STPC-01 AT $3.75.)

PETER SPOERRI WANTS INFO ON ALTERNATE POWER SUPPLIES. (INCLUDED)

ANDREW W. LEPP RECEIVED EXCELLENT SERVICE FROM JAMES ELECTRONICS AND WANTS TO KNOW THE DIFFERENCE BETWEEN AN 8008 AND 8080. (ABOUT $300 NOW, LESS LATER, ABOUT 10 TIMES AS POWERFUL, ONLY A FEW IC'S ARE NEEDED FOR A COMPUTER. WRITE TO INTEL FOR THE 8080 BOOK AND SEE THE JAN PDP ELECT.)

GREG HUNTZINGER, 2382 OAKLAND ST., AURORA, CO 80010 WANTS TO BUILD A TV/T FOR HIS TV STUDIO BUT WANTS TO COMMUNICATE WITH SOMEONE THAT HAS MADE THE TV MODIFICATIONS NECESSARY.

BILL MILLER IS WORKING ON A TAPE CASSETTE CONTROLLER.

MARK SPOHR, 527 LAFAYETTE AVE., CINCINNATI, OH 45220 HAS A BSEE AND IS NOW A SENIOR MED STUDENT AT UNIV. OF CINCINNATI AND IS INTERESTED IN USING THE MARK-8 FOR DIAGNOSIS, TREATMENT, DRUG DOSAGE INTERACTIONS, AND HEALTH SYSTEMS PLANNING. (SEVERAL DOCTORS HAVE GOTTEN TOGETHER THRU THE NEWSLETTER SO FAR.)

W. H. BURTNER, RR2, BX 267, VALPARAISO, INDIANA 46383 IS HAVING TROUBLE WITH SOME OF THE "INSIDE TERMS" SUCH AS SCROLLING, FLOPPY DISK, INTELLIGENT TERMINAL, ETC. HE IS INTERESTED IN THE KG'S KIT. (I'VE SEEN THEIR MANUAL AND STAY AWAY FROM IT UNTIL THEY REVISE IT COMPLETELY AND CONVERT TO PC BOARDS. IT IS NOW A WIREWRAP LIST, A SURPLUS WIRE WRAP BOARD THAT HAS TO BE UNWRAPPED AND THE COMPONENTS. IT WOULD BE HARDER TO GET WORKING THAN A MARK-8 AND THEIR I/O SYSTEM IS WEIRD.)

ANGEL BRAVO, 10333 FELSON ST., BELLFLOWER, CA 90706 UNFORTUNATELY GOT TAKEN BY ELECTRONIC COMPONENT SALES FOR $131. IF ANYONE GETS ADDITIONAL INFO ON HOW HE CAN GET HIS MONEY BACK, PLEASE LET HIM KNOW.

TERRY G. HARRIS, 417 NORTHWESTERN DR., GRAND FORKS, ND 58201 WOULD LIKE TO BUILD AN 8080 SYSTEM BUT IS STOPPED BY THE PRESENT COST. HE PROVIDED A REPRINT FROM COMPUTER DESIGN, OCT 74 PAGE 112 THRU 117 THAT IS WORTH LOOKING UP ON A CASSETTE TAPE SYSTEM. HE APPARENTLY HAS ACCESS TO A PDF-8 BECAUSE HE WANTS THE PDF-8 CROSS ASSEMBLER. (DEC HAS AN ELABORATE PDF-8 SUPPORT PACKAGE FOR THEIR 8008 MPS MODULE SERIES.)

WILLIAM SEVERENCE, MAIN ST., CENTER LOVELL, ME 04016 SAYS POLY PACS IS EXCELLENT AND WATCH OUT FOR BAD IC'S FROM IEU. HE BOUGHT THE PRECISION SYSTEMS POWER SUPPLY FOR $48 AND SAYS ITS GREAT BUT WOULD LIKE A SCHEMATIC. HE RECOMMENDS THE SCEL81-88 USER MANUAL. HIS FSK MODEM CIRCUIT IS IN FIGURE 14, PARTS 1 AND 2.
JOHN M. GELHOUN, 1247 CENTER ST., BERKELEY, CA 94704 OF EDUCATIONAL TESTING SERVICES SAYS ALTHOUGH ELECTRONICS WAREHOUSE BURNED DOWN (THEY ARE STILL ADVERTISING?), HE KNOWS BILL GODBOUR AND HE IS AN ALL-AROUND GOOD GUY AND HAS EVERYTHING FOR THE MARK-8. HE IS INTERESTED IN 8080'S AS SOON AS THEY GET CHEAPER AND IS INTERESTED IN A CARD READER AND PUNCH NO MATTER HOW SLOW, CLUMSY, ETC. AS IT WOULD PROVIDE A STANDARD MEANS OF DATA INTERCHANGE.

MORRIS KRIEGER, 37 EIGHTH AVE., BROOKLYN, NY 11217 IS QUITE CONCERNED WITH GETTING ACCURATE INFORMATION SO HE CAN GET A UNIT WITH PERIPHERALS RUNNING AS EASILY AS POSSIBLE. (I THINK ALL OF THE BUGS HAVE BEEN FOUND AS SEVERAL UNITS ARE NOW RUNNING SUCCESSFULLY.) HE HOPES TO USE A TVI, CASSETTE TAPE, AND PAPER TAPE READER AND PUNCH.

DAVE BOWLES, 4501 GLEN HAVEN RD., SOQUEL, CA 95073 SAYS HE ORDERED AN 8008 FROM KA ELECTRONICS FOR $66 AND HAS EXPERIENCED 5% FAILURES FROM JEU SO TEST THEM BEFORE SOLDERING THEM IN. HE HAD THE SAME TROUBLE WITH SOLDER BRIDGES ON THE MEMORY BOARDS THAT EVERYONE ELSE IS HAVING. HE WOULD LIKE TO PROPOSE A USER GROUP CONFERENCE. (HOPE YOU GET TOGETHER WITH OTHER BUILDERS IN YOUR AREA BY WAY OF THE ROSTER.) HE WANTS A CHEAP 8080 (THAT'S SEVERAL MONTHS AWAY) OR A 8008-1 (WISH HAS IT THAT MOST OF THE MICROSYSYSTEM INTERNATIONAL MF8008'S RUN AT 800 KC).

MERRY CHRISTMAS EVERYONE. HOPE SANTA BRINGS YOU AN 8080 AND 16K OF 2102'S. HOPE YOU FIND THE INFO HERE READABLE AND USEFUL. I AM SICK AND TIRED OF WRITING, TYPING, DUPLICATING, FOLDING, STAMPING, ETC. NOW IT'S TIME TO GET MY 8008 SYSTEMS AND TVI RUNNING. THANKS FOR YOUR PATIENCE.

SINCERELY,
HAL SINGER
Fig D: Severence's FSK Modem - Page 1

Order COM 250Z UART for $9.95 from Celebon Electronics
1618 James St, Syracuse, NY 13203

Note: RDA & TBMT may be applied to data input bus as a flag word. Periodically, this word would be enabled by SWT and checked for activity. Or, SWE could be left permanently enabled and RDA could drive Mask & Interrupt Input.
Fig D Severence's FSK MODEM

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From Fig 20 FSK VCO
XIC-2207 VCO Data Sheet

Components for 300 Band
f space = 1070 Hz
f mark = 1270 Hz

C0 = .22 µF  R0 = 501 kΩ
C1 = C2 = .047 µF  C3 = .033 µF
R3 = 911 kΩ  R4 = 470 kΩ

Set f space first with low level on data input.

Order IC's from
EEP Corp
10180 W Jefferson Blvd
Culver City, CA 90230
213/838-1912

XR-210 $10 - XR-2207 = ?
ADDITIONS TO ROSTER AS OF DECEMBER 31, 1974

OAKLAWN HAWK PRODUCTIONS, 600 COLONIAL VILLAGE, BROOKINGS, SD 57006

R. C. PROTON, BOX 31, MIDLAND, MI 48640 IS INTERESTED IN INDUSTRIAL MINI-
COMPUTER APPLICATIONS INVOLVING INSTRUMENTATION, PROCESS MONITORING,
SERVO CONTROL, AND WANTS TO INTERFACE A TVT, BAUDOT TTY, FLUTTER, AND
SERVO ACTUATORS.

BOB ALBRECHT, PEOPLE'S COMPUTER CO., PO BOX 310, MENLO PARK, CA 94025
SEE FRONT OF NEWSLETTER FOR DETAILED INFO ABOUT BOB'S COMPANY.

HARRY E. ALLEN, 428 S. SPRING AVE., LAGRANGE, IL 60525

D. BERGGREN, 9207 SW 43RD AVE., PORTLAND, OR 97219 HAS RENOMED THE
MARK-8 AND IS MAKING HIS OWN BOARDS. HE IS USING 1103 MEMORY (MAYBE
HE CAN EXPLAIN REFRESH, SHARE HIS CIRCUITS, & DESIGN A 4K MEMORY CHIP
BOARD WITH REFRESH?). HE WILL USE THE MARK-8 TO CONTROL AN ELABORATE
EXISTING BURGLAR ALARM SYSTEM, FOR TEMPERATURE AND HUMIDITY CONTROL IN HIS
GREENHOUSE, FOR A LAWN SPRINKLER SYSTEM, & FOR BOOKKEEPING.
HE PLANS TO ADD A MODIFIED TVT, CORE MEMORY, CASSETTE TAPE, AND MODEMS.
HE WANTS A PRINTER OTHER THAN A TTY CAUSE TTY'S ARE TOO UNRELIABLE
(SLOW, UGLY, AND NOISY THEY ARE BUT UNRELIABLE THEY AREN'T). TALK TO
SOME USERS AND THEY WILL VERIFY EXCELLENT LONG TERM RELIABILITY.)
ANYONE HAVE OTHER SUGGESTIONS FOR LOW COST PRINTERS?

CARL BOMGARDNER, 26 HOUSTON AVE., MIDDLETOWN, NY 10940

PABLO E. CABAN, 188 GREEN ST., BROOKLYN, NY 11222

JOHN CATERALL, ELECTRONIC ASSOCIATES, 822 SOUTH N ST., LAKE WORTH, FL
33460 WILL USE THE MARK-8 FOR DESIGN OF MATV/CATV SYSTEMS, FOR TRANSISTOR CROSS REFERENCING, STOCK CONTROL, INVENTORY, & PRICING. HE PRESENTLY HAS AN RCA 70-15 AND AN RCA 70-35 HE IS BRINGING ON LINE.

LARRY D. CHANDLER, 550 SNELLING AVE., NORTH, APT. 203, ST PAUL, MN 55104
IS A DIGITAL SYSTEMS DESIGNER INVOLVED IN MINICOMPUTER PROGRAMMING.

NEVILLE H. CHANDLER, 210 ROSE ST., METUCHEN, NJ 08840

KENNETH E. CHARLTON, PROGRAMMING METHODS, GTE INFORMATION SYSTEMS,
1121 SAN ANTONIO RD., PALO ALTO, CA 94303

SPENCER C. CHERRY, 3444 E. INDIANOLA, PHOENIX, AZ 85018

PROF. ROBERT O. CHILDRESS, PO BOX 5004, TENNESSEE TECH, COOKEVILLE,
TN 38501

DAVID W. CLARK, PO BOX 22, BROWNSTOWN, PA 17508

MARK A. CONDICI, 410 WOODS LANE, APT. 6A, DOWNERS GROVE, IL 60515

ROBERT CONTI, 204 E. WILLOWOOD, VILLA PARK, IL 60181

HAROLD E. CRONIN, 556 ROWE ST., CHINA LAKE, CA 93555

RICK L. CUMMINGS, 900 PARKER ST., FORT WORTH, TX 76112

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W. E. DAVIES, 24121 MARATHON, MISSION VIEJO, CA 92675

C. O. DEGROOT, 159 W. 81 ST., #4J, NY, NY 10024 IS INTERESTED IN STORING AND RETRIEVING DATA ON A TAPE, RECORD, AND STAMP COLLECTION AND WANTS A GOOD CASSETTE CIRCUIT.

DOUG DRYE, 3202 WINCHESTER DR., GREENSBORO, NC 27406

GEORGE H. ENOS, SYSTEMS ANALYST, SCIENCE APPLICATIONS, INC., 2400 W. VALLEY PARKWAY, STE. 12, ESCONDIDO, CA 92025 WILL ADD PROVISIONS FOR TIME SHARING THE MARK-8 WITH HIS COMPANY'S DECSYSTEM-10 COMPUTER. HE IS WORKING ON A SYMBOLIC COMPILER AND WANTS TO KNOW ABOUT PRESENTLY DEFINED STANDARDS. (ARE THERE ANY?)

PAUL E. BECK, 1105 PALM DR., LAYTUN, UT 84041

GEORGE FISCHER, 72 SOUTH RAILROAD AVE., STATEN, ISLAND, NY 10305 WANTS TO KNOW IF THE USER GROUP IS OPEN TO BUILDING OTHER 8008 SYSTEMS SUCH AS THE SCELEI, ROS, EXPERIMENTERS LIBRARY MINI (WHAT'S THIS), MP PUBLISHINGS, AND HAL 1600. (YES) HIS INTEREST IS SOFTWARE AND IN PARTICULAR HE WANTS TO PROGRAM GAMES TO RUN ON 8008 MINI'S. HE ALSO MENTIONED THE AMATEUR COMPUTER SOCIETY.

R. S. FORMAN, 1142 KILOR CT., EUGENE, OR 97402

DAVID E. FULTON, 378 PARK AVE., RUTHERFORD, NJ 07070

F. GERSTELE, 1271 AIRKINS WAY, BOULDER, CO 80303

GILCHRIST, 7385 WEST CENTRAL, WICHITA, KS 67212

S. C. GILMORE, 2914 PERKINS LN., REDONDO BEACH, CA 90278

C. C. GINN, 3733 MINOT, FORT WORTH, TX 76133

PHIL GLAZER, ACE ELECTRIC SERVICE, 40 BROADWAY, AVE., TRENTON, NJ 08618

WILLARD E. GRANGER, 201 GREENWELL DR., HAMPTON, VA 23666

K. H. GRIFFITHS, MARINE SCIENCE INST., 700 STRAND, GALVESTON, TX 77550 PLANS TO USE THE SYSTEM IN SOME OCEANOGRAPHIC INSTRUMENTS.

LEE C. HANSON, 51 CES, BOX 648, APO SAN FRANCISCO, CA 96366 HAS HIS COMPUTER COMPLETE BUT IS WAITING THE POWER SUPPLY.

BRU. R. W. HARRIS, MONSIGNOR PARKELL HIGH SCHOOL, 2900 AMBOY RD., STATEN ISLAND, NY 10306 PLANS TO USE THE MARK-8 AS A TEACHING TOOL FOR ASSEMBLY LANGUAGE AND USE IT AS A DATA CONCENTRATOR TO USE THEIR TWO LOCAL TTY TERMINALS DURING SLOW HOURS. HE IS WRITING AN ASSEMBLER THAT WILL RUN ON THE TIMESHARE TERMINAL AND OUTPUT OBJECT CODE ON PUNCHED TAPE.
HARVEY HEINZ, 9730 TOWNLINE DIVERSION, SURREY B.C. CANADA, V3S 4N7 IS GOING TO UNDERTAKE CONSTRUCTION OF A LOW COST MARK-8 CARD READER AND WILL USE HIS MARK-8 FOR GAMES. HE PRESENTLY BUILDS INDIVIDUAL GAME MACHINES.

LARRY HENNE. 707 POTTER DR., COLORADO SPRINGS, CO 80909

DAVID HIGGS, KHIG/STEREO 105, P.O. BOX 1106, PARAGOULD, AR 72450 WOULD LIKE FOR US TO GET PL/M AND COMMIT IT TO PROM. (GOOD IDEA, EXCEPT PL/M IS A HUGE FORTRAN IV PROGRAM THAT RUNS ON A BIG MACHINE THAT CAN HANDLE FORTRAN IV.)

DR. RUDOLF HIRSCHMANN, 1345 S. BEVERLY GLEN, #1, L.A., CA 90024 IS ESPECIALLY INTERESTED IN GETTING A TEXT EDITOR PROGRAM FOR THE MARK-8 AND WOULD LIKE A MODEM CIRCUIT FOR CONNECTING IT TO THE UNIVERSITY COMPUTER.

PROF. PIERRE M. HONNELL, WASHINGTON UNIV., EE DEPT., SAINT LOUIS, MO 63130 IS PRESENTLY INVOLVED IN COMPLETION OF THE MATRIX COMPUTER, AN ANALYTIC MACHINE FOR SOLUTION OF MATRIX EQUATION SYSTEMS AND HOPES TO TIE IN A DIGITAL MACHINE AS SOON AS POSSIBLE.

MARK A. HUTCHINSON, RT. #4 BOX 306, JACKSON, OH 45640

JOE T. HUFFMAN, 1010 WASHBURN ST., CORONA, CA 91720

STEVE INGOGLIA, 1163 ROSEMARY ST., DENVER, CO 80220

LARRY S. JACOBSON, DEPT. OF PSYCHOLOGY, COLORADO STATE UNIV., FORT COLLINS, CO 80523 IS A GRAD STUDENT IN EXPERIMENTAL PSYCHOLOGY AND WILL USE THE MARK-8 TO AUTOMATE A DISCRIMINATION APPARATUS FOR USE WITH PRE-SCHOOL AGED CHILDREN.

GARY E. JOHNSTER, PSC BOX 6967, APO, SAN FRANCISCO, CA 96237 PLANS TO ADD LOW COST SHIFT REGISTER MEMORY (I'M WORKING ON THE SAME IDEA, GARY, SINCE I HAVE LOTS OF 1K S.R. I GOT VERY CHEAP.).

HARRY E. V. JOST, 111 WAVERLY ST., SHILLINGTON, PA 19607

T. N. KASPER, 2030 GREGORY ST., SAN DIEGO, CA 92104

DONALD R. KELLEY, FACILITY ENGINEER, FORT MCNAIR, WASH. D.C. 20319

RODNEY KOELLING, 1500 SPARKMAN DR., 12H, HUNTSVILLE, AL 35805

GARY W. KRAMER, RESEARCH ASSISTANT, DEPT. OF CHEM., PURDUE UNIV., WEST LAFAYETTE, IN 47907

A. KULESZ, 3014 N. HAUSSEN CT., CHICAGO, IL 60618

DALE J. LAMOTHE, 53 BONN-BADGODESBERG, KLOSTERBERGSTRASSE 13, MUFFENDORF WEST GERMANY WILL ADD A MODEM TO PERMIT COPYING RADIOT Y SIGNALS AND IS BUILDING AN ELABORATE PUSH BUTTON ASSEMBLY TO ALLOW DIRECT INSTRUCTION ENTRY THAT USES 15 IC'S AND 100 DIODES.

BARRY LAW, 1503 N. HAYDEN ISLAND DR., PORTLAND, OR 97217
HUN LEBELLO, OAKTON COMMUNITY COLLEGE, 7900 NORTH NAGLE, MORTON GROVE, IL 60053

BILL LEWIS, 6620 NE CUTTER, KANSAS CITY, MO 64119

SOL LIEB, UNION COUNTY TECHNICAL INSTITUTE, 1776 KARITAN RD., SCOTCH PLAINS, NJ 07076

GEORGE D. LOWE, 3615 N. PINE GROVE, APT. 3W, CHICAGO, IL 60613

JIMMY LOGOTHETIS, 107 6TH ST., BROOKLYN, NJ 08030

LUM LOU, 709 QUINNARD, ANNISTON, AL 36201

CLINT McDOWELL, ELECTRONICS DEPT. CHAIRMAN, DIABLO VALLEY COLLEGE, PLEASANT HILL, CA 94523

L. MCFAWNN, 2063 TRIUMPH DR., FAIRBORN, OH 45324

JEROLD R. MCGONIGLE, 5320 MOLTRIE RD., SPRINGVALE, VA 22151 EXPECTS TO USE HIS MARK-8 & TVT FOR A COMPUTER FOOTBALL GAME.

DAVE MALLERY, 1701 AGUA FRIA, SANTA FE, NM 87501 HAS BEEN A PROGRAMMER FOR EIGHT YEARS.

PHIL MORK, 12 WOODLAND RD., WESTON, MA 02193 PROVIDED SOME CIRCUITS FOR PERIPHERALS HE IS BUILDING. FIGURE 1 SHOWS A SCHEMATIC OF HIS MODEM CIRCUIT, FIGURE 2 SHOWS HIS INTERRUPT EXPANSION SCHEME, FIGURE 3 SHOWS HOW TO CONTROL AC LOADS FROM THE MARK-8, FIGURE 4 SHOWS HIS SCOPE DRIVER CIRCUIT, FIGURE 5 SHOWS HOW HE WILL CONNECT A ROM FOR OFTEN USED ROUTINES, FIGURE 6 SHOWS HIS CONTROL OUTPUT PORT ASSIGNMENTS AND A SAMPLE LOADER PROGRAM THAT CAN BE PUT IN ROM, FIGURE 7 SHOWS HOW HE WIRED HIS SWITCHES SO THAT YOU CAN'T JAM UNLESS YOU ARE IN SINGLE STEP, AND FIGURE 8 SHOWS HIS TVT/MODEM SELECTOR CIRCUIT. HE USED A 5MHZ CRYSTAL FROM POLY FACS AND DIVIDED BY 5 INSTEAD OF 4 USING A 7490. (THANKS FOR ALL THE INFO, PHILIP.)

ROBERT A. MAYER, RD #1, MILLMONT, PA 17845.

JIM MEHL, PO BOX 632, LOS GATOS, CA 95030 WILL USE HIS MARK-8 AS AN INTELLIGENT TERMINAL WITH LOCAL EDITING CAPABILITIES, FOR PERSONAL ACCOUNTING AND RECORD KEEPING, AND AS A CONTROLLER FOR ELECTRONIC GAMES.

AL J. MEIER, PSC4, BOX 10106, KESSLER AFB, MS 39534

ROBERT MIRAR, PO BOX 2028, CHAPEL HILL, NC 27514

RALPH H. MOLTZAU, 1568 MOLINA ST., HONOLULU, HI 96818

DON MORGAN, 225 N. PARK DR., SEYMOUR, IN 47274

G. SCOTT MORRIS, PLEIADES, 964 CREST ROAD., DEL MAR, CA 92014 HAS HIS OWN PDP-8/S AND TVT.

DON N. MORRISON, C/O ALBERTA RESEARCH, 11315 17 AVE., EDMONTON, ALBERTA, CANADA T6G 2C2

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THOMAS NEWMAN, 2230 SWEETWATER DR., SAN LEANDRO, CA 94578 PLANS TO INTERFACE A CRT, KEYBOARD, CASSETTE TAPE, PAPER TAPE READER, AND A NOVA 1200 AND WOULD LIKE A FORTRAN CROSS ASSEMBLER. HIS MARK-8 USES A 74126 TRISTATE BUS.

E. N. NOREN, 111-11033-127 ST. EDMONTON, ALBERTA, CANADA.

HAROLD L. NOVICK, ATTORNEY AT LAW, 2810 HENDERSON CT., WHEATON, MARYLAND ORDERED FROM ELECTRONIC COMPONENT SALES AND MOST OF HIS ORDER WAS FILLED BUT A REFUND WAS SENT INSTEAD OF THE 8008. HE RECOMMENDS THAT YOU AVOID DEALING WITH THEM. (I WONDER IF ‘ATTORNEY AT LAW’ HAD SOMETHING TO DO WITH GETTING THE ORDER?)

MOGENS PELLE, BIRKHOJTERASSERNE 416C, 3520 FARUM, DENMARK INTENDS TO USE HIS MARK-8 FOR ON LINE CONTROL OF EXPERIMENTS.

DEAN B. PETERSON, JR., 801 SANS SOUCI DR., APT. 201, RALEIGH, NC 27609

SSG JACKIE W. PIERCE, 460-84-4884, 178 SIG. CO., APO NY, 09102 IS USING A PE ‘SCOPE WRITER’ WITH THE SOUTHWEST TECH. PRODUCTS (STP) KEYBOARD, IS DOING SOME RESEARCH ON CASSETTE TAPE DATA RECORDING AND WANTS TO STANDARDIZE THE CASSETTE FORMAT AMONG MARK-8 USERS SO TAPES CAN BE TRADED. HE PROMISES TO FURNISH A CIRCUIT OF THE MODEM. HE IS ALSO WORKING ON A PENCIL MARK 3X5 FILING CARD READER. EACH SIDE OF A CARD WOULD ACCOMODATE ABOUT 35 8-BIT WORDS AND THEIR SYNCH BITS. THE CARD WOULD BE READ BY MOVING THE SENSOR ARM ACROSS THE CARD BY HAND. (THIS IS EXCITING! KEEP WORKING ON IT JACKIE AND LET US KNOW HOW IT WORKS OUT.) HE EXPECTS TO USE HIS MARK-8 FOR CONTROL OF EXPERIMENTS, DATA ACQUISITION, INFORMATION FILING ON CASSETTES, TEACHING AID, HOUSE SECURITY DEVICE, AND FOR HOUSEHOLD CONTROL FUNCTIONS.

NICK PINE, MS 08, GTE/IS, EAST PARK DRIVE, MT. LAUREL, NJ 08057

FRANK RACO, 1100 E. RENTON ST., CARSON, CA 90745

ROBERT REILING, 193 THOMPSON SQ., MOUNTAIN VIEW, CA 94043

R. D. REINEBECK, 899 FAIRFIELD RD., NORTH VANCOUVER, B.C., CANADA

GEORGE W. ROMPOT, 216 COLIER DR., SPRINGFIELD, IL 62704 HOPES TO WRITE PROGRAMS THAT WILL SIMULATE OTHER MINI-COMPUTERS AND IS EMPLOYED AS AN IBM 370/155 SYSTEMS PROGRAMMER FOR AN INSURANCE COMPANY.

R. O. RODGERS, 14428 SAN ARDO RD., LA MIRADA, CA 90638 TALKED TO A MICRO SYSTEMS INT. SALES REP. AND THEY CONSIDER THE MARTIN RESEARCH BOOK "MICRO COMPUTER DESIGN" THE BEST ONE AVAILABLE. MARTIN’S PRICE FOR THE BOOK AND THE MF8008 IS NOW $120.

W. MICHAEL SCHAFFER, 27 N. MIDLOTHIAN, MUNDELEIN, IL 60060

BENJAMIN SHAW, 1731 BONAIRES WAY, NEWPORT BEACH, CA 92660 THINKS THAT HE CAN OBTAIN LOTS OF 8008 SOFTWARE THAT HE CAN SHARE WITH OTHER USERS.
DAVID SCHULTZ, 122 MONTE VISTA, LOST ALAMOS, NM 87544 HOPES TO ADD OCTAL KEYBOARD ENTRY, OCTAL LED READOUT, AND HOPES TO BUILD A SPEECH SYNTHESIZER AND AUDIO RECOGNIZER EVENTUALLY.

MICHAEL SEMANCZUK, 40 WILLOW ST., ELMWOOD PARK, NJ 07407 PLANS TO INTERFACE HIS MARK-8 TO A LARGER COMPUTER AT WORK TO AID IN DEBUGGING.

DAVID W. SHORTHILL, 15567-12TH AVE., N.E., SEATTLE, WA 98155

SOLID STATE MUSIC, JOHN R. BURGOON, 1222 CAROLYN DR., SANTA CLARA, CA 95050 IS INTO THE DESIGN OF COMPUTERIZED CONTROL OF ELECTRONIC ORGANS AND WANTS TO COMMUNICATE WITH OTHERS WITH SIMILAR INTERESTS. SEE FLYER IN BACK LISTING MARK-8 PARTS HIS COMPANY CAN SUPPLY BUILDERS.

CHARLES SOOLEY, 28 KILMANAGH COURT, BRAMPTON, ONTARIO CANADA L6W 1A7

J. Soudriette, Drawer 7267, Norfolk, VA 23509

KEN STAMBAUGH, 5009 Guide Meridian Rd., Bellingham, WA 98225

NORMAN F. STANLEY, PO Box 723, Rockland, ME 04841 IS WORRIED ABOUT THE RELIABILITY OF DISCOUNT PRICED 8008'S. (RUMOR HAS IT THAT AT LEAST A COUPLE OF COMPANIES ARE OR WERE SELLING HIGH TEMP. FALLOUTS. M&R AND KA ELECTRONICS BOTH SAY THEY ARE SELLING FIRST RUN GUARANTEED MF8008'S. YOU'LL HAVE TO INQUIRE ABOUT WHAT OTHERS ARE SUPPLYING.)

JAMES A. STARK, M.D., 485-34TH ST., OAKLAND, CA 94609 WANTS TO KNOW IF ANYONE IS INTERESTED IN AN 8008 ASSEMBLY PROGRAM THAT RUNS IN "RUSH" ON THE INTERNATIONAL TIME SHARE SYSTEM.

F. STAUBER, 183 Woodville, Toronto, Canada M4J 2R4 WILL USE HIS MARK-8 FOR SPEED, DRIFT, AND HEADING CALCULATIONS FOR AIRPLANES AND TO RECEIVE AND SEND MORSE CODE. HE IS A GOVERNMENT COMPUTER SUPERVISOR FOR A 370/158.

ROBERT SUDING, (Wolmd), 370 South Queen St., Lakewood, CO 80226 HAS HAD HIS MARK-8 RUNNING FOR 2 MONTHS NOW WITH 512 BYTES OF MEMORY SOON TO BE EXPANDED TO 1K. HE HAS ADDED OCTAL KEYBOARD DATA ENTRY AND READOUT. HE WILL SOON HAVE A NEW LED BOARD BUILT WITH LED OCTAL READOUTS. HE IS MODIFYING THE TVT TO USE A MCM6571 UPPER & LOWER CASE CHARACTER GENERATOR.

ROBERT SWARTZ, 195 Ivy Lane, Highland Park, IL 60035

TIM TOPOLE, 2742 N. California, Chicago, IL 60647 WILL BE INTERFACING A SUPER BEE CRT AND A FLOPPY DISK.

ADAM TRENT, NASA/STDN, ASCENSION, Box A, Patrick AFB, FL 32925 IS FINISHING THE MARK-8 AND IS ABOUT TO START ON THE TVT AND WANTS TO KNOW WHERE TO GET USED TTY'S, DATA SHEETS FOR THE 8263'S AND 8267'S (WRITE FOR THE DATA BOOKS DESCRIBED EARLIER). HE SUGGESTED THE AUGAT SOCKET PIN SOLUTION TO THE MEMORY BOARDS. HE PROVIDED INFO ON MNH APPLIED ELECTRONICS AND TRIED AN ORDER OF ICA, ICC, AND ICD IC'S AND FOUND THEM ALL GOOD BUT AN ORDER OF 7400 REJECTS PRODUCED NO GOOD UNITS. ADAM IS ON A REMOTE ISLAND IN THE SOUTH ATLANTIC AND WANTS TO HEAR FROM PEOPLE REGARDING WHAT THEY INTEND TO DO WITH THEIR MARK-8'S.

JON TERNER, 301 Ocean Ave #8, Santa Monica, CA 90402
JON TYLER, 5625 JOHN R. RD., TRUY M1 48084 IS MAKING HIS OWN PC BOARDS.
HE MADE HIS OWN CAMERA FROM A MESHNA $11 LENS. HE IS MOST INTERESTED
IN WORD PROCESSING AND TYPESETTING APPLICATIONS.

JORGE VILLEGAS, AP. AEREO 55161, MEDELLIN, COLUMBIA, S.A. IS INTERESTED
IN A TVT AND WOULD LIKE TO BUY AN ASSEMBLED UNIT. (PERHAPS THE NEW
SOUTHWEST TECHNICAL PRODUCTS KIT IS WHAT YOU ARE LOOKING FOR.)

WILLIAM A. WALDE, 28 TUTTLE DR., ACTON, MA 01720 RECEIVED HIS PC BOARDS
IN SEPT. WITH REFERENCE NUMBER 2009 (DOES THAT MEAN OVER 2000 BOARD SETS
HAVE BEEN SOLD?) HE SAID BILL GOEBOUT ELECTRONICS, BOX 2673, OAKLAND
AIRPORT, CA 94614 SAID HIS $50 8008 IS AN INTEL UNIT TESTED AT 1 MHZ AND
GUARANTEED. WILLIAM CAUTIONS YOU ON ORDERING 8263 AND 8267'S FROM
A SIGNETICS DISTRIBUTOR. USE THE RIGHT NUMBER OR YOU MAY GET A MILITARY
GRADE CERAMIC FLATPACK AT $32.10. (N8263N & N8267B ARE RIGHT) HE SUS-
PECTS THE MOLEX CONNECTOR PART # IS WRONG AND WANTS TO KNOW IF 1101,
1101A, AND 1101A1'S CAN BE MIXED ON THE SAME BOARD. HE OBTAINED A CIRCU-
LAR FLOURESCENT LAMP WITH A MAGNIFYING GLASS IN THE CENTER TO AID IN IN-
SPECTING AND SOLDERING THE BOARDS. HE IS AN ASSEMBLY LANGUAGE PROGRAM-
MER ON BIG IBM, XDS, AND BURROUGHS MACHINES. HE RECENTLY BUILT THE PE
MARCH 74 LOGIC PROBE AND WAS VERY PLEASED WITH THE RESULTS.

JERRY WALKER, 761 CLAYTON, SAN FRANCISCO, CA 94117

J. W. WARD, 7236 CIRRUS WAY, CANOGA PARK, CA 91304

STEVE WASH, 7277 BLUFF ACRES DR., GREENWOOD, IN 46142 SUGGESTS THE FIG.
9 CIRCUIT SO THAT THE OUTPUT PORT LED'S WILL DISPLAY CONTENTS OF ANY
OUTPUT PORT.

GREGG WEBER, 1000 PLAZA DR., APT. 311-C, STATE COLLEGE, PA 16801

ROGER S. WELLS, 18AMS BOX 13258, APO SAN FRANCISCO, CA 96367 IS GOING
TO INTERFACE AN ELECTRIC TYPEWRITER.

J. SCOTT WILLIAMS, PO BOX 932, BELLINGHAM, WA 98225

PETER WOLFE, 42409 HIGHLAND DR., PO BOX 139, YARROWS, B. C. CANADA
VOX 2AO IS A STUDENT AT B. C. INSTITUTE OF TECHNOLOGY MAJORING IN ELECT/
ELECTRONIC TECHNOLOGY.

CARL K. ZETTNER (WSHFG), 108 MOSS DRIVE, SAN ANTONIO, TX 78213 IS A
EDF CONSULTANT AND A RADIO AMATEUR AND WILL USE THE MARK-8 FOR CONTROL-
LING HIS AMATEUR RADIO TTY STATION. HE POINTS OUT THAT THE DATAPoint
2200 HAS THE SAME INSTRUCTION SET WITH ONLY FOUR EXCEPTIONS SO DATAPoint
SOFTWARE MAY BE USEABLE WITH MINOR MODIFICATIONS.
FOR THOSE THAT MIGHT BE INTERESTED, MY COMPANY HAS AVAILABLE THE FOLLOWING MARK 8 COMPONENTS:

.1 MF 25 V ERUIG DISC CAPACITORS 17/$1.50
100 MF 25 V SPRAGUE TE1211 ELECTROLYTICS 1/$.40
1K OHM 1/4 WATT 5% RESISTORS 16/$1.10
1.8 K OHM 1/4 WATT 5% RESISTORS 1/$.05
33 PF DISC 1/$.10
7400 TTL 14/$2.50
7402 TTL 2/$.40
74L04 TTL 3/$1.20
7440 TTL 13/$3.00
7474 TTL 2/$.90
7410 TTL 2/$.45
7420 TTL 1/$.25
7442 TTL 5/$4.50
74123 TTL 2/$1.80
74173 TTL 4/$5.00
7475 TTL 8/$5.50
7476 TTL 3/$1.35
2501/1101 MOS 256x1 STATIC RAM 8/$16.00
8008 CPU (APPROX 3 WKS DELIVERY) 1/$60.00
MV5023 TYPE DIFFUSED RED OR CLEAR RED 33/$8.00
STATE PREFERENCE. THESE WILL BE MATCHED FOR APPROX. SAME LUMINENCE
18 PIN IC SOCKET FOR 8008 1/$1.25

THE ABOVE ARE AVAILABLE IN REASONABLE QUANTITIES AT THIS TIME. DO NOT SEND MONEY FOR 8008'S AT THIS TIME. IF INTERESTED, SEND SELF-ADDR. ENVELOPE AND I WILL ADVISE WHEN AVAILABLE. ALL THE ABOVE ARE TESTED AND GUARANTEED. CALIF. RESIDENTS ADD 6% SALES TAX. I WILL MAIL 1ST CLASS WHITIN 24 HOURS UNLESS I GET SWAMPED. IF INTERESTED SEND FOR COMPLETE LIST & PRICES ON TTL, DTL, TTL, ECL, CMOS, NMOS, PMOS, DIODES TRANSISTORS, ETC. I SPECIALIZE IN SELLING TO ACADEMIC INSTITUTIONS. CAL POLY, BRIGHAM YOUNG, ETC. MY BANK REFERENCE IS: WELLS FARGO, EL CAMINO, SANTA CLARA - COMMERCIAL, 1ST NATIONAL BANK OF SAN JOSE - PERSONAL, SEND CHECKS OR MONEY ORDERS TO ABOVE ADDRESS.

I HAVE A LARGE STOCK OF MEMORIES: 2602, 93410, 8223, 8225, 7489, 82S07 (74206), 1103, ETC. AND THE TOUGH TVT ICS - 8288, 2524, 4024, ETC. ALSO CLARE-PENDAR ASCII ENCODED KEYBOARDS, COMPUTER TYPE, LIKE NEW, TESTED. $40 - POSTAGE PAID.

10% DISCOUNT ON ORDERS OVER $100.00.

PC BOARDS FOR THE 8008 MINI USING 32K BIT MEMORY BOARDS FOR THE 2602 1024 BIT STATIC RAMS ARE ON THE DRAWING BOARD AND WILL BE AVAILABLE AFTER NOVEMBER. THEY WILL USE EDGE CONNECTORS, NOT MOLEX CONNECTORS.
Figure 1  Phil Mork's Modem Circuit

- **Figure 1**  Phil Mork's Modem Circuit

- **R1**  Trans. baud adj
- **R2**  Trans. low freq
- **R3**  Trans. high freq
- **R4**  Rec. freq adj
- **R5**  Rec. panel adj

**Component Descriptions:**
- **Res. In μΩ**
- **Cap. In μF**

**Legend:**
- Parallel Data Out
- Handshaking signal
- Parallel Data In
- +12 V
- -12 V
Figure 2 Phil Mork's Interrupt Exp Circuit

Ties together the Modem, Keyboard, TVT, and 4 other optional inputs - 2 pos going, 2 neg.

TVT is connected (test point C, Cursor board) to tell computer that character has been loaded and is ready for another.

Figure 3 Phil Mork's Power Controller

Figure 4 Phil Mork's Oscilloscope Driver Circuit (Sample & Hold)

X is analogy version of data last time sample was high.
Y is control port bits.
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<tr>
<th>Item Description</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Total</th>
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<tbody>
<tr>
<td>1 each 8008 CPU</td>
<td></td>
<td>$60.00</td>
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<tr>
<td>1 each 8008 CPU including all the resistors (5%), 1 disc capacitors and 7400's for the Mark-8 (Mini-Kit)</td>
<td></td>
<td>75.00</td>
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<tr>
<td>1101</td>
<td></td>
<td>ea 5.00</td>
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<tr>
<td>2102</td>
<td></td>
<td>ea 10.00</td>
<td></td>
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<tr>
<td>1 ea 2513, 1 ea 2518, 6 ea 2524 (for the TVT)</td>
<td></td>
<td>42.50</td>
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MAIL TO: M & R ENTERPRISES
P.O. BOX 1011
SUNNYVALE, CALIF. 94088

(Please Print)

NAME _____________________________________________________________

ADDRESS _______________________________________________________

CITY ___________________________________________________________

STATE _________________________________________________________

ZIP ___________________________________________________________

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<th>HOW MANY</th>
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Merchandise Total
Calif. Sales Tax (6%) if applicable

TOTAL AMOUNT ENCLOSED _________________________________________

Order shipped within 48 hours upon receipt. Price includes first class postage in Continental U.S.

TERMS: Orders over $150 cashier checks ONLY.

All IC's brand new from factory.
This catalog offers some high-speed TTL or EIA MODEM and some MOS, TTL, computer power supplies which we recently acquired. At this time we are sold out of mag. tape units and 'halo' paper tape units, however, other items in catalogs 2 through 6 remain in effect. Catalog #3 is now cancelled in total. The schematic for the AmpeX diode arrays in catalog #6 was incorrect; the correct diagrams appear in this catalog #7. The Agat DIp-14 IC boards are still available, but we failed to mention that they are powered on pins 1 and 8. The powering pins can be easily changed, however.

We hope you find some items of interest in this catalog. Send us a self-addressed, stamped envelope (BASE) for a free copy of any of our catalogs. Also, please be sure to include postage and insurance money with your order. We have a minimum order of $5.

We greatly appreciate your past patronage.

---

**Cat. #DCTAU MODEM System - 1900 BAUD**

This is a complete, controlled, TTL, Modulator/Demodulator system for interfacing your computer or TTL system to a standard telephone line. This Terminal Adapter Unit (TAU) will allow asynchronous EIA or TTL data transmission and receipt at up to 1900 BAUD (characters / per second). The unit is in a 5.25" X 6.75" X 1.25" metal case with front panel; it weighs 11 lbs. and contains 159 integrated circuits (76 series + 701 op amps) on 8` cards. Documentation for the system includes card schematic diagrams and a detailed set of specifications and signal descriptions for the MODEM card. The unit is powered and controlled through 3 - 25 pin D-connectors in the rear. There are 8 LED's on the front panel which indicate the status of the TAU in its data transmission and receipt modes. Powering for the system must be provided externally by +5v, at about 2 amps, regulated and +12v, at about 150 ma each, regulated. These TAU's are only slightly used, but may in some cases require minor repairs. The systems originally cost nearly $1000 and were used in a nationwide hotel reservation system, so they are ideal for computer-telephone communications. This is a beautiful system for tying your computer into the phone system (with proper circuitry), but it will require someone with TTL and Modem knowledge to connect properly. Please be sure to include postage and insurance when ordering. DCTAU.

Shipping wgt is 20 lbs.

**Complete - MODEM System and Documentation - $45.00 / $3.00**

**DCTAU**

**NOTE:** These units can also be used for interfacing your computer to a standard audio tape recorder.

**Cat. #DCPS - +5, +12, -12 - Power Supply**

This is a new or slightly used small power supply ideal for TTL or MOS systems. It actually contains three separate, highly regulated supplies at +5 volts at 5 amps, +12 volts and -12 volts at about 2.5 amps. Each supply can be remote sensed, and a large 3A cracker protection circuit is provided. A copy of the schematic diagram is furnished with each supply. The unit is 11" X 6.5" X 5.8", weighs 15 lbs., and contains 22 transistors, 15 diodes, 88 resistors, 15 capacitors, along with other components. Input is 115v, 60 Hz, line voltage. Power supplies are adjustable as below with internal pots:

<table>
<thead>
<tr>
<th>Current</th>
<th>Volts</th>
<th>Adjust range (volts)</th>
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<tr>
<td>+5</td>
<td>5</td>
<td>4.5 to 7.0</td>
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<tr>
<td>+12</td>
<td>2.5</td>
<td>10 to 14</td>
</tr>
<tr>
<td>-12</td>
<td>2.5</td>
<td>-10 to -14</td>
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</tbody>
</table>

These supplies seem to us to be ideal for MOS/LSI and TTL computer circuitry. Also they can be used to power the MODEM boards above, and part of the 80S magnetic tape units sold previously by us, and many other systems.
Shipping weight is 25 lbs. The unit comes in a sturdy cadmium plated steel case which can be opened for easy maintenance. Complete Power Supply and Schematic: $35.00 DCPS

Cat. #ICV - 7400 SERIES TTL REJECTS

ICV1 - These are bulk 7400 Series Reject IC's in DIP-14 and DIP-16 packages. All are lent leads, most are marked and dated. There are quite a few bad IC's in these lots, but there are also a large number of usable devices. Shipping weight is 4 lbs.
1000 - 7400 Series TTL Rejects for $15.00

ICV2 - These are sorted versions of the above reject IC's.
ICV2,1 - 7400 at 24 ea. ICV2,3 - 7410 at 25 ea. ICV2,5 - 7474 at 45 ea.

Note: These units in ICV1 and ICV2 are rejects and are not guaranteed by us. U-test-om!!

Cat. #ICU - Bulk TTL IC'S

As advertised in Cat. #5 - mixed good/reject/etc. IC's. 1000 IC's in a bag, with spec. sheets. Shipping weight 3 lbs. per bag. New price is $10.00 per bag of 1000.

Cat. #ICT - 748181 ARITHMETIC UNITS - HIGH SPEED

These are guaranteed, good units, ceramic DIP-24 packages. $2.50 each ICT

Cat. #ICY - SRA-7 - LED READOUT - OPCOA - RED

These are guaranteed, good units. 7 segment, Red, $2.50 each ICY

Cat. #DCAG - COMPUTER KEY SWITCHES

New, chrome plated key switches with 2 keys. These are 1 1/16" in diameter and 1 1/8" long. Weight is 1 oz. New.

DCAG

Cat. #DCCG - #30 COMPUTER WIRE - KYVAR BLUE - SILVER PLATE - see Cat. #5.

1000 ft. for $10. 5000 ft. for $40. 20,000 ft. for $140.

DCCG

Cat. #ICW - DIODE ARRAYS - AMXRX 597-175

These are new, tested, guaranteed units in ceramic DIP-14 packages. They contain 10 diodes in a highly usable array (see diagram). These units are very useful for memory plane diode decoders, multiplexer arrays for calculators, LED display diode diodes, logic enhancement arrays, and many other uses. These units are a steal at 5¢ each, guaranteed good.

5¢ EACH

DIP-14 BASIC DIAGRAM

ICW Arrays at 5¢ each ICW

Cat. #TCAI - AUGMENT WIRE WRAP BOARDS

These are used 105-30 boards in groups of 1, 2, 3, 4, 5, or 6 units, each having 30 - DIP-14, gold plated, wire wrap, IC locations. The boards are wrapped and in excellent condition. Weight is 7 1/2 lb. per section. Priced on pins 1 and 8.

$4 per section of 30; $2.50 for board of 180 locations

Cat. #ICA, ICD, ICA, etc. - High speed TTL IC's are still available from Cat. #5 at 5¢ for gates and 9¢ for flip flops and are guaranteed good. Spec sheets included.
A newsletter dedicated to the interaction and dissemination of information to computer enthusiasts involved in the construction, programming, and applications of MICROCOMPUTER SYSTEMS.

VOLUME 1, NUMBER 5

FEBRUARY 8, 1975
DO WE HAVE SOME EXCITING NEWS FOR YOU THIS TIME! EVERYONE'S DREAM WILL NEARLY COME TRUE WHEN THEY SEE BOR COOK'S CREED TELETYPewriter OFFER. JIM FRY HAS GOT 2102'S DOWN TO $5.45. 8008 PRICES CONTINUE TO DROP. (COOK HAS THEM FOR $45.) THE MILL MONITOR-8 ROM & CASSETTE UNIT ARE MAJOR BREAKTHRU'S FOR THE HOBBYIST, AND THE DIGITAL GROUP HAS AN EXCITING DOCUMENTATION PACKAGE THEY ARE OFFERING THAT INCLUDES A CASSETTE TAPE UNIT THAT WORKS AND A $80 TV TYPEWRITER UNIT. ITS AN EXCITING TIME TO BE WORKING IN HOBBY ELECTRONICS BUT FRUSTRATING TOO SINCE THINGS CHANGE SO DARN FAST. WE NOW HAVE 400 PARTICIPANTS & SEVERAL NEW LETTERS ArrIVE EVERY DAY.

SINCE MANY PEOPLE WILL SOON BE EXPERIMENTING WITH CONFIGURATIONS OTHER THAN THE MARK-8, WE ARE SWITCHING BACK TO THE NAME "MICRO-B COMPUTER USER GROUP." JOHN CRAIG, PRESENTLY WITH VARIAN WILL BE HELPING ME AS A CO-EDITOR. HE PREPARED PART OF THIS NEWSLETTER.

IT'S TIME TO MAKE A DECISION ON WHAT TO Do WITH THE NEWSLETTER FOR THE FUTURE. SEVERAL POSSIBILITIES HAVE COME UP BUT NOTHING THAT WE CAN REALLY COUNT ON. BOB ALBRECHT, THRU PCC, WOULD LIKE TO START A HOBBY COMPUTER NEWSPAPER IN THE FALL. WE HAVE SEVERAL REGIONAL GROUPS THAT COULD PROBABLY BE PERSUADED TO PUBLISH AT LEAST A FEW NEWSLETTER ISSUES.

NOTHING NEVER HAS COME UP THAT I AM WILLING TO GAMBLE THE INTERESTS OF THE PARTICIPANTS ON. ALMOST UNANIMOUSLY, PARTICIPANTS AGREE THAT A SUBSCRIPTION NEWSLETTER IS NECESSARY. JUDGING FROM THE VERY GENEROUS DONATIONS THAT KEEP ARRIVING DAILY, WE MUST BE DOING SOMETHING RIGHT. THEREFORE THE FOLLOWING DECISION HAS BEEN MADE.

WE WILL CONTINUE TO PUBLISH 6 MORE NEWSLETTERS IN THE NEXT 6 TO 12 MONTHS FOR A FEE OF $6.00. A SERIOUS ATTEMPT WILL BE MADE TO HAVE THEM OFFSET PRINTED AND WE WILL INVESTIGATE A NON-PROFIT BULK MAILING PERMIT. I RELUCTANTLY PROPOSE THE $6.00 FEE BUT WITH PAPER AND PRINTING COSTS AS HIGH AS THEY ARE, IT WILL PROBABLY COST NEARLY THAT TO PUBLISH THE NEXT 6 ISSUES. I WOULD LIKE TO HAVE A FEW DOLLARS LEFT OVER TO HELP CONSTRUCT PERIPHERALS FOR THE CABRILLO COMPUTER CENTER'S 8008 SYSTEM TO HELP COMPENSATE THE ADVANCED STUDENTS THAT HAVE HELPED MAKE THE NEWSLETTER POSSIBLE.

MANY THANKS TO THOSE THAT HAVE SENT IN GENEROUS DONATIONS. WE HAVE KEPT CAREFULLY RECORDS OF DONATIONS AND PUBLISHING COSTS AND WE WILL ONLY BE ABOUT $50 OR $60 IN THE HOLE AFTER THIS ISSUE. IF YOU HAVE ALREADY DONATED $6.00 OR MORE, PLEASE NOTE IT ON THE RENEWAL FORM. YOUR SUBSCRIPTION IS ALREADY PAID AND MANY THANKS FOR HELPING PAY FOR POSTAGE AND PAPER FOR THE PAST ISSUES.

PLEASE REMEMBER THAT THIS IS A NEWSLETTER. THAT MEANS WE DEPEND ON YOU!!! TO SEND INFORMATION THAT MIGHT INTEREST OTHERS. IF EVERYONE TAKES JUST A LITTLE EXTRA TIME TO WRITE UP WHAT THEY ARE DOING, THE NEWSLETTER WILL CONTINUE TO BE INTERESTING AND VALUABLE. IF YOU CAN SEND CAMERA READY WRITEUPS, PROGRAM LISTINGS, AND SCHEMATICS, WE WILL BE ABLE TO PUBLISH MUCH MORE MATERIAL THAN IF WE HAVE TO RETYPE AND REDRAW EVERYTHING. PARTICIPANTS MUST BE COMPLIMENTED ON THEIR WILLINGNESS TO SUPPLY MATERIAL SO FAR. YOU HAVE KEPT OUR MAILBOX FULL AND HAVE HELPED MAKE THE NEWSLETTER VALUABLE AND INTERESTING.

WE COULD EASILY DO 80 PAGES THIS TIME WITH THE MATERIAL WE HAVE IF WE COULD JUST FIGURE OUT HOW TO PRINT IT AND PAY POSTAGE. PLEASE DON'T BE UPSET IF SOME GOOD STUFF YOU SENT IN DOESN'T MAKE IT INTO THIS ISSUE. WE'LL GET IT INTO THE NEXT ONE FOR SURE. A LOT OF ITEMS TO BE MENTIONED ARE TOO BIG TO PUBLISH IN THE NL SO WE ARE PROPOSING A SUBTLE BRIEVE. SEND US A NEWSLETTER ARTICLE AND A SASE, AND WE'LL SUPPLY THE REPRINT YOU REQUEST.
CREED model 75 teletype with interface kit, includes crate
FOB Naperville, Ill. See over for description. $125.00
Carriage return and run out(repeat) key option on above, add 5.00
Set of original maintenance manuals on microfiche available soon
(For loan of originals write for information) available soon
New type characters for Creed
Lamp and photocell with mounting bracket for counting 1.00
the number of Creed punch operations
Paper tape winder(wind up) and 2 plastic reels 5.00
Paper tape per reel .30
per box of 10 2.50
Power distribution box - includes 3 wire cord, six outlets 5.00
and switch in metal box. Wonderful for work bench.
Creed Manual (may be credited to later purchase of Creed). 1.00

Optical Scanner for use with bar codes. Originally used with Creed
in Spiegel system to generate teletype code. Has a variety of
switches, motors, lens, photocell, power cord, etc.
Includes some descriptive material. good condition $10.00
damaged 5.00

Integrated Circuits (all prime, obtained from Intel or MIL
distributors unless noted otherwise)
8008 - 8 bit Microcomputer chip with Creed $45.00
1702 - 256 x 8 Programmable and erasable Read Only Memory 35.00
with Creed 30.00
(programmed with Creed monitor for free)
2102 - 1K x 1 RAM - Static 6.00
8 with Creed 45.00
1101 - Manufactured for United. Fully tested. 1.50
Radio Electronics 1101 memory board with 32 - United 1101's 55.00
Wire wrap boards - Wrapped, used, bypass capacitors included.
14 - 16 pin sockets and 21 - 14 pin sockets 10.00

Transformers, two secondaries 27 v and 7 v, appear to be high current 4.00

Lambda power supplies - 20 v 20 a- variable from 0 to 25 v. includes
20v 12 a - variable from 0 to 25 v. no meters 40.00
current and voltage meters (rack mountable) 60.00
Rixon multiplexer circuit packs and mounting hardware. Write for
full information. Circuit packs include teletype speed
converters, clocks, small power supplies, modems, etc.
ITT CREED MODEL 75 TELETYPETE

COMPLETE WITH INTERFACE KIT AND PROG'MS FOR 8008

Table model with shock mounted rubber feet. Weighs 55 lb.

Uses 5 bit Baudot code, fractions set.

Manufactured for Spiegel about 1964.

Programs included (available on 1702):
1. Convert to and from 6 bit code or ASCII
2. Monitor program to load (octal keyboard) or display memory.
3. Loader from 5 bit serial device (paper tape reader or cassette)
4. Paper tape or cassette dump in loader format

KEYBOARD - Includes 29 keys in 3 rows (not as shown above), some available with repeat key and carriage return. The keyboard is mechanically linked to the printer so that it can be used locally without a loop supply

PRINTER - A cylindrical type head gives high quality printing and allows individual characters to be replaced. Both single or multiple copy and pin or friction feed are selectable by levers. There are 71 characters per line and standard 8 1/2 inch wide paper is used.

PAPER TAPE PUNCH - A reel of tape is held in a disappearing drawer below the keyboard and there is a low tape warning light. Punching is suppressed on 5 control characters, but instructions are included to remove the suppression. A full reel of 11/16 inch tape is included.

NO TAPE READER

MISCELLANEOUS FEATURES
1. Message sender drum is activated by a solenoid and sends 20 characters as determined by bars in the drum.
2. Fast form feed solenoid (kit does not include driver for this solenoid as it is unnecessary in most applications).
3. Digital operations counter for maintenance logging.
5. Start key above keyboard (not shown above) brought out to contacts.

ELECTRICAL INTERFACE - Serial to printer (polar 24 v solenoids) and parallel from keyboard (instructions included for rewiring for serial from keyboard for other applications). Punch suppress, print suppress, and message sender solenoids. 10 characters per sec., 7 1/2 bit code, and 13 1/3 millisecond bit time.

INTERFACE KIT - Includes manual, program listings, power supply for solenoids, drivers for solenoids and input Interface. Requires 5 v. from processor for 7406 driver, 1 input port (port 0) and 1 or 2 out ports (11 and 12). Warranty: To arrive in working order. Free parts for 1 year as necessary.
HOW TO GET RELIABLE HARD COPY PRINTOUT FOR $125
-----------------------------------------------------------------

BOB COOK, WILCOX ENTERPRISES, 25 W 178 39TH ST., NAPERVILLE, IL 60540, PROVIDED US WITH WHAT I THINK IS THE MOST EXCITING INFORMATION TO HIT THE HOBBY COMPUTER GROUP YET. ENCLOSURE IS A FLYER OFFERING CREED TTY'S MANUFACTURED IN ENGLAND BY A SUBSIDIARY OF IT&T IN 1964 FOR A SPECIALIZED ORDER PROCESSING SYSTEM USED BY SPIEGEL.

BOB HAS DONE A BEAUTIFUL JOB OF PREPARING HIS FLYER AND IT WILL TAKE MANY RE-READINGS BEFORE YOU APPRECIATE ALL OF THE FEATURES THESE OFFER. HE ALSO PROVIDES A MARK-8 INTERFACE KIT WITH THE UNIT SO THAT THE BUYER WILL KNOW EXACTLY HOW TO GET THE UNIT RUNNING, HAS PROM'S AVAILABLE WITH A KEYBOARD MONITOR DESCRIBED BELOW, AND WILL SUPPLY FREE PARTS FOR 1 YEAR SO THAT YOU CAN KEEP THEM RUNNING. HE ALSO HAS SERVICE DOCUMENTATION AVAILABLE AND SELLS EACH UNIT WITH A DETAILED MANUAL.

A REASONABLY QUIET AND MODERN, 10 CPS, HARD COPY DEVICE AND KEYBOARD WITH A PAPER TAPE PUNCH AS A BONUS FOR $125. THAT HAS TO BE A DREAM COME TRUE FOR THE MARK-8 PARTICIPANT, TO MAKE THE OFFER SEEM EVEN BETTER, CIRCUITS AND PROMS WILL SOON BE AVAILABLE FOR USING THE CREEDS WITH THE MIL MONITOR-8 DESCRIBED IN THE NEXT SECTION.

IT LOOKS LIKE I WILL HAVE TO MAKE GOOD ON MY PROMISE FOR A CONSTRUCTION ARTICLE ON A $35 PAPER TAPE READER. MR. TITUS SAYS HE BUILT ONE USING A LEXED STEPPING SWITCH DRIVE. MAYBE WE CAN GET HIM TO SUPPLY MORE DETAILS.

BOB HAS SEVERAL HUNDRED OF THESE UNITS AVAILABLE SO IT WILL UNDOUBTEDLY BECOME THE STANDARD MARK-8 USER'S HARD COPY DEVICE. HE WOULD LIKE TO SEE THE MIL MONITOR BECOME THE STANDARD ALSO.

THE CREED I/O FORMAT IS AS FOLLOWS:

IN0

OUT11

BIT 0 UNUSED

BIT 0 SERIAL OUT TO PRINTER, PUNCH, CASSETTE, ETC.

1 D0 CREED
2 D1 PARALLEL
3 D2 KEYBOARD OUT
4 D3
5 D4

OUT13

6 STROBE KEYBOARD
7 SERIAL IN PAPERTAPE

BIT 0 UNUSED

1 PUNCH INHIBIT
2 PRINT INHIBIT
3 MESSAGE SENDER
4-7 UNUSED

THE CREED BAUDOT LOADER TAPE FORMAT -- 5 BIT TAPE

B-----BBL L H H D D -----------D D BBBBBBBBBBBB HEADER
L H L H L H L H TRAILER
B MEANS BLANK TAPE

L - LOW 4 BITS OF LOW 8 BITS OF LOAD ADDRESS

L - HI

H - LOW 4 BITS OF HI 8 BITS OF LOAD ADDRESS

H - HI

D - LOW 4 BITS OF DATA WORD

D - HI

THE HIGH ORDER BIT OF EACH 5 BIT WORD IS IGNORED, EXCEPT IN LOOKING FOR BLANK HEADER AND BLANK TRAILER, I.E. THE 5TH BIT MAY BE 1 OR 0 EXCEPT THAT 00000 MUST BE 10000 RATHER THAN 00000.

THE CREED MONITOR--FUNCTIONS AND CONTROL CHARACTERS
B REPRESENTS THE LAST THREE DIGITS TYPED.

H - PUT B IN H
L - PUT B IN L
Z - PUT B IN MEMORY
S - PUT H:L IN 'START ADDRESS'
N - PUT H:L IN 'END ADDRESS'
X - CALL 'START ADDRESS'
0 - LOAD MEMORY FROM TAPE, PUT FIRST ADDRESS IN START ADDRESS

PAGE 2
I - INCREMENT HI: L
D - DECREMENT HI: L
M - DUMP MEMORY FROM START ADDRESS TO END ADDRESS AS A LOADER TAPE
A - L TO LIGHTS
B - H TO LIGHTS
C - MEMORY AT HI: L TO LIGHTS
G - 7 - SHIFT B LEFT 3 BITS AND INSERT IN LOW 3 BITS
COMING - PRINT HI: L MEMORY IN OCTAL

THE MIL MOD-8, MONITOR-8, CHEAP MEMORY, AND A CASSETTE TAPE THAT WORKS!

EVER SINCE PEOPLE FIRST DISCOVERED THE MICROSYSTEMS INTERNATIONAL (MIL) MOD-8 CONFIGURATION, IT HAS STARTED TO LOOK BETTER AND BETTER. (SEND THE MIL CARD IN AND YOU WILL RECEIVE AN MB8008 BOOK WITH CIRCUITS AND PC BOARD LAYOUTS FOR THE MOD-8 AND A DESCRIPTION AND LISTING OF MONITOR-8.) THE MOD-8 BOARDS ARE AVAILABLE PRESENTLY FROM CANADA FOR ABOUT $120 AND WE HAVE PERMISSION TO HAVE THEM CUSTOM ETCHED FOR US. ROBERT SWARTZ, 195 IVY LANE, HIGHLAND PARK, IL 60035, HAS HIS MOD-8 RUNNING AND IS VERY IMPRESSED WITH THE DESIGN AND QUALITY OF THE BOARDS AND THE TOTAL SYSTEM. IT CAN ALSO BE EXPANDED TO AN 8080 SYSTEM BY CHANGING A COUPLE OF BOARDS WHICH WILL BE MADE AVAILABLE.

WITH THE ANNOUNCEMENT THAT MONITOR-8 WOULD SOON BE AVAILABLE IN A MASK PROGRAMMED ROM, THINGS REALLY GOT EXCITING. NOW WE HAVE A COPY OF MIL'S CASSETTE LOAD AND DUMP CIRCUIT AND ARE TOLD THAT THE ROM MONITOR-8 WILL INCLUDE CASSETTE LOAD AND DUMP ROUTINES. I'M ECSTATIC!

MANY PARTICIPANTS MAY NOT HAVE RECEIVED THE MF8008 MANUAL SO WE HAD BETTER FIRST EXPLAIN WHAT MONITOR-8 IS. IT'S A 2K BYTE PROGRAM THAT ALLOWS YOU TO: 1) INTERRUPT RESTART DIRECTLY TO TTY CONTROL. (WHO NEEDS A FRONT PANEL?) 2) SET THE CURRENT LOCATION POINTER FROM THE TTY. (ALL DATA ENTRY AND MANIPULATION IS DONE AT THIS ADDRESS AND IT IS UPDATED TO POINT AT THE NEXT MEMORY ADDRESS AFTER EACH OPERATION.) 3) DISPLAY THE CURRENT LOCATION POINTER ON THE TTY. 4) DUMP SYMBOLIC (TYPES OUT THE MNEUMONIC CONTENTS OF MEMORY LOCATIONS BETWEEN TWO MEMORY LIMITS.) 5) LOAD A SECTION OF MEMORY FROM TTY IN OCTAL. 6) DUMP A SECTION OF MEMORY ON TTY IN OCTAL. 7) LOAD A SECTION OF MEMORY FROM TTY IN BNPF FORMAT. 8) DUMP A SECTION OF MEMORY IN BNPF FORMAT. (USEFUL FOR ROM PROGRAMMING.) 9) LOAD A SECTION OF MEMORY WITH INSTRUCTIONS TYPED IN MNEUMONIC FORM. 10) START A PROGRAM AT A TYPED STARTING LOCATION. 11) COPY A PROGRAM FROM ONE SECTION OF MEMORY TO ANOTHER. 12) TRANSLATE A PROGRAM SO THAT MEMORY REFERENCES ARE ADJUSTED SO THAT IT WOULD RUN AT A NEW LOCATION IF COPIED. 13) SET A BREAKPOINT. (WHEN A RUNNING PROGRAM REACHES THIS LOCATION, IT TYPES OUT THE CONTENTS OF THE CARRY FLAG, THE A, B, C, L, & H REGISTERS AND THE CONTENT OF MEMORY POINTED TO BY L & H, AND RETURNS CONTROL TO MONITOR-8. 14) CLEAR THE BREAK POINT. 15) PROGRAM 1702 FROM.'S. 16) DUMP A SECTION OF MEMORY ONTO A CASSETTE. 17) LOAD A SECTION OF MEMORY FROM CASSETTE. 18) VERIFY THE CONTENTS OF A CASSETTE AGAINST MEMORY.

NOW THE GREAT NEWS! MAURY GOLDBERG, CELITRON COMMUNICATIONS CORP., 1618 JAMES ST., SYRACUSE, NY 13203 315-422-4467, (ALSO M&R ENTERPRISES, PO BOX 1011, SUNNYVALE, CA 94088.) IS GOING TO BE ABLE TO SUPPLY THIS MONITOR-8 ROM AND ALTHOUGH THE PRICE IS NOT FIRM, HE THINKS HE CAN SUPPLY IT FOR ABOUT $58 AND HE SHOULD BE ABLE TO SUPPLY A PC BOARD FOR THE INTERFACE SOON ALSO. TWO K OF MEMORY FOR $50 IN ONE EASY TO WIRE IN PACKAGE WITH ALL OF THAT CAPABILITY, AND AS A BONUS, 35 OR 50 INTERNAL SUBROUTINES THAT YOU CAN USE FOR YOUR OWN PROGRAMMING! YOW!!! THE GOOD NEWS ISN'T OVER YET. THE CHICAGO GROUP IS WORKING ON A HARDWARE MODIFICATION THAT ALLOWS THE CFEED TTY'S THAT BOB COOK CAN SUPPLY (OR ANY 5 LEVEL BAUDOT TTY) TO OPERATE WITH THIS MONITOR.

NOW SOME DETAILS ON THE CASSETTE INTERFACE. AN EXTREME CONDENSATION OF MIL'S WRITEUP FOLLOWS:

PAGE 3
PAUL MORK'S MUSIC PROGRAM (YOU'LL JUST HAVE TO TRY THIS ONE!)

---

INSTRUCTIONS: LOAD PROGRAM AT MEMORY LOCATIONS 00000 TO 00050.
LOAD DATA STARTING AT MEMORY LOCATION 00060.
CONNECT AMPLIFIER AUXILIARY INPUT THRU A 1 MFD CAPACITOR
TO ANY LINE ON OUTPUT B. CONNECT COMPUTER AND AMP.
GROUND TOGETHER.

START PROGRAM WITH RESTART 005.
PROGRAM STOPS AT END OF TUNE.
(IF YOU WANT TO KNOW WHAT TUNE IS PROGRAMMED HERE, YOU'LL JUST
HAVE TO TRY IT FOR YOURSELF.)

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WRITE YOUR OWN MUSIC. DATA IS AT LOCATIONS 00044 AND 00045 CONTROLS TEMPO. DATA STARTING AT 00060 IS MUSIC, 1 BEAT PER WORD. LOAD NOTES AS FOLLOWS. 377 STOPS PROGRAM. C=027, D=030, E=033, F=037, G=043
F=045, D=051, C=057, B=061, A=070, G=077.

B-3
SOFTWARE

Memory Diagnostic Program
By
James R. Steele

Program loads memory address into memory location then checks for error. For a random test pattern:
1) Put pattern in loc. 1
2) Change loc. 6 to 37
3) Change loc. 14 to 391

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WITH THE INCREASING USE OF MICROPROCESSORS, THERE IS A GROWING NEED FOR LOW COST MEMORY DEVICES. THIS NEED CAN BE MET BY USING A LOW COST AUDIO CASSETTE UNIT TO STORE DATA. OFFERING 330 BAUD (BITS PER SECOND) WITH 1 BIT PER 1 MILLION ERROR RATE USING A LOW COST REUSABLE AUDIO CASSETTE AND A MEDIUM QUALITY RECORDER AS THE STORAGE MEDIUM, THE COMPLETE SYSTEM IS AN ATTRACTIVE ALTERNATIVE TO THE TELETYPewriter PAPER TAPE APPROACH.

THE TWO POPULAR CASSETTE RECORDING METHODS ARE FSK (FREQUENCY SHIFT KEYING) AND TONE BURST RECORDING. WITH THE FSK SYSTEM, TEMPORARY LOSS OF SIGNAL DUE TO TAPE IMPERFECTIONS AND THE TAPE "BUMPING AGAINST THE HEAD WILL CASE THE PLL TO LOSE TRACK OF INPUT FREQUENCIES AND THE REQUIRED RELOCKING OF THE PLL MAY REQUIRE SEVERAL BIT TIMES. FURTHERMORE, WOW AND TAPE FLUTTER WILL CAUSE FREQUENCY SQUARE WHICH COULD BE INTERPRETED AS DATA BIT TRANSITIONS. THE TONE BURST TECHNIQUE BEGINS TO FAIL ABOVE THE 200 BAUD LEVELS AND WITH AUTOMATIC LEVEL CONTROLS (ALC) USE IN MOST CASSETTE UNITS WHICH ADJUST THE RECORDING AMPLIFIERS TO COMPENSATE FOR SIGNAL LEVEL VARIATIONS, THE NO-TONE STATE WILL CAUSE THE GAIN TO BE MAXIMUM WHICH RESULTS IN UNBEARABLE BACKGROUND NOISE BEING RECORDED.

A HYBRID APPROACH HAS BEEN TAKEN WHICH TAKES ADVANTAGE OF THE LESS THAN 6 KHZ FREQUENCY RESPONSE OF A CASSETTE RECORDER. "1"S ARE RECORDED AS 6 KHZ AND "0'S" AS 12 KHZ (WAY ABOVE THE RESPONSE OF THE CASSETTE BUT IT ENSURES THAT THE ALC WILL NOT BOOST THE GAIN). DURING PLAYBACK, A SIMPLE CAPACITOR FILTERS OUT ANY HIGH FREQUENCY AND THE 6KHZ SIGNAL IS DIGITALLY INTEGRATED TO PROVIDE A LOGIC 1 LEVEL. THE DIGITAL INTEGRATOR WILL TRAP AFTER 1 CYCLE AND HOLD UP TO 1 CYCLE TIME THUS REDUCING PROBLEMS DUE TO DROPOUTS AND TAPE NOISE. SOFTWARE USED TO GENERATE AND RECEIVE SERIAL DATA ALSO INCLUDES PARITY CHECKING ROUTINES. FURTHERMORE, EACH BIT TIME IS DIVIDED INTO 12 EQUAL SAMPLE TIMES AND THE DATA READ ROUTINE AVERAGES THE SAMPLES DURING EACH BIT TIME (LESS THAN 6 IS A "0", MORE THAN 6 IS A "1"). THIS FURTHER REDUCES THE NUMBER OF ERRORS DUE TO TAPE NOISE AND DROPOUTS. THE RESULTING SYSTEM OPERATES VERY SATISFACKORILY AT A 330 BAUD RATE WITH AN ERROR RATE BETTER THAN 1 BIT/1016 BITS USING A MEDIUM QUALITY AUDIO CASSETTE CARTRIDGE.

THE HARDWARE INTERFACE IS SHOWN IN APPENDIX A-1. IT USES SOME FUNNY IC'S BUT THEY ARE AVAILABLE AND A CLEVER GUY COULD EASILY CHANGE IT TO EASILY AVAILABLE IC'S. ALSO ITS 'DIGITAL' NOT 'ANALOG' WHICH IS A VERY NICE FEATURE.

THE MONITOR ROUTINE OFFERS 3 OPTIONS: 1) DUMP TO CASSETTE 2) LOAD FROM CASSETTE 3) VERIFY THAT CASSETTE DATA IS THE SAME AS MEMORY. TO USE IT, THE USER TYPES XOT 007000 AND MONITOR ACCEPTS A LOW AND HIGH MEMORY ADDRESS AND REQUESTS OPTION D/L/V. FOLLOWING THE PRINTING OF THE OPTION LIST, THE USER SHOULD START THE CASSETTE UNIT, EITHER IN PLAY OR RECORD MODE ACCORDING TO THE DESIRED FUNCTION, AND TYPE THE OPTION LETTER.

IF THE WRITE OPTION IS CHOSEN, IT WILL WAIT FOR 5 SECONDS TO ENSURE THAT THE TAPE LEADER IS PAST THE BEAD, WRITE A PREAMBLE OF 377 WORDS AND A SYNCH WORD OF 000. IMMEDIATELY AFTER THE 000 SYNCH WORD, MEMORY DATA IS RECORDED AS CONTINUOUS DATA WORDS. UPON COMPLETION, CONTROL IS RETURNED TO MONITOR.

THE PLAYBACK ROUTINE READS CHARACTERS UNTIL IT RECEIVES A 377 WORD AND THEN WAITS UNTIL IT RECEIVES A 000 SYNCH WORD AND THEN LOADS SUBSEQUENT DATA ITEMS. A PARITY ERROR OR A VERIFY ERROR WILL PRINT THE CARRY FLAG, CONTENTS OF A,B,C,L & H REGISTERS AND CONTENTS OF MEMORY POINTED TO BY H & L AND RETURN CONTROL TO MONITOR. THE A & B REGISTERS CONTAIN THE CASSETTE DATA AND H & L POINT TO THE CURRENT LOCATION POINTER.

THE FULL DOCUMENT IS 11 PAGES LONG AND INCLUDES THE SOFTWARE LISTING AND COPIES WILL BE SENT TO ANYONE SUPPLYING A 20 CENT SASE AND A SHORT CAMERA READY WRITUP ON YOUR MICRO-COMPUTER PROJECT USEABLE IN THE NEXT NEWSLETTER.

PAGE 4
MARK-8 MODS, A SRS VIDEO TERMINAL, & ANOTHER CASSETTE UNIT THAT WORKS!

---------

THE DIGITAL GROUP, PO BOX 6528, DENVER, CO 80208 HAS AN EXCITING PACKAGE OF INFORMATION THAT WILL SOON BE AVAILABLE. THE BEST WAY TO DESCRIBE IT IS TO EXTRACT PARAGRAPHS FROM LETTERS THEY HAVE SENT.

"A GUY NAMED DR. ROBERT SUDING CALLED US ABOUT SHOWING HIS COMPLETE MARK-8 TO THOSE IN THE DENVER AREA AND ABOUT IS SHOVED UP. DR. SUDING HAS A DOCTORATE IN SYSTEMS ANALYSIS, WORKS FOR IBM AND HIS LATEST DEVELOPMENT PROJECT IS IN GRAPHICS. HE IS ALSO ONE OF THE NATION'S LEADING DEVELOPERS OF SLOW-SCAN TV. HE HAS MADE EXTENSIVE MODS TO HIS MARK-8 INCLUDING PLUGGABLE BOARDS, OCTAL READOUT, LARGE POWER SUPPLY, & KEYBOARD DATA ENTRY. HE SPENT A 1/2 DAY DESIGNING AN FSK CASSETTE INTERFACE AFTER Rejecting OTHER CIRCUITS DUE TO DRIFT. RESULT--NOT ONE BIT ERROR IN OVER 2 MONTHS USING A K-MART $30 EL-CHEAP.

HIS CROWNING ACHIEVEMENT IS A TV CHARACTER GENERATOR THAT USES 1101 RAM (ALMOST INSTANTANEOUS UPDATE) AND DISPLAYS UPPER AND LOWER CASE, #’S & SYMBOLS AND THE GREEK ALPHABET AND THAT CAN BE BUILT FOR UNDER $80."

DR. SUDING SAYS, "THE 'DIGITAL GROUP' IS ASSISTING ME TO DISTRIBUTE MY IDEAS AS EASILY AND EFFICIENTLY AS POSSIBLE. IT IS AN OUTFIT WHOSE DESIRE IS MUTUAL HELP ON A BREAK-EVEN BASIS. I AM VERY ACTIVELY INVOLVED IN AMATEUR RADIO SLOW SCAN TV DESIGN AS A HOBBY AND OFTEN AVERAGE TWO LETTERS A DAY, SO THIS WAY HELP GETS OUT FAST FOR THE MARK-8. THE COST OF $7.50 IS SOLELY REIMBURSEMENT FOR EXPENSES OF REPRODUCTION, THE CASSETTE, & MAILING." INCIDENTLY, DR. SUDING ASKS THAT ALL QUESTIONS BE DIRECTED THRU THE DIGITAL GROUP TO HIM.

"A COPY OF THE CASSETTE INTERFACE CIRCUIT IS INCLUDED SO THAT THOSE INTERESTED CAN GET TO WORK ON THE CIRCUIT AND TO SERVE AS AN EXAMPLE OF WHAT THEY EXPECT THEIR ENTIRE $7.50 DOCUMENTATION PACKAGE TO LOOK LIKE. THE LATEST LIST OF SCHEMATICS AND SOFTWARE TO BE INCLUDED IN THE PACKAGE IS:

I. MARK-8 HARDWARE MODIFICATIONS
   1. FRONT PANEL OCTAL KEYBOARD AND 7 SEGMENT READOUTS.
   2. INPUT PORT EXPANSIONS (TO 7 PORTS)
   3. OUTPUT PORT EXPANSIONS.
   4. A LARGE INEXPENSIVE POWER SUPPLY.
   5. A 4-IC CASSETTE RECORDER INTERFACE THAT WORKS! (NOT ONE BIT ERROR IN OVER 2 MONTHS ON A K-MART EL-CHEAP.)
   6. 128 CHARACTER-SET INEXPENSIVE TV TYPEWRITER CAPABLE OF DISPLAYING 256 CHARACTERS UTILIZING 1101 RAM AND WHICH CAN BE BUILT FOR UNDER $80.
   7. A BACKPLANE WIRING CHART TO ASSIST CONVERTING THE MARK-8 TO PLUGGABLE BOARDS.
   8. A 128-CHARACTER KEYBOARD ENCODER.
   9. A PARTS LIST FOR ALL OF THE ABOVE.

II. SUPPORTING PROGRAMS WITH DOCUMENTATION (25 PAGES).
   1. CASSETTE DUMPER (BOOTSTRAP LOADER)
   2. CASSETTE LOADER
   3. MEMORY CLEAR SUBROUTINE
   4. MEMORY CHECKER (TESTS CHIPS AND IDENTIFIES BAD ONES)
   5. KEYBOARD TO MEMORY
   6. BIT REVERSE SUBROUTINE
   7. KEYBOARD PROGRAM LOADER
   8. RESTART TO PROGRAMS
   9. KEYBOARD TO TV
   10. TV CHARACTER GENERATOR TEST.
   11. TV CHARACTER GENERATOR DEMONSTRATION.
   12. RUNNING (RIGHT TO LEFT) TV DISPLAY.
   13. TV STORAGE DUMP
   14. TV HOME ERASE SUBROUTINE
   15. TV SPACING SUBROUTINE
   16. TV CHARACTER ENTRY SUBROUTINE.

III. A CASSETTE CONTAINING ALL THE ABOVE SOFTWARE.

IV. SUPPORTING NARRATIVES AND COMMENTS THRUOUT.

THE PRICE FOR THE PACKAGE IS $7.50, DELIVERY - FIRST CLASS, DELIVERY DATE - AFTER ARRIVAL OF NEWSLETTER #5.

THERE ARE 2 MINOR CORRECTIONS TO THE CASSETTE INTERFACE SCHEMATIC ENCLOSED: 1) THE UNMARKED DIODE IN THE LOVER CIRCUIT IS A IN914, & 2) THE ALTERNATE WIRING FOR 741’S IS FOR 14-PIN DIP 741’S.

PAGE 5
CASSETTE INTERFACE CIRCUITS

(BUILT ON ADDRESS LATCH CARD)

BY ROBERT I. SUDING, W4UDM

C/O THE DIGITAL GROUP
FO BOX 6528
DENVER, COLORADO 80206

INPUT 741 CAN ALSO BE A 17415CP1 WHICH HAS A HIGHER SLEW RATE AND IS A PIN FOR PIN EQUIVALENT TO MINI-DIP 741. (HARDER TO FIND, THOUGH)

ALL IC'S ARE AVAILABLE FROM BILL GODDOUT ELECTRONICS, BOX 2763
OAKLAND AIRPORT, CA 94614.

VCO TUNEUP
1. INPUT A PLUS 5V TO PIN 42.
2. ADJUST MARK POT FOR 2125 HZ OUTPUT.
3. GROUND PIN 42.
4. ADJUST SPACE POT FOR 2975 HZ OUTPUT.
Interconnection schematic to connect UART I/O board on IBM 724 typewriter to the Stack-8 computer. By Roger Smith

Above circuit if you have TTY connected.

Above circuit if you don't have TTY.
"WE HAVE DECIDED TO DO A DOUBLE-SIDED PC BOARD FOR THE TV CHARACTER GEN. AND SHOULD HAVE QUOTES BACK SOON. A "KIT" AND THE PC BOARD MIGHT BE AVAILABLE BY THE END OF FEBRUARY. DR. SUDING IS ALSO EXPANDING HIS CHARACTER GENERATOR TO 1000 CHARACTERS ON THE SCREEN AT A TIME. BANDWIDTH IS THE MAJOR LIMITATION, BUT HE FEELS IT WILL WORK REASONABLY WELL. (REMEMBER, TV DESIGN AND GRAPHICS ARE HIS FORTE.) IT WILL USE 2102'S AND TAKE 5 MSEC TO UPDATE THE SCREEN SO WE WILL PROBABLY HAVE TWO VERSIONS."

"DR. SUDING HAS COMPLETED AND IS OPERATING HIS HARDWARE INTERFACE FOR THE RADIO SHACK 5612 12-DIGIT CALCULATOR CHIP. IT REQUIRES LESS THAN $20 IN PARTS INCLUDING THE CHIP (ABOUT $8). HE IS NOW DEVELOPING THE SOFTWARE DRIVER ROUTINES. IT USES +5V AND +12V, 17 IC'S, PORT 6 AND LOWER HALF OF PORT 7 FOR INPUT AND PORT 7 FOR OUTPUT. HIS FIRST APPLICATION WILL BE A CHECKBOOK BALANCER (WITH RECALL LOOK-UP) FOR HIS WIFE. DR. SUDING ALSO MENTIONED USING A MOSTEK IC THAT COSTS $27.50 AND ROUGHLY Duplicates FUNCTIONS OF THE SR-50. PERHAPS HE CAN BE PERSUADED TO COMPLETE THAT DESIGN. OTHER ITEMS HE IS WORKING ON ARE 4K DYNAMIC RAM MEMORY, 16K SHIFT REGISTER MEMORY, AND A SCAN CONVERTER, 16K BITS OF SR MEMORY ORGANIZED AS 128 X 128 DOT POSITIONS ON A BLACK AND WHITE TV SCREEN. THIS UNIT COULD BE USED FOR LINE GRAPHING, STATISTICAL ANALYSIS, AND VIDEO GAMES. A FOLLOW-ON PROJECT WOULD INTERFACE TO A COLOR TV."

DR. SUDING HAS BEEN SELECTED AS A KEYNOTE SPEAKER AT THE DAYTON HAMVENTION, DAYTON, OHIO, SUNDAY, APRIL 27, 1975, 2:00 PM, THE LARGEST HAM CONVENTION IN THE WORLD. HIS TOPIC IS "THE MICROCOMPUTER IN DESIGN AND APPLICATION WITH HAM RADIO". HIS MARK-V WILL BE ON DISPLAY AND OPERATING AS A CW STATION, RTTY STATION, SLOW-SCAN TV STATION, AND USING NAME RETRIEVAL BY CALL. ALL OF THESE APPLICATIONS ARE UP AND RUNNING ON HIS MARK-V AND WILL BE MADE AVAILABLE LATER THRU THE DIGITAL GROUP. ANYONE IN THE MARK-V GROUP SHOULD ATTEMPT TO ATTEND IF THEY ARE IN THE AREA.

THE ALTAIR 8800 -- THE DREAM MACHINE! OR A NIGHTMARE?
-----------------------------
MORE AND MORE PEOPLE KEEP WONDERING ABOUT THE ALTAIR 8800 AND HOW THEY CAN MAKE THE KIT PRICES SO LOW. A LOT OF PEOPLE HAVE GAMBLED ON IT. (SEVERAL THOUSAND BACK ORDERS ACCORDING TO ONE REPORT.) I SUSPECT THAT ITS A LOSS LEADER TO TRY TO LOCK PEOPLE INTO BUYING THEIR ADD-ONS. AT LEAST ONE KUMO IS FLOATING AROUND ABOUT THEM USING FACTORY FALLOUT 8800'S. (INTEL SAYS YOU CAN ALWAYS TELL A FALLOUT. IF IT DOESN'T HAVE THE FULL FACTORY MARKINGS, THEN IT IS NOT A PRIME COMPONENT AND IS SOME FORM OF FALLOUT. THAT MAY NOT KEEP IT FROM WORKING BUT IT DOES MAKE A GUY NERVOUS.) WITH THE KIND OF BACKLOG THEY ARE SUPPOSE TO HAVE, YOU MAY HAVE TO WAIT MANY MONTHS FOR DELIVERY AND THEN YOU'LL STILL BE STUCK WITH THE PROBLEM OF MEMORY AND PERIPHERALS.

IF THE FUTURE ARTICLES ON PERIPHERALS IN POPULAR ELECTRONICS ARE GLORIFIED ADVERTISEMENTS AS THE LAST TWO HAVE BEEN, THEN WHAT? I SUGGEST THAT EACH NEWSLETTER PARTICIPANT TAKE A FEW MINUTES OF TIME TO WRITE PE AND TELL THEM WHAT YOU THINK OF THE TWO ALTAIR 8800 ARTICLES. MINE WONT BE COMPLIMENTARY! EVEN THE INFORMATION PACK DIDN'T CONTAIN ANY REAL CONSTRUCTION INFORMATION.

I ASKED MITS TO RESPOND TO OUR PRELIMINARY STANDARDIZATION PROPOSAL AND SUPPLY US WITH THEIR PLANNED PERIPHERAL I/O FUNCTIONS AND CODES SO WE COULD ATTEMPT TO DESIGN STANDARD INTERFACES THAT COULD BE USED WITH EITHER THE MARK-V OR ALTAIR 8800. THEIR REPLY WAS: "NO, IT IS NOT POSSIBLE FOR YOU TO RECEIVE 'A DESCRIPTION OF I/O CODES AND THEIR ACTIONS FOR 8800 PERIPHERALS'. MITS IS A BUSINESS AND AS SUCH, WE DON'T GIVE OUT THIS TYPE OF INFORMATION." THIS IS A FIRST! THEY MAY BE THE ONLY MINICOMPUTER MAINFRAME MANUFACTURER IN THE WORLD THAT REFUSES TO HELP YOU INTERFACE TO THEIR COMPUTER. GOOD LUCK, IF YOU ORDERED AN 8800.

THE STUDENTS AND STAFF OF THE CABRILLO COMPUTER CENTER WERE PARTICULARLY EXCITED TUESDAY, NOVEMBER 21 FOR THEY RECEIVED A PDP-9/E CENTRONICS LINE PRINTER INTERFACE. WE FIGURE THAT IF THEY SENT AN INTERFACE, OUR 6 MONTH OVERDUE LINE PRINTER CAN'T BE VERY FAR BEHIND. WE WERE COUNTING ON USING IT FOR PREPARATION OF THE NEWSLETTER AND MAILING LABELS.

PAGE 6
THE AUDIO CASSETTE TAPE DATA STORAGE UNIT - DON LANCASTER'S IDEAS

( THE FOLLOWING WAS PUBLISHED FROM PAGE 12 OF THE LATEST PEOPLE'S COMPUTER
COMPANY NEWSPAPER AND IS AN EXPERIMENT IN PARTICIPATORY DESIGN ORGANI-
ZED BY LEE FELSENSTEIN. LET US KNOW IF YOU MAKE ANY PROGRESS IN THIS
DIRECTION AND THEN NOTIFY PPC.)

ENTER DON LANCASTER, CARRYING A 4-LEGGED BUG CALLED A UART.
"AHA!" SAYS DON. "I'VE NOTICED SOMETHING ABOUT THE UART THAT MAY HAVE
ESCAPED YOU. YOU KNOW THAT IT REQUIRES A CLOCK SIGNAL AT EXACTLY 16
TIMES THE BIT RATE, RIGHT?"
"RIGHT. SO?
"WHAT THAT REALLY MEANS IS THAT NO MATTER WHAT THE SPEED, 16
CLOCK CYCLES INTO THE RECEIVER CLOCK MARKS OFF ONE BIT OF DATA.
IF YOU HAD A CLOCK FREQUENCY OF 16 TIMES THAT BAUD RATE RECORDED ON THE
SAME TAPE AS THE DATA, AND YOU USED THAT CLOCK TO RUN A UART TO RECEIVE
THE DATA, THE CLOCK WOULD ALWAYS BE AT THE RIGHT SPEED FOR THE DATA, NO
MATTER HOW SLOPPILY THE TAPE RAN!
"BUT WE DON'T HAVE A STEREO TAPE--
"NO NEED FOR TWO CHANNELS. JUST RECORD THE DATA AS AN AMPLITUDE
MODULATED SIGNAL ON A CARRIER FREQUENCY OF 16 TIMES THE BAUD RATE. FROM
ONE TAPE CHANNEL YOU HAVE 16 CYCLES PER BIT, LOUD OR SOFT DEPENDING ON
WHETHER THE DATA IS 1 OR 0, BUT ALWAYS THERE. JUST AMPLIFY AND LIMIT
THE CARRIER AND FEED IT TO THE CLOCK INPUT OF THE UART. DEMODULATE THE
DATA WITH AN AM DETECTOR AND FEED IT TO THE SERIAL INPUT OF THE UART.
OUT COMES 8 BITS ALL LINED UP PROPERLY ON THE PARALLEL OUTPUT PINS!"
WOW! WHAT AN IDEA! NOW ALL WE HAVE TO DO IS SOLVE THE LITTLE
PROBLEMS.

LITTLE PROBLEM #1. THE UART RECEIVER PRESENTS ITS DATA TO THE WORLD AS
UP TO EIGHT PARALLEL BITS. BUT IF WE WANT TO USE IT AS A PAPER TAPE
REPLACEMENT AT A TERMINAL, WE HAVE TO COME OUT WITH SERIAL DATA. (NOT
A PROBLEM FOR MOST MARK-8 USERS.) SOLUTION: USE THE OTHER HALF OF THE
UART, THE TRANSMITTER. FEED IT A NICE, CONSTANT CLOCK FROM AN OSCIL-
LATOR AND TIE ITS DATA AND CONTROL INPUTS TO THE RECEIVER'S OUTPUTS.
WHEN A WORD OF DATA COMES IN FROM THE RECEIVER, IT GETS SQUIRTED
OUT TO THE COMPUTER AT JUST THE RIGHT SPEED. TO AVOID TAPE OVERRUNNING
THE TRANSMITTER, THE RECEIVER SHOULD BE SET FOR ONE STOP BIT AND THE
TAPE RECORDED WITH TWO STOP BITS. THAT ALLOWS FOR UP TO A TEN PERCENT
SPEED DIFFERENCE WITHOUT STUMBLING.

LITTLE PROBLEM #2. RECORDING THE DATA ON THE TAPE. DON SUGGESTS A 15
DB DIFFERENCE FROM A "1" TO "0". THIS WORKS OUT TO "0" BEING 17% OF THE
"1" CARRIER AMPLITUDE.

LITTLE PROBLEM #3. CONTROLLING THE AMPLIFICATION OF THE SIGNAL RECEIVED
FROM THE TAPE. POSSIBLE APPROACHES INCLUDE: A) AUTOMATIC GAIN CONTROL
CIRCUIT. B) A LEVEL INDICATOR SO YOU CAN ADJUST THE PLAY LEVEL PROPERLY
AND SEE IF IT FALLS BELOW THE MINIMUM DURING PLAYBACK. C) RECEIVER
CIRCUITRY WITH ENOUGH "DYNAMIC RANGE" TO ALLOW FOR A WIDE RANGE OF INPUT
SIGNAL LEVELS.

LITTLE PROBLEM #4. THE AMPLITUDE DEMODULATION - MINIMIZING THE EFFECT
OF NOISE SPIKES.

LITTLE PROBLEM #5. EXTRACTING THE CLOCK SIGNAL WITHOUT INTERFERENCE
FROM NOISE OR LOW SIGNAL LEVELS. A BIG AMPLIFIER WITH A LIMITER WOULD
AMPLIFY NOISE UP TO SIGNAL LEVELS. A PHASE-LOCKED LOOP WOULD BE NICE
BUT A LITTLE EXPENSIVE, THOUGH IT WOULD ELIMINATE NOISE PROBLEMS. MAYBE
A SERIES OF SMALL AMPLIFIERS AND LIMITERS, WITH TRIGGER THRESHOLDS FOR
NOISE REJECTION?

LITTLE PROBLEM #6. CONTROLLING TAPE MOTION. MOST CASSETTE RECORDERS
HAVE A REMOTE ON/OFF SWITCH WHICH STOPS THE MOTOR. THIS COULD BE RE-
PLACED BY A PAIR OF RELAY CONTACTS WHICH PLUG INTO THE SAME JACK. WILL
CONTROL BE MANUAL? MANUAL START AND AUTOMATICALLY MAINTAINED UNTIL
THE SIGNAL STOPS? WHAT KIND OF RELAY TO USE? CAN SOMETHING OTHER THAN
A RELAY BE USED?

PAGE 7
Paul Farr’s TVT-MARK-8 Interface

A-3

Better protection. Crowbar circuit protects a power supply from overvoltages by sensing the voltage across the load, instead of the supply’s output voltage, which is the usual approach. This means that overvoltage sensing will not be affected by wiring voltage drops, nor will there be an increased sensitivity to voltage transients. The components shown here are for a power supply of 4 to 10 volts at up to 20 amperes.

Electronics/May 2, 1974

Another Crowbar Circuit A-5

Jay Bowden’s Circuit For Making Precision Systems Power Supply Uninterruptable.

A-6
ANALOG-TO-DIGITAL CONVERTER

Theory of Operation

As the computer addresses output port B with an output command the latch output grows high. This initializes the 74193 counters to zero. As long as the latch is high the counters are held at zero. This holding period can be used to select one of up to 255 different analog signals (via an analog multiplexer). When the latch goes low the 74193's begin to count (assuming a voltage greater than zero is being measured). Clock pulses for the counting circuit are obtained from the 8080 "Sync" clock. As the 74193's count through their binary progression they cause the 8-bit DAC to generate a staircase output at pin 4. This output is compared with the buffered input voltage. When the two signals are equal the output of the comparator goes low and stops the counting of the 74193's. The binary output of the 74193's at this point is directly proportional to the input voltage. The computer can sense this binary output at any time (with an input command) and act on it as directed.

Adjustments: "Vref" to the MC140P (pin 1/) is adjusted for a 2mA current at pin 4 when all TTL inputs are high (+2v). The following program provides the proper delay and input instructions:

<table>
<thead>
<tr>
<th>Location</th>
<th>Instruction</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>LAI</td>
<td>Load A Register with analog device #</td>
</tr>
<tr>
<td>x+1</td>
<td>OUT B</td>
<td>Select analog device &amp; initialize counter</td>
</tr>
<tr>
<td>x+2</td>
<td>LAI</td>
<td></td>
</tr>
<tr>
<td>x+3</td>
<td>24010</td>
<td>1.05 millisecond delay</td>
</tr>
<tr>
<td>x+4</td>
<td>INA</td>
<td></td>
</tr>
<tr>
<td>x+5</td>
<td>JFZ</td>
<td></td>
</tr>
<tr>
<td>x+6</td>
<td>x+4</td>
<td></td>
</tr>
<tr>
<td>x+7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x+8</td>
<td>INP Y</td>
<td>Y = analog converter port #</td>
</tr>
</tbody>
</table>

CARD READER

Some time ago, we purchased a great deal of material from RCA, when they closed down their computer manufacturing facility. In this material we came across several units identified as "CARD READERS". These are apparently standard IBM card readers, designed for reading individual cards. We do not have any technical information, other than the unit appears to electro-mechanical, is 9"x10"x8", weighs 21 lbs.

The unit has the RCA part number MI/6331, MI580316. The units are all new, and each one is serial numbered. The inventory sheet we have RCA paid $280.00 for these units. The parts alone are worth many times our price. We do not have any further information. The sketch to the left shows what the unit looks like.

STOCK NO.88205 $15.00 ea. 2/27.50
REPORT ON MY VISIT TO INTEL

I MADE AN APPOINTMENT AND DROPPED BY INTEL ON DEC. 27. THEY WERE INTERESTED IN OUR GROUP, HELPFUL TO THE EXTEND THAT I RECEIVED COPIES OF ALL OF THEIR PUBLICATIONS, UNINTERESTED IN HELPING OUT THE GROUP IN ANY SIGNIFICANT WAY, UNWILLING TO PART WITH DIAGNOSTIC SOFTWARE OR GIVE US ACCESS TO THEIR PROGRAM LIBRARY, AND TOTALLY UNWILLING TO TALK ABOUT QUANTITY PURCHASES ALTHOUGH I WAS TOLD THAT WE SHOULD PUT TOGETHER A PACKAGE OF ITEMS WE WANTED IN QUANTITY AND THEN TALK TO THE DISTRICT DISTRIBUTORS. I RECEIVED A VERY NICE TOUR OF THEIR DESIGN AND MANUFACTURING FACILITY. SINCE A VERY HIGH PRIORITY NEED IS SYSTEM CHECK-OUT DIAGNOSTIC PROGRAMS, I ESPECIALLY TRIED TO OBTAIN THEM AND WOULD YOU BELIEVE THEY SAID THEY DON'T HAVE ANY!! HOW DO ALL OF THOSE CHIPS GET TESTED AND THEIR INTELLEC 8'S AND 8-80'S??

HERE IS WHAT WILL INTEREST YOU:

1) INTEL USER GROUP PROGRAM LIBRARY - IT COSTS $100 TO JOIN (RIDICULOUS) BUT THEY WOULD PREFER TO HAVE YOU JOIN BY SUBMITTING A PROGRAM FOR AN 8000 OR 8000 WHICH WOULD GET YOU A YEARS MEMBERSHIP. FORMS FOR SUBMITTING THE PROGRAM CAN BE OBTAINED BY WRITING USER'S LIBRARY, INTEL, 3065 BOWERS AVE., SANTA CLARA, CA 95051. THE 8000 SECTION HAS 18 PROGRAMS LISTED INCLUDING A FLOATING POINT PACKAGE, RAM TEST PROGRAM, TTY LOAD AND DUMP, AND A PROGRAM THAT SENDS MORSE CODE FOR TEXT TYPED ON THE TTY.

2) BOOKS OF INTEREST
   B) MCS-8 (8000) ASSEMBLY LANGUAGE PROGRAMMING MANUAL-200 PAGES $5.00 (THIS ONE TAKES UP WHERE THE SCELBI MANUAL LEAVES OFF. EXCELLENT - WELL WORTH $5.00)
   C) 8000 ASSEMBLY LANGUAGE PROGRAMMING MANUAL - 80 PAGES $5.00 (IF YOU ARE INTERESTED IN 8000'S YOU NEED THIS.)
   D) INTELLEC 8/MOD 8 1) REFERENCE MANUAL (CONTAINS INTELLEC 8 SCHEMATICS) $5.00 2) OPERATORS MANUAL $5.00
   E) INTELLEC 8/MOD 80 (8000) 1) REFERENCE MANUAL (CONTAINS INTELLEC 80 SCHEMATICS) $5.00 2) OPERATORS MANUAL $5.00 (I DIDN'T GET THIS ONE BUT IT PROBABLY EXISTS.)

I STOPPED BY THE MICROSYSTEM INTERNATIONAL SALES OFFICE IN PALO ALTO. IF YOU FILL OUT THE CARD IN THE FLYER ATTACHED, YOU'LL RECEIVE A PACKAGE OF INFO INCLUDING THE MF8008 APPLICATION BULLETIN 80007 WHICH INCLUDES THE MOD 8 DESIGN AND THE MONITOR 8 USERS GUIDE AND PROGRAM LISTING. YOU MIGHT ALSO ASK FOR BULLETINS 80001C (SHORTFORM CATALOG), 80004A (LINEAR IC'S), AND 80005 (MOS MEMORIES).

STANDARDIZATION PROPOSAL

Everyone says let's standardize but no one will say what to! About Jan 18, I decided to face the problem, and proposed a partially thought out list of possible peripherals and what they should cost and a list of I/O assignments. This was intended as something that participants could "throw rocks" at in an attempt to get some dialogue going in the direction of standardization. This was sent out to about 50 of our most active participants and other interested parties. Information received in response to this was to be included in this newsletter but the important items already included squeezed it out and it will have to be included in issue #6. If you would like to receive the proposal and the comments received so far and then reply to it, please send a 20 cent sase and a camera ready description of something of interest for the next newsletter.

LITERATURE OF INTEREST

Don Lancaster is one of the most clever designers around. His RTL Cookbook was incredibly good but who uses RTL logic? His TTL Cookbook is almost as good and well worth $7.95. Order from PCC Bookstore, PO Box 310, Menlo Park, CA 94025.
WHETHER YOU LIKE IT OR NOT, SOME DUMMY IS GOING TO SUGGEST USING HEXADECIMAL NOTATION FOR THE 8086 OR 8088. YOUR ONLY DEFENSES ARE:
1) HAVE LOTS OF NASTY WORDS STORED UP TO USE ON HIM.
2) ORDER THE 16-PAGE PROGRAMMED INSTRUCTION MANUAL "UNDERSTANDING HEXADECIMAL NOTATION", AVAILABLE FREE FROM EDUCATION CENTER, FISHER CONTROLS CO., MARSHALLTOWN, 50156. (I GOT IT WITH THAT ADDRESS. YOU PROBABLY WILL TOO.)

A 176 PAGE DATA CONVERSION HANDBOOK WITH EVERYTHING YOU EVER WANTED TO KNOW AND MORE ABOUT A/D AND D/A CONVERTERS IS AVAILABLE FOR $1.58 FROM HYBRID SYSTEMS, 87 2ND AVE., BURLINGTON, MASS 01803.

THE DESIGNER'S GUIDE TO PROGRAMMED LOGIC BY PRO-LOG CORP., 852 AIRPORT RD., MONTEREY, CA IS A VALUABLE REFERENCE FOR 8086 USERS. (WHETHER ITS WORTH $10.00, I HAVEN'T DECIDED YET.)

WRITE MOTOROLA SEMICONDUCTOR PRODUCTS, 5005 E. MCDOWELL RD., PHOENIX, AZ 85008 FOR BROCHURES ON THEIR M6800 MICROPROCESSOR SERIES. IT'S SUPPOSED TO BE MUCH BETTER THAN THE 8080 AND AVAILABLE SOON.

A COMPLIMENTARY ISSUE OF THE "NEW LOGIC NOTEBOOK" IS AVAILABLE FREE FROM MICROCOMPUTER TECHNIQUES, INC., 11227 HANDLEBAR ROAD, RESTON, VIRGINIA 22091. IT CONTAINS A COMPLETE DESCRIPTION AND BLOCK DIAGRAM FOR ALL OF THE MICROPROCESSORS THAT HAVE BEEN BUILT OR PROPOSED.

WRITE THE DIGITAL EQUIP. CORP., COMPONENT GROUP, ONE IRON WAY, MARLBOROUGH, MASS 01752 AND ASK FOR M7341, M7344, M7345, M7346 8086 MODULE DATA SHEETS AND THE APPLICATION NOTES, "GENERAL INTERFACING TECHNIQUES FOR M7341 MICROPROCESSOR MODULES" (CONTAINS 1/O EXPANSION INFO), AND "INTERFACING THE 686 CASSETTE UNIT TO THE M7341 MICROPROCESSOR". FOR YOU INTERRUPT NUTS, THE M7346 MODULE HAS THE CUTEST 8086 PRIORITY INTERRUPT SCHEME YOU HAVE EVER SEEN. (THANKS TO MAURY GOLDBERG FOR SENDING THESE.)

THANKS TO ROBERT KELLEY, 5806 MT TERMINAL DR., WACO, TX 76710.
I'VE HAD A CHANCE TO LOOK AT THE MARTIN RESEARCH BOOKS. I'M SLIGHTLY COLORBLIND ON THE RED END OF THE SPECTRUM AND THE RED PLASTIC PAGES TO DISCOURAGE COPYING DON'T BOTHER ME AT ALL AND THE CONTENT IS GREAT. OH, IT WOULD HURT TO PAY $100 FOR IT. YOU'D BETTER HUNT DOWN SOMEONE WHO CAN LOAN YOU THEIR COPY FOR A FEW DAYS.

WE MAY BE THE ONLY HABBY COMPUTER GROUP IN THE WORLD WITH THEIR OWN POET LAUREATE. ADD MRS. GENEVIEVE ALLVEN, 1328 N. BALDWIN, PORTLAND OR TO THE ROSTER. (MY MOM WANTS TO RECEIVE THE NEWSLETTER AND HER POETRY IS INTERESTING! SAMPLES WILL APPEAR AS SOON AS SHE IS INSPIRED.)

COMMENTS FROM CURRENT PARTICIPANTS

ADAM FRENT, BENDIX BOX A ASCENSION, PATRICK AFB, FL 32925 SAYS HE FEELS LIKE HE IS BEING LEFT BEHIND BY THE SPEED WITH WHICH THINGS ARE HAPPENING (WHO DOESN'T?). HIS MARK-8 & TUV PROJECTS WERE INTENDED TO BE LEARNING EXPERIENCES WHICH HE SAYS THEY CERTAINLY HAVE BEEN. HE WORKS WITH A UNIVAC 1218 WHICH IS USED TO HANDLE TRACKING DATA AND TO PROVIDE ANGLE POINTING DATA FOR THEIR S-BAND DISH ANTENNA. HE SUBMITTED A BEAUTIFUL HANDBOOK TYPE FORMAT IN WHICH HE HAS ARRANGED THE MARK-8 INSTRUCTIONS WHICH LISTS THE MNEUMONIC, OCTAL, BIN, HEX AND INSTRUCTION DESCRIPTIONS. ITS 7 PAGES LONG, MUCH TOO BIG TO INCLUDE, BUT WE CAN SUPPLY COPIES FOR A NEWSLETTER ARTICLE AND A 20 CENT SASE.

ROBERT SWARTZ, 195 IVY LANE, HIGHLAND PARK, IL 60035, PURCHASED THE MICROSYSTEMS INTERNATIONAL BOARD SET FOR THE MOD-8 SYSTEM AND SAYS THE BOARDS AND THE SYSTEM ARE GREAT. (MARTY SPEARLE OF WAR ENTERPRISES CONTACTED MIL AND OBTAINED A RELEASE TO ENABLE US TO HAVE THE BOARDS ETCHED FOR US BY ANYONE. THE MOD-8 BACKPLANE CONTAINS A PROM PROGRAMMER THAT USES ABOUT $40 WORTH OF PARTS. THE MIL MONITOR IS FABULOUS. HE HAS A SAMPLE ROM WITH A BAD BIT AND IS PRESENTLY USING IT.

ROBERT IS WORKING CLOSOY WITH BOB COOK, MARK CONDIC, AND DON MARTIN OF MARTIN RESEARCH AND THEY ARE SETTING UP A CHICAGO AREA USER GROUP. ALL PEOPLE IN THE CHICAGO AREA SHOULD CONTACT ROBERT AT 472-6600 DAYTIME, AND 432-6423 AT NIGHT. DON MARTIN WILL SOON SUPPLY AN 8088 KIT PRICED SOMEWHERE AROUND $250.

BOB SAYS THE 74L138 IS PARTICULARLY HANDY FOR USE WITH AN 8088 SYSTEM. HE RECOMMENDS GERBER FOR PARTS, ALL PRIME. CALL TOLL FREE 800-225-8290 TO ORDER OR TO OBTAIN A CATALOG.
A SIMPLE ANALOG-TO-DIGITAL CONVERTER

by
Jim Pry

Note 1: This output could go to some type of overflow latch and/or indicator if desired.

Note 2: DC thru D7 could be connected to an analog multiplexer circuit.

Note 3: Maximum Vin = 2.55 volts. Accuracy to ±5mv in 10 mv steps.

Note 4: All analog IC's are Motorola.

Note 5: MC 1741 can be replaced by a LM741 & MC1709 can be replaced by a LM709 thereby bringing the total cost from $12.00 to $7.00.
Microsystems International's
Mod-8 Cassette Tape Interface
M. PAUL FARR, 3723 JACKSTADT, SAN PEDRO, CA 90731 MADE NUMEROUS COMMENTS ON OUR STANDARDIZATION PROPOSAL. He PROVIDED US WITH A SCHEMATIC OF HIS TUT INTERFACE (APPENDIX A-3), AND A VERY COMPREHENSIVE RAM MEMORY TEST PROGRAM, AND HE HAS MADE MODIFICATIONS TO A STANDARD KEYBOARD MONITOR PROGRAM TO HANDLE THE TUT. SEND A SHORT ARTICLE FOR THE NEXT NEWSLETTER AND A 20 CENT SASE FOR A COPY OF EACH. HE REGRETS THAT HE MUST WITHDRAW HIS OFFER TO SUPPLY REVERSED MARK-R MEMORY BOARDS. THE ARTWORK IN THE PACKAGE WAS NOT GOOD ENOUGH TO PRODUCE QUALITY BOARDS AND HE'd RATHER NOT SEND OUT SHBBY GOODS. HE SAYS THE GENERAL INSTRUMENTS 8Q-5-1013 UART IS AVAILABLE EVERYWHERE FOR $6.75 IN SINGLE QUANTITY.

RGS ELECTRONICS, 3650 CHARLES ST. SUITE K, SANTA CLARA, CA 95050 HAS UPGRADED THEIR KITS AND MANUALS TO PCC BOARDS SO COMMENTS IN THE LAST NL DON'T APPLY ANYMORE. $25 IS STILL AN AWFUL LOT TO PAY FOR THAT MANUAL. BORROW ONE FROM SOMEONE IF YOU'RE REALLY INTERESTED. THEIR BUS I/O IS REALLY CUTE BUT SUFFERS FROM THE FACT THAT NO ONE ELSE USES IT PRESENTLY.

ROGER SMITH, SMITH ENTERPRISES, 4502 E. NANCY LN., PHOENIX, AZ RS404 INCLUDED THE SCHEMATIC IN APPENDIX A-4 SHOWING HOW TO INTERFACE HIS TUT TAPE RECORDER UART BOARD TO THE MARK-R. HE SAYS HE TRIED ALL KINDS OF CASSETTE TAPE RECORDING TECHNIQUES AND SETTLED ON TONE BURST BECAUSE IT WORKS WELL AND NO CRITICAL TUNING IS REQUIRED.

LARRY PLESKAC, 938 PAULA ST., ESCONDIDO, CA 92027 REPLIED IN DETAIL TO THE STANDARDIZATION PROPOSAL. HE SUGGESTS TWO CASSETTE UNITS, ONE FOR READING, AND THE OTHER FOR WRITING, AND WANTS TO STANDARDIZE THE CASSETTE FORMAT. (I SUSPECT THAT EITHER THE SANDING OR MILL FORMAT WILL BE FORCED AS A STANDARD BECAUSE THEY WORK AND PEOPLE WILL START USING THEM IMMEDIATELY.) EVERYONE IT SEEMS, WANTS MONEY FOR THEIR DOCUMENTATION AND LARRY VONDIERS IF WE AREN'T GOING TO BE REDUCED TO A BUNCH OF SMALL BUSINESSMEN DEALING WITH EACH OTHER INSTEAD OF HOBBYISTS.

WILLIAM E. SEVERANCE, CENTER LOVELL, MAINE 04016, 207-925-2271 SAYS HIS MARK-R HAS BEEN UP AND RUNNING SINCE EARLY DEC. HIS STRANGEST DEBUGGING PROBLEM WAS THE CLOCK WHICH WOULDN'T START ON FREQUENCY MULTICYCLE INSTRUCTIONS WOULDN'T RUN. HE SOLVED IT BY PARALLELING A 27 PF CAPACITOR ACROSS R3 ON THE CPU BOARD. HE HAS MADE EXTENSIVE MODIFICATIONS TO THE MARK-R, ESPECIALLY TO THE INPUT BUS. HE ALSO MADE EXTENSIVE COMMENTS ABOUT THE STANDARDIZATION PROPOSAL.

JERRY WALKER, 761 CLAYTON, SAN FRANCISCO, CA 94117 SAYS HE HAS THE MARTIN RESEARCH BOOK AND AN 8086 CHIP AND WOULD LIKE TO GET TOGETHER WITH SOMEONE IN THE BAY AREA AND BUILD A COMPUTER. HE HAS 10 YEARS EXPERIENCE AS AN ELECTRONIC TECHNICIAN.

PHIL MORK, 12 WOODLAND RD., WESTON, MA 02193 GOT HIS MARK-R RUNNING DEC. 22. HE CHANGED HIS MIND AND IS NOW USING SOFTWARE FOR PARALLEL TO SERIAL CONVERSION AND VICE VERSA. HE'S WRITTEN A CONTROL PROGRAM THAT TIES THE TUT, KEYBOARD, AND MODERN TO THE COMPUTER AND ALLOWS OCTAL LOADING AND DUMPING, EXECUTION OF PROGRAMS, AND I/O TO THE MODERN. HE HOPES TO ADD A CHECKING PROGRAM WHICH WILL VERIFY CASSETTE DATA. HIS LOADER PROGRAM SHOULD FIT IN TWO 8223'S WHICH WILL LOAD THE CASSETTE DATA INTO MEMORY. STARTING AT THE ADDRESS WHICH FORMS THE FIRST 2 WORDS AND CONTINUING UNTIL A 377 IS ENCOUNTERED IN CASSETTE DATA. THIS COULD BOOTSTRAP THE REST OF THE CONTROL PROGRAMS INTO THE COMPUTER. HE PROPOSES THE FOLLOWING TAPE FORMAT: 1 7/8 IPS CASSETTE, 300 BAUD, 1 START, 8 DATA, AND 2 STOP BITS. START BIT LOGIC 1, STOP BITS LOGIC 0. DATA TRANSMITTED LEAST SIGNIFICANT BIT FIRST, LOGIC 1=1270 Hz, & LOGIC 0=1070 Hz. UPON FIRING UP HIS SYSTEM (WITHOUT THE ROM), HIS REGULATOR BROKE DOWN PRODUCING SMOKE AND A MINOR EXPLOSION FROM A 7476. HE REBUIT THE PS, ADDED A CROWBAR, AND FOUND DAMAGE TO THE MINIMAL: 2 7475 AND A COUPLE OF 1101'S. MORAL: YOU REALLY DO NEED A CROWBAR! ANOTHER CIRCUIT IS SHOWN IN APPENDIX A-5. HE SUPPLIED THE CUTE MUSIC PROGRAM THAT YOU MUST TRY WHICH APPEARS IN APPENDIX B-2. NOW THAT HE HAS A RUNNING ROM, HE IS FAR MORE INTERESTED IN SOFTWARE THAN HARDWARE. HE THINKS A COMMERCIAL COMPUTER HOBBYIST MAGAZINE WOULD BE FEASIBLE.
MR. TITUS, TYCHRON, INC. (THE NEW NAME FOR HIS COMPANY), PO BOX 242, BLACKSBURG, VA 24060, 783-951-9830 SAYS HIS CALCULATOR INTERFACE WILL APPEAR IN RE SOON. IT WILL USE THE TI MS-6117 BCD MATH CHIP AND KA ELECTRONICS SALES, 1220 MAJESTY DR., DALLAS, TX 75247 WILL BE SELLING IT AND PERHAPS A KIT OF PARTS ALSO. TECHNIQUES, INC. WILL HAVE THE PC BOARD.

SSG. JACKIE W. PIERCE, 460-84-4884, 187TH SIG. CO., APO NY 09182 WANTS TO KNOW WHETHER WE HAVE SET UP COMMITTEE OPERATION FOR THE GROUP. ITS HARD ENOUGH TO JUST COMMUNICATE! PERHAPS LOCAL GROUPS CAN ORGANIZE THAT WAY BUT IT SURE DOESN'T SEEM FEASIBLE NATIONALLY IN THE NEAR FUTURE.) HE SUGGESTS THE FOLLOWING STANDARD FORMAT FOR TAPE RECORDING: A TAPE SHOULD BE SEPARATED INTO BLOCKS. EACH BLOCK SHOULD BE NUMBERED SEQUENTIALLY AND BE BIG ENOUGH TO STORE 1K BYTES. THERE SHOULD BE APPROXIMATELY 5 SECONDS BETWEEN BLOCKS WITH ABOUT 3 SECONDS BETWEEN THE NUMBER OF THE BLOCK AND THE DATA IN THE BLOCK (TO PERMIT EDITING INFORMATION IN A BLOCK) THERE SHOULD BE A START AND STOP CHARACTER AROUND THE BLOCK NUMBER AND AROUND THE DATA. IF YOU WANT TO CORRECT OR CHANGE INFORMATION IN BLOCK 001, YOU READ THE TAPE UNTIL 001, THEN STOP (DURING THE 3 SEC INTERVAL), GO TO RECORD MODE, AND WRITE IN A WHOLE NEW DATA GROUP. THE START AND STOP CHARACTERS WILL PREVENT MOST ERRORS DUE TO TAPE RECORDER START UP AND STOP TIMES. HE IS ALSO LOOKING FOR AN A/D CONVERTER THAT CAN SAMPLE AROUND 50 KHZ.

R. S. FORMAN, 2421 NW JOHNSON, PORTLAND, OR 97210 IS CONFUSED AS TO WHETHER TO CONTINUE OBTAINING 8008 PARTS OR TO SWITCH TO AN 8086. HE WANTS HARDCOPY PRINTOUT (TRY BOB COOK'S CREEDS). NOTE HIS NEW ADDRESS.

BOB ALBRECHT, PEOPLE'S COMPUTER COMPANY, PO BOX 316, MENLO PARK, CA 94025 SAYS HIS $3.00 YEARLY SUBSCRIPTION OFFER TO THE PCC NEWSPAPER IS EXTENDED INDEFINITELY TO MARK-8 PARTICIPANTS. HE IS STARTING TO EMPHASIZE MICROCOMPUTERS AND HOME COMPUTERS HEAVILY IN THE NEWSPAPER. SEVERAL PARTICIPANTS HAVE ALREADY MENTIONED HOW EXCITED THEY ARE ABOUT THE NEWSPAPER'S CONTENT. THE 9 BACK ISSUES FOR $6.00 IS STILL A GOOD BUY. BOB SAYS HE WOULD LIKE TO START A HOBBYCOMPUTER NEWSPAPER IN SEPTEMBER 1975. IT WOULD BE 8 1/2 BY 11, ABOUT 20 PAGES PRINTED ON NEWSPRINT, 6 ISSUES A YEAR, $3.00 YEAR FOR CHARTER SUBSCRIPTIONS, $5.00 THEREAFTER. WRITE BOB AT PCC IF YOU ARE INTERESTED IN SUPPORTING THIS EFFORT AND SEEING WHAT HE CAN DO.

MARK CONDIC, 410 WOODS LANE, #4A, DOWNERS GROVE, IL 60515 HAS A CLASS HE IS TEACHING IN WHICH THEY ARE BUILDING UP SOME OF DON MARTIN'S (MARTIN RESEARCH) NEW 8008 CHEAP 8080 SYSTEM. (I DON'T HAVE ANY OTHER INFO ON IT NOW BUT IT IS SUPPOSED TO BE GOOD.) BOB SWARTZ SAYS MARK IS WILLING TO WRITE A BASIC BUT ISN'T WILLING TO WRITE THE FLOATING POINT PACKAGE. WE GOTCHA MARK!!!! JOE CIMINO, 19384 RICHWOOD COURT, BROOKEVILLE, MARYLAND 20820 WILL HAVE A SUPER FLOATING POINT PACKAGE AVAILABLE SOON. CAN WE PLACE OUR ORDER? A BASIC LIKE DEC'S PDP-8 EDU10 THAT WILL RUN IN 6K BUT WILL ALLOW YOU TO DEFINE LARGE MEMORY SIZE FOR TEXT AND DEFINE MACHINE LANGUAGE FUNCTIONS. DEC PUTS EDU10 IN 4K OF 12 BIT WORDS SO AN 8086 BASIC IN 6K SHOULDN'T BE UNREALISTIC. MARK SAYS HE HAS A CROSS ASSEMBLER THAT RUNS ON A UNIVAC/1100. HE SUGGESTS REGIONAL NEWSLETTER DISTRIBUTION POINTS. HE AND BOB SWARTZ ARE ACTIVELY FORMING A CHICAGO AREA USER GROUP.

DAVID HIGGIN, KHIG/STEREO 105, PO BOX 1106, PARAGOULD, AR 72450 WOULD LIKE TO HAVE AN ASSEMBLER AVAILABLE IN PROM. HE IS GOING TO BUY A MITS 8800 WITH HIS IRS '74 RETURNS.

JOHN B. HOPKINS, 29 GRANDVIEW AVE., PITMAN, NJ 08071 SAYS THE COMPUTER HOBBYST GUS ARE GREAT AND HE IS ALSO IMPRESSED WITH THE PCC NEWSPAPER. HE WOULD LIKE TO SEE SEPERATE EDITORS FOR VARIOUS SPECIAL INTEREST AREAS, A SOFTWARE LIBRARY, AND WOULD LIKE THE GROUP TO INVOLVE ONLY 8008 SYSTEMS. HE HAS A RUNNING MARK-8 WITH 1.5K OF 1101'S WITH OCTAL LOADING VIA 8 PUSHBUTTON SWITCHES DECODED BY SOFTWARE (I'D LIKE TO SEE THAT SOFTWARE SINCE MY MARK-8 CONFIGURATION COULD EASILY BE SET UP THIS WAY ALSO.) HE CONTRIBUTED THE RANDOM NUMBER GENERATION ALGORITHM IN APPENDIX B-3. HE HAS ACCESS TO SEVERAL LARGE LIBRARIES SO IF YOU CAN'T FIND A PARTICULAR REFERENCE LOCALLY HE'S WILLING TO HELP. HE WOULD LIKE TO SEE US GET TOGETHER ON A STANDARD TTY 1/0.
We have received a large number of copies of magazine articles which would be of interest to all of us. Hal and I have decided the best approach would be the local one and therefore we are going to seek permission to reprint from the publishers and then include them in future newsletters. In the meantime those of you having access to Electronic Design News magazine will find the list on page A-3 of interest.

Phillip C. Bold, 963 South Iowa St., Addison ILL 60104, plans on getting started on his Mark-8 toward the end of January.

Harry C. Derks, 65a Goldenrod Ave., Holland MICH 49423, is currently building his Mark-8.


Frederick H. Faulkner (Hal) Lt. Col. USAF, 58 Offutt Rd., Bedford MA 01730, is hard at putting together his TWT and Mark-8. He has plans for cassette tape, possibly 4K of 1101's or interfacing 20K bytes of core, hard copy (printer), and a modem & acoustic coupler for telephone interface. He wants to acquaint his daughter (11) and son (17) with computer programming and applications. (which is one of my big goals.)

LGC Engineering, 1007 Delaware St., Berkeley CA 94703, are builders of the "Tom Swift Terminal" (or "A Conivial Cybernetic Device") which is an inexpensive computer terminal for public-access information systems. Their goal is to dispel the theory that the more complex a technology becomes the less useful to society it becomes.

SSgt Jackie W. Pierce, L60-A4-4986, 178th Signal Co., APO New York 09102, has built, and is testing, a cassette recorder modem which operates at 3800 bps. It requires a frequency cntr & dual-trace scope for calibration.

Phil Lohr, 3917 Flowerfield Rd., Charlotte N.C. 28210, has his Mark-8 about 85% finished & the TWT about 30%. And, what a system he's going to have! He's got a floppy disc, card reader, card punch, and plans on a 16K memory. It's going to be used for research work, developing a Computer Design Simulator language, and probably be retired eventually to a GP household computer.

Gerald McKee, 46227, Six S Company, P.O. Box 4667, San Jose CA 95126, plans on using his Mark-8 for learning programming and updating his electronics background (which goes back to 1940).

Bro. Felix N. Neussendorfer, Colegio San Antonio Abad, Box 729, Humacao, Puerto Rico 00661, will be using his Mark-8 as a tool for teaching programming. He is currently building the TWT and plans to build a cassette interface & controller. He expressed a concern over availability of software for the MARK-8. (That's what this User's Group is all about, Felix. After we all get the little beasts running the interchange of software will become the big thing.)

+hal has some additional sundries to contribute to this issue so I'm now going to drop it off at his house for the finishing touches. Incidentally, he and I have reached a decision regarding the future of the Newsletter. We will be working together on it in the future as a joint project (and I'm sure you can appreciate the fact that it is too much for one man).

It's been a pleasure.

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Gordon French, 614 19th A, c/o Jenio Park CA 94035, and Jerry Delk, 777 Millar Ave., San Jose CA 95129, have been working for several months on an intelligent terminal controller which uses an 8008 for control. They have written an interpretative language and math routines which use ASCII number strings.

Gary E. Friedrich, 2618-2 Caritales Dr., Rancho Cordova CA 95670, has joined the growing list of Mark-P builders.

Several of you Canadians have mentioned the difficulty of getting parts up there in Canada. I received a note from K7I Hamilton, 116 John St., Dartmouth Nova Scotia. He runs an electronic mail order house and may be of assistance.

Fred Hatfield, Computer Data Systems, Inc., 1322 Grandview Ave., Columbus OH 43212, is currently writing a system for an 8080 w/a disc. He is a good man to know if you have a Teletype (manuals, parts, misc. info, etc.). He has a home PDP-8.

Robert A. Helber, 2417 E. Yucca St., Phoenix AZ 85028, another newcomer.

J. Horner, 3889 NE Duncilley, Portland OR 97212, also.

A.J. Klinenschnitz, Ch. Engr., AKI Industries, Inc., 23 Abbeyview Ave., Willow Grove PA 19090

John LaTocha, 2130 University Ave. #B9, Madison WI 53705

Emerson Lawson, Jefferson Productions, One Julian Price Place, Charleston CO 82028

Jeff Mendenall, P.O. Box 702, Ridgecrest CA 93555

Larry Moss, 9347 O'Day Drive, Highland IND 46322

Jim Rawlings W86QY, 211 Milo Place, San Ramon CA 94583

Michael Semencauk, 40 Willow St., Elmwood Park N.J. 07407

Lloyd L. Smith, 530 Pierce Ave., Dyer IND 46311, has received his circuit boards.

Larry Stein, 151 Kline Blvd., Colonia N.J. 07067

John Szilcok, 3395 Cliff Road N Unit 30, Mississauga ON Canada C5A-3M7

Dave Turner, Box 24/1647, FPO New York 09540 (an electronic tech stationed in Spain)

David Walters, Route 4 Box 386, Andalusia ALA 36420

David H. Jewell, 2495 Oro Ave., Oroville CA 95965, hasn't started yet but anticipates using his micro-computer for scientific calulations & plotting math functions.

Sgt. Lee C. Hanson, PSC Box 618, APO San Francisco 96366, has his Mark-2 up and running & would like to get some basics on programming (once again, I would recommend the Scelbi manual). He made a remark about convincing his wife the cost of the TVT would be worthwhile. It's for sure you're not alone in that department, Lee.

Hey...one of you Ham radio operators should compile a list of all the Hams who are into this thing so you guys can get together on the air. It seems that several of you are interested in code conversion, radio teletype (w/a TVT), etc.

S Lieberman, 1389 Duranro Ave., Los Angeles CA 90035, has put together the Southwest Tech Prod Corp Keyboard & Beeper Kit KBD-2 and finds that some of the switches on his unit are hinging up. Does anyone have a cure for the problem?

Jim Fry has come up with a significant contribution in the way of a low-cost analog-to-digital converter. He has included, along with the schematic, a theory of operation and a test program for making adjustments. The entire package may be found on page A-1.
RICK BRENNAN, 601 S. KNIGHT, PARK RIDGE, IL 60068 BOUGHT THE ALT AIR
8800 KIT AFTER EVALUATING THE RGS AND IEU KITS. THE IEU INFORMATION
PACKAGE IS A COMBINATION OF NATIONAL IMP-16 LITERATURE REPRINTS AND A
FEW DESCRIPTIONS OF THE KIT, SCHEMATICS, PC BOARDS, AND PARTS
LAYOUTS. IT IS DEFINITELY NOT FOR THE BEGINNER. HE ORDERED A SET OF
REPRINTS FROM EDN FOR $6.95 ON MICROPROCESSORS AND WILL LET US KNOW
WHETHER THEY WERE WORTH THE MONEY.

THANKS TO LEE C. HANSON, 51 CES, BOX 648, APO SAN FRANCISCO 96366,
WE NOW HAVE A COPY OF THE SCHEMATICS FOR THE PRECISION SYSTEMS POWER
SUPPLY. IT WILL HAVE TO BE REDRAWN BEFORE IT CAN BE DISTRIBUTED. LET
US KNOW IF YOU NEED A COPY. LEE IS VERY IMPRESSED WITH THE COMPUTER
HOBBYST. HE WONDERS IF HE DID THE RIGHT THING BY GOING THE MARK-8
INSTEAD OF WAITING FOR THE 8080 SYSTEM. (I MAY BE OVERLY PESSIMISTIC
BUT I SUSPECT THAT YOU'ILL BE VERY GLAD YOU DIDN'T DEAL WITH MTS.) HE
WOULD ALSO LIKE SOME ARTICLES ON ELEMENTARY COMPUTER THEORY SO HE CAN
SORT OUT THE STRANGE VOCABULARY PEOPLE KEEP USING.

DAVE CHAPMAN, 3420 S. PERKINS RD., MEMPHIS TN 38118 HAS AGREED TO SERVE
AS "ART EDITOR" FOR THE NL. WE'LL CHALLENGE HIM BY ASKING HIM TO RE-
DRAW THE PRECISION SYSTEMS POWER SUPPLY SCHEMATICS.

STEVE CIARCIA, 41 HILLTOP DRIVE, WEST HARTFORD, CT 06107 HAS HIS SCELBI
COMPUTER RUNNING AND IS EVEN MORE ENTHUSIASTIC THAN BEFORE REGARDING THE
QUALITY OF THE BOARDS AND THE DESIGN OF THE SYSTEM. (I'VE HEARD RUMORS
THAT THE PRICE OF THEIR BOARD SETS HAS BEEN REDUCED. THAT MAY NOW BE
THE BEST WAY TO GO. (THEY DO PUBLISH A USER NEWSLETTER. PERHAPS THEY
OFFER THAT ON A SUBSCRIPTION BASIS.)

BILL MILLER, 2813 WAGNER DR., BURLINGTON, NC 27215 SUGGESTS NL SUBSCRIPTIONS
AND RECOMMENDS THAT PARTICIPANTS SUBMIT SCHEMATICS AND PROGRAMS
IN CAMERA READY FORM (OH!! PLEASE DO! YOU WOULDN'T BELIEVE THE AWFUL
COPIES AND SCHEMATICS WE RECEIVE AND THERE JUST ISN'T TIME TO REWRITE
AND REDRAW EVERYTHING.) HE HAS AN RS-23A AND ASRS3. HE RECEIVED DON
TARBELL'S CASSETTE TAPE INFO AND WILL BUILD IT AND LET US KNOW HOW IT
WORKS.

LARRY MOSS, 9347 O'DAY DR., HIGHLAND, IN 46322 WONDERS IF PERIPHERALS
CAN REALLY BE BUILT AT PRICES MENTIONED IN THE STANDARDIZATION PROPOSAL.
HE PLANS TO BUILD A SMALL DIGITAL DATA ACQUISITION SYSTEM AND AN AUTO-
OMATIC FIST FOLLOWER (MORSE CODE TO TTY CONVERTER). THE SENDING PROGRAM
IS AVAILABLE IN THE INTEL USER LIBRARY. ALSO CONTACT DR. SUDING;
C/O DIGITAL GROUP, BOX 6528, DENVER CO 80206 FOR SOME REALLY FANCY
INFORMATION ON RAM STUFF.

JAY C. BOWDEN, 1613 ENCINO DR., ESCONDIDO, CA 92025 HAS HIS MARK-8
RUNNING WITH A KEYBOARD AND LED DIGIT READOUTS. NOW HE WANTS SOME
SOFTWARE TO MAKE IT DO SOMETHING USEFUL. HE USED A PRECISIONS SYSTEMS
POWER SUPPLY AND HAD 5 OUT OF 35 BAD 1101'S FROM IEU. HE SUPPLIED THE
CLEVER CIRCUITS IN APPENDIX A-6 TO MAKE THE PS UNINTERRUPTABLE.
HE IS INTERESTED IN A 4K Dynamic RAM MEMORY. (WITH 2102'S HEADING
$25 EACH, IT DOESN'T APPEAR PRACTICAL ANYMORE!) HE MENTIONED MICRAL
A FRENCH COMPANY THAT MAKES AN ELABORATE 8080 SYSTEM WITH AN AVAILABLE
BASIC. HE WOULD ALSO LIKE TO KNOW MORE ABOUT PL/M. (IT COSTS SOME-
THING LIKE $1250 TO BUY FROM INTEL AND REQUIRES A BIG FORT IV MACHINE
TO RUN.) HE WOULD ALSO LIKE TO KNOW IF ANYONE ELSE WOULD LIKE TO
SPLIT THE COST OF THE SCELBI CALCULATOR PROGRAM.

MICHAEL G. SCOTT, ROUTE 1, BOX 185, KIRON, IOWA 51448 HAS STARTED ON A
TUT AND NOTES THAT SWT NO LONGER SUPPLIES TUT BOARDS. (SEMTRONICS, RT 3
BOX 1, BELLAIRE, OH 43906 DOES BUT YOU MAY WANT TO CONSIDER THE NEW SWT
TUT OR THE DIGITAL GROUPS TUT INSTEAD.) HE WOULD LIKE TO KNOW HOW MANY
2520's CAN BE DRIVEN BY THE TUT CLOCK DRIVER? HE SUGGESTS WRITING TO
SIGNETICS, 811 EAST ARQUES AVE., SUNNYVALE, CA 94086 FOR THE BIG
WHITE DATA BOOK WHICH HAS DATA ON EVERYTHING.
JOSEPH A. CIMMINS, 19304 RICHWOOD COURT, BROOKEVILLE, MARYLAND 20729
IS PROMOTING A WASHINGTON DC USER'S GROUP AND INTENDS TO SET UP AN 8008
AND 8086 SOFTWARE DISTRIBUTION HOUSE. THE GROUP'S RESOURCES INCLUDE
MARK-8'S, INTELLEC 8'S, MIL-MOD-8'S, BIG COMPUTERS, ETC., AND THEY ARE
CONTEMPLATING BIG THINGS FOR THE FUTURE. THEY INTEND TO HAVE EACH
OF THE SEMISTANDARD DEVICES THE USER GROUP ESTABLISHES SO THEY CAN DO
SOFTWARE MODIFICATION FROM ONE FORMAT TO ANOTHER. THEY HAVE PURCHASED
THE INTEL USER LIBRARY. THEY WILL SOON SET UP A TELEPHONE COMMUNICATIONS
NETWORK USING MIKE HAYES' (MNH ELECTRONICS) MODEMS AND JOE IS EVEN
SUGGESTING USE OF THE HAM RTTY SATELLITE NETWORK FOR NATIONAL DISTRIBUT-
UTION OF SOFTWARE. MAYBE WE CAN GET THEM TO WRITE UP WHAT THEY HAVE
GONE FOR THE NEXT NEWSLETTER. JOE IS DOING THE GROUP A SERVICE BY PUT-
TING THE ROSTER INTO MACHINE READABLE FORMAT. CONTACT HIM IF YOU WANT TO
BUY A COMPLETE SET OF STICK-ON MAILING LABELS. HE WILL SOON MAIL OUT AN
ELABORATE SURVEY FORM ASKING PARTICIPANTS DOZENS OF QUESTIONS RELATING TO
WHAT THEY ARE DOING AND WHAT THEY WANT TO DO IN THE FUTURE. HE WILL
COMPILE THIS INFO AND MAKE IT AVAILABLE TO ALL OF US SO PLEASE TAKE
FILLING IT OUT SERIOUSLY. HE IS ALSO WORKING ON A SUPER 8008 FLOATING
POINT PACKAGE.

JIM FRY, DIGI-TEL ELECTRONICS, PO BOX 6585, TOLEDO OH 43612 SENT A LETTER
TO PARTICIPANTS OFFERING 2102'S AT $5.45 EA. IF HE COULD COLLECT ORDERS
FOR 1000. SOME PEOPLE WERE SUSPICIOUS SO HE ASKED THAT THIS LETTER BE
REPRINTED IN THE NEWSLETTER.

DEAR INQUIRER:

THANK YOU FOR YOUR INTEREST IN THIS PROJECT. I DON'T MIND YOUR
BEING A BIT SKEPTICAL. I AM A MEMBER ALSO OF THE CABRILLO GROUP AND YOU
WILL FIND MY NAME ON THEIR ROSTER. I HAVE UNDERTAKEN THIS PROJECT SO
THAT WE COULD OBTAIN THIS NECESSARY & EXPENSIVE PART AT THE LOWEST
PRICE.

AT THE TIME I FIRST WROTE TO HAL ABOUT HANDLING THE PAPERWORK &
ORDERING FOR THE GROUP, THE PRICE WAS $7.00 EACH IN QUANTITIES OF 1000.
SINCE THAT TIME I HAVE FOUND A SOURCE FOR 2102'S FOR $4.95. THAT IN
ITSELF IS A SIGNIFICANT SAVINGS SO I DECIDED NOT TO WAIT FOR THE NEWS-
LETTER TO COME OUT, BUT TO WRITE TO THE MEMBERS DIRECTLY. I BORROWED
COMPANY STATIONARY, HAD LETTERS PRINTED, AND CONVINCED MY WIFE INTO DOING
THE TYPING. I AM NOT DOING THIS AS A MONEY MAKING PROJECT, AND DON'T
INTEND TO BECOME A SURPLUS DEALER. I AM ASKING ONLY 10% OVER OUR COST
TO COVER MAILING EXPENSES. THIS IS NOT MY BUSINESS BUT MY HOBBY.

THIS WILL BE A ONE TIME ONLY ORDER THEREFORE I HAVE ASKED FOR A
10% DEPOSIT SO I KNOW EXACTLY HOW MANY WE WILL NEED. I DEFINITELY DO
NOT WANT ANY SURPLUS. THESE DEPOSIT CHECKS WILL NOT BE CASHED UNTIL
THE ORDER IS ACTUALLY PLACED AND WILL BE RETURNED TO YOU IF WE DON'T GET
OUR MINIMUM QUANTITY. ORDERS ARE COMING IN AND I HOPE WE MAKE IT.

THE ORDER DEADLINES HAS BEEN EXTENDED TO MARCH 14.

I FAILED TO MENTION IN MY INITIAL LETTER THAT THESE UNITS WILL
HAVE MIL-SPC-883 PROCESSING. THEY ARE GUARANTEED BY THE MANUFACTURER.
AND ALTHOUGH I DO NOT EXPECT MANY RETURNS, I WILL HANDLE ANY COMPLAINTS
WITH THE MANUFACTURER. I WOULD SUGGEST USING SOCKETS OR MOLEX PINS
WITH THIS DEVICE TO OVERCOME OVERHEATING AND STATIC VOLTAGE PROBLEMS.

I HOPE THIS LETTER EXPLAINS MY POSITION. DO NEED YOUR SUPPORT
IN GETTING THIS QUANTITY PRICE. HOPE TO HEAR FROM YOU SOON.

SINCERELY, JIM FRY

JIM SAYS HE TRIED PHIL WORM'S FRONT PANEL SWITCH MODS (NL #4)
AND FOUND THAT WHEN IN SINGLE STEP AND INTERRUPT MODES, HE COULD NOT
SINGLE STEP. HE MOVED 55 COMMON TO THE B TAP TO CORRECT IT.

TERRY RITTER, 2524B GLEN SPRINGS WAY, AUSTIN TX 78741,
512-441-0036 HAS COMPLETED HIS EXECUTIVE MONITOR SYSTEM WHICH INCLUDES
KEYBOARD ENTRY, MODIFICATION, & PROGRAM INITIATION, TTY OCTAL
DUMP IN WHICH ALL MASKING, BAUDOT TRANSLATION, BIT TIMING, AND SERIAL
OUTPUT IS DONE IN SOFTWARE. HE SAYS THAT AFTER TWO WEEKS OF USE
HE IS WELL SATISFIED AND WOULD MAKE ONLY MINOR CHANGES IF HE WERE
TO RECONSTRUCT IT. HE SUPPLIED A COPY AND A CIRCUIT OF HIS BAUDOT SERIAL
ISOLATED TTY DRIVER, AND AN OCTAL LISTING IN WHICH HE HAS PARTITION-
ED THE 8086 OP CODES INTO LOGICAL GROUPS TO EASE PROGRAMMING, AND AN
OCTAL LISTING WITH COMMENTS OF HIS EXECUTIVE. ITS LONG I SEND A NL ARTI-
CLE AND A 20 CENT SASE FOR A COPY OF THE ABOVE. HE MADE HIS OWN ROM BY

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Dale Berggren, 9207 S.W. 43rd Ave., Portland ORE 97219, has a unique and interesting suggestion: A SWAP SHOP section to the NL. To quote him... "Not a big deal, make-a-profit thing but just place a just to get rid of unwanted or unneeded things in hopes of getting needed items. No money involved. No commercial interests, etc."

He also asks if anyone has compiled a name & address list (with their Mark-8) of the User Group members? Might be a worthy project. He is currently building a "Day Clock" with variable length interrupts (more info on that after he's tested it).

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PEOPLE'S COMPUTER COMPANY ---- P.O. Box 310, Menlo Park, CA 94025

Fantastic publication - I thoroughly enjoy it. Bob Albrecht, the editor, writes that he had such a good response to the offer made in NL #4 that he will extend it to the user's group for an additional period of time (til Feb 28, '75). See NL #4 for details.

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Dr. George L. Haller, 1500 Galleon Dr., Naples Fla., 33940, has a Scelbi w/2K of memory, Tape interface, & model 32 RO. He is programming it for golf handicaps (which consists of accepting 20 scores; sorting; adding the lowest ten in double precision; subtracting the course rating; dividing by ten; multiply by 0.85 (whew!), and then output the result.

Dr. James G. Callas, 631 No. San Pedro Rd., San Rafael CA 94903, would like to see a recommended list of books (software & hardware) which would be applicable and helpful to the Mark-8 users. (digital group??) He also commented on a NL comment regarding doctors in "hobby" computers:..."That's hardly the right word for some of the very serious computer applications involved."

Here's a good one..... a note from a gentleman in Pearl City, Hawaii which says: "Aloha: Please kindly send me copy of your latest Catalogue." AND IT'S TYPED ON THE BACK OF A LABEL FROM A CAN OF DOLE PINEAPPLES!!! Now, there must be a really interesting story behind that one!

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Due to circumstances beyond our control, we will now do a "BRANCH & PECK" to a different typewriter. (or is that a "BRANCH & BOMB")

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Adam Trent, Randex box A Ascension, Patrick AFB FLA 32925, is stuck down there on Ascension Island (working for NASA) and is about to fire up his Mark-8. He speaks very highly of NNI-AE Applied Electronics. They provide extensive documentation on their surplus electronics & too quality. He is planning to interface his with a NIVAC 121P. Should be interesting.

James R. Rodde, Ant. 216, 1200 No. Dean Road, Auburn ALA 36830, has a running Mark-8. And, he gives a lot of credit to the NL for reports (which a lot of other people have also). You will find his Memory Diagnostic program on page 11.

(After 24 pages I've decided on the amendments! Appendix A will contain HARDWARE information (schematics, etc.); Appendix B will be devoted to SOFTWARE; etc! Appendix C will be reserved for flyers and announcements from COMMERCIAL SUPPLIERS.)

Lawrence Wink, 7200 Calexico Way, Santa Barbara CA, is hard at it (fighting the solder bridges) and should have his Mark-8 up soon.

Doug Warden, #4 Colonial Village, Memphis T.N. 38006, is a senior at SMU and is working on a color memory interface design for the PCP.

Peter Wolfe, Box 110, Yarmouth Rd., Canada W4X 2A1, is getting started on his Mark-8 and is getting the PCP from Martin research along with their book "Microcomputer Design."

Sterling Gilmore, 1134 Parkside Dr., Lubbock Texas CA 79308, is currently working on a TV to Mark-8 interface while waiting for the processor parts to arrive.
Just received the letter from Jim Fry concerning the 4K static RAMs. I will neglect my previous comment about designing a refresh for the 4K dynamic memories. I didn't realize the prices were getting so far down on the static (he's trying for a quantity order at $5.45 each).

Gregory W. Hart, 8948 Ramstad Ave., Fair Oaks CA 95628, is presently constructing his Mark-8 and in comparing the construction booklet and the Intel Users Manual he has noted several items which seem to be in error with regard to the output ports. (I haven't checked this out, so I'll just give it to you verbatim.)

"An output instr is 01 RRM MMM where the RRM=00 and the MMM= the output port location from port 0-7. In the Mark-8 only the RR=01 is used. The output port 0 is used thereby limiting us to 8 output ports. The Mark-8 as constructed only allows 7 output ports to be used, ports 1-7. In many cases in the booklet reference is made to output port 0 being addressed by a 121 instr. However, in tracing the circuit I note that the 7442 decoder on the output port board has no connection made to the 0000 input which corresponds to a 121 instr. Pin 1 of the 7442 (1C 12) is the 0 output which corresponds to the 121 instr and should be utilized. As it is I don't understand how the Mark-8 can use port 0 since it is never decoded. On the LED Reg board the 7442 decoder is wired correctly so that when a 121 instr is given the 0 bit of the 7442 (pin 1) is used to enable the LED display. Perhaps because most users only use the display rather than the actual port 0 they aren't aware of the error. Some errors noted in the sample programs: (a 121 = port 0, 123 = port 1, 125 = port 2, & 127 = port 3) Yet on page 9 the sequencing program lists a 123 as port 2 (same mistake on page 10 in the counter input program)"

Vincent Buscemi, Newfield High School, Marshall Dr., Shelden N.Y. 11784, is trying to get the school to finance an 8080 system. He was asking about a good computer basics manual and also stated that he was sending for a Scelbi manual. That is an excellent manual for basics and more.

Capt. Mack Ward, 17 Nijmegen St., Ft. Bragg, N.C. 28307 states that the bug reports and other info has helped him in getting along with the construction of his Mark-8.

Mark Peterson, Teaching Specialist, Dept. of Industrial Education, University of Minn., Duluth Minn., says the use of small brass rivets for plated thru holes works quite well (see your local auto brake relining shop for rivets) -- no soldering necessary. He also sent the interesting ad from Delta Electronics Co. (no address) for card reader assemblies on page 6.

J. Scott Williams, P.O. Box 932, Bellingham WA 98225, (computer programmer) has decided to go with the ALTAIR 8800 (Jan 75 PE) because of the stronger interrupt capability (compared to the 8008). I know how he feels... everything I encounter which increases the 8008's capability I latch onto.

Doug Drye, 3202 Winchester Dr., Greensboro N.C. 27406, writes that the Computer Hobbyist Group in North Carolina has decided to publish their newsletter on a regular basis ($6.00 per yr.).

Bob Thomas, 910 Sonman Ave., Portage PA 15946, would like to see a memory system based upon the new 4K dynamic chips (so would a lot of us... how about somebody getting an in with one of the suppliers, and then design a nice simple refresh circuit? --- it's so simple to just sit back and suggest these things, isn't it? ---). Bob has an order in for the ALTAIR 8800.
HAND THREADING VIPS THRU TOROIDAL CORES! HE WOULD LIKE INFO ON A
CHEAP 5283 FROM PROGRAMMER AND IS WORKING ON AN OSCILLOSCOPE OCTAL
DISPLAY AND CASSETTE TAPE CIRCUITS. HE STILL OFFERS HARDWARE AND SOFT-
WARE HELP VIA SAE, AND IS FURIOUS ABOUT HAVING TO PAY FOR EVERYTHING
AND IS SURE THERE IS AN ALTERNATE DISTRIBUTION METHOD SUCH AS DAISY
CHAIN THRU THE MAIL.

ADDITIONS TO POSTER AS OF FEBRUARY 2, 1975

(DONALD K. ARELES, THUNDERHILL PRINTER, 7054 25TH NE, SEATTLE, WA 98115
IS INTERESTED IN 8080 INTERFACES AND I/O DEVICES AND IN 8080 PROGRAMS.

DON ALLISON, BOX 1685, CRAIG AFB, ALABAMA 36701 IS PLANNING ON BUILDING
AN ALTAF 4800 IN THE SPRING.

MIKE ANASTASION, 6211 OINCEWOOD CIRCLE, CITRUS HEIGHTS, CA 95610

RICHARD D. APPLING, 1009 G NO. 6, LINCOLN, NEBR 68508

MICHAEL J. HATCHELDER, DEPT. OF EE, SOUTH DAKOTA SCHOOL OF MINES, RAPID
7701

JERRY BILEK, 774 MILLER AVE., SAN JOSE, CA 95139

LEN D. BORES, M.D., OPHTHALMOLOGY, 1055 FISHER BUILDING, DETROIT, MI
48202

JER ROSSWELL, M.D., 29 KENILWORTH ST., NEWTON, MASS 02158

SP/6 JOHN R. BRONSON, 208-26-5689, USACSC SUPPORT GROUP, PO BOX 5307,
FT. LEE, VA 23801

WILLIAM BROOKS, BROOKS OPTRONICS, 2971 COPPER RD., SANTA CLARA, CA 95051

BRUCE BROWN, 4801 KENMORE AVE., APT. 1022, ALEXANDRIA, VA 22304

DR. J. N. BURNETT, DEPT. OF CHEM., DAVIDSON COLLEGE, DAVIDSON NC 28036

TOM CARY, 4370 VALENTINE ST., FORT WORTH, TX 76107

JOHN CHOCHRAN, ELECTRONIC AUTOMATION SYSTEMS, INC., PO BOX 966, JESSUP,
GEORGIA 31545

PERRY COLSTROM, 5720 MADISON ST. NE, MINNEAPOLIS, MN 55432

WILLIAM CONRAD, 7818 HANCOPT, TOLEDO, OH 43417

CHARLES F. DOUPS, 381 POLAND ST., WINNETKA, IL 60093 IS DEEPLY INVOLVED
IN ELECTRONICS IN MODEL RAILROADING. HE IS CONNECTED WITH THE GARFIELD-
CLARENDA MODEL RAILROAD CLUB AND ANYONE WITH SIMILAR INTERESTS SHOULD
CONTACT CHARLES AND FIND OUT WHAT THEY ARE UP TO. HE IS ALSO INTERESTED
IN COMPUTER TEXT PROCESSING SYSTEMS. HE KNOWS OF A SOURCE OF 1/4 WATT
RESISTORS AT $.02 EA IN QUANTITIES OF 100-499. IF YOUR INTERESTED,
CONTACT HIM.

ELLIS, JACK. (I LOST HIS ADDRESS. IF YOU KNOW IT, LET
US KNOW PLEASE.)

MILK HAYES, MHN APPLIED ELECTRONICS, PO BOX 120A, LANDOVER, MD 20785
HAD A FLYER IN ML #4 ADVERTISING MODEMS AND POWER SUPPLIES AMONG OTHER
THINGS. ADAM TENT SAYS WE MISQUOTED HIM. HE ORDERED A POWER SUPPLY
AND IT IS FABULOUS. THE TTL LOGIC WHICH HE SAID CONTAINED NO GOOD
ITEMS WAS ONLY A SAMPLE THROWN IN WITH ANOTHER ORDER FOR FREE. HE SAYS
THAT MKE SUPPLIES QUALITY MERCHANDISE AND MAY BE THE ONLY SUPPLIER THAT
FURNIHSHES COMPLETE DOCUMENTATION WITH SUPPLIES EQUIMENT. I CAN
VOUCH FOR THAT. I PURCHASED 3 PAPER TAPE READERS AND RECEIVED 1/2 INCH
THICK MANUALS. MIKE SENT ME ONE OF THE MODEMS AND IT COMES WITH A

PAGE 14
1/2 inch thick documentation package. Joe Cimmino has used one of the modems to implement a cassette tape unit and says it works great. The Washington DC group is planning on setting up a telephone system for trading software that will use these modems. The FSK unit includes elaborate noise discrimination circuitry and is usable up to 1900 bits per second. Joe is even talking about joining up with the Ham Satellite RTTY network for national software trading. It may be worthwhile to take another look at flyer in the last newsletter and order catalog no. 8 which includes an elaborate description of the modems, the power supplies, and some really wild electroacoustical serial memory units.

Joseph R. Hoke, 2523 Saint Clair Dr., Hillcrest Heights, MD 20031

Robert Leonard, 3003 Driscoll Dr., San Diego, CA 92117

Robert Long, 1815 Sweetwater Rd., Sp. 165, Spring Valley, CA 92077

Sidney R. Maxwell II, PO Box 217, Gueenchee, UT 85059

Mits, 6328 Linn, NE, Albuquerquee, NM 87108

John C. Neves, 938 Palo Alto Ave., Palo Alto, CA 94301 is interested in Morse code translation and wants to try digital filtering algorithms.


Tim Rand, 59 Willington Oaks, Storrs, CT 06268

Eric Schott, 208 14th Ave., Janiata, Altoona, PA 16601

Ralph E. Skoog, 6217 Kennedy Ave., Hammond, IN 46323

Gary H. Smith, 1121 Sparkman Ave., Melbourne, FL has a running Mark-A.

Dr. Leo H. Soderholm, RM 213, Ag. Engr., Iowa State Univ., Ames, Iowa 50010

C. Solomon, Friends' Central School, 68th St. and City Line, Philadelphia, PA 19151

Stephen C. Stallings, The Computer Hobbyist, Box 295, Cary, NC 27511

David F. Stout, 717 Saranac Dr., Sunnyvale, CA 94087

Ed Szczepanski, M00G Inc., fountain Airport, East Aurora, NY 14052

O. C. Tasker, PO Box 168, Romney, WV 26757

George Tate, 3544 Dahlia Ave., La, CA 90026

Lester C. Ward, Box 351, Manteo, NC 27954

Robert E. Whitmoyer, J.D., Old Dollar Rd., Box 13, Route 1, Heuvelton, NY 13654

Rusty Whitney, Oregon Museum of Science and Industry, 4015 SW Canyon Rd., Portland, OR 97221

David Williams, Sterling Electronics, 1061 Industrial Rd., San Carlos, CA 94070 is an Mil distributor and should be contacted if anyone wants prices on quantity purchases.

David Yulke, 121 Liberty Ave., Selden, NY 11784 will soon offer 5203 PROM Programming Service. (Now all of you guys that bought 5203 PROMS without knowing how to get them programmed have an out.)
I recently told Hal Singer that I would be happy to lighten his load somewhat and do the next newsletter. The result is that he stopped by my house a few days ago and dropped off a BOX of correspondence! You just can't imagine the bulk of mail he's been getting. (Or perhaps you can if you notice that the last newsletter was 28 pages in length!)

He mentioned that most of the material was new correspondence but that there were a lot of older letters that he felt he hadn't been able to do justice. I'm going to make every effort to get as much of it all as I can.

As an introduction let me just slip in a few words about myself here and then I'd like to tell you a few things about Hal. I'm a Computer Systems Instructor with Varian Data Machines in Irvine, California. When I tell people that my hobby is building a micro-computer they look at me like I'm some kind of nut. (And, sometimes after teaching, troubleshooting, or studying computer hardware all day I think I know what they mean!) I've been building my Mark-8 in a wire-wrap version and I can assure you that that approach is nothing to write home to Mother about! Unfortunately (and fortunately) I recently acquired a Varian 620-L computer (a basket case) and I've decided to put the 8008 aside for the time being and devote my energies to getting it up and going. (I'm building it on a board which will plug right into the 620-L, so no telling what kind of interesting application I'll come up with now.)

Now, about this guy Hal Singer that everybody keeps writing to...

I first met Hal about 4½ years ago when he attended an Adult Education class I was teaching in digital electronics. That was about the time that Hal was getting the ball rolling on acquiring a computer for Cabrillo High School (where he teaches math and algebra). His efforts were finally realized and he and a couple of other math teachers have succeeded in building a fine educational tool called the Cabrillo Computer Center. Hal is an "EE", and when he's not building something like the Mark-8 in his home laboratory (workshop) he's busy putting that good electronic knowledge to good use building peripherals for the school computer center. (And, he's built some beauts!)

Hal has been throwing real strong hints in the last few newsletters for someone to come up with a standardization scheme for the I/O -- so that the software we develop in the future can be exchanged among ourselves with no problems. He didn't get any response so he generated a version of his own (which looks good), and sent it to about 31 bodies and asked them to evaluate it. He sent it out to people who have their Mark-8's running, Mr. Titus, Intel, Scelbi, Dr. Robert Suding (to whom he would like to apologize -- I'm sure for misspelling his name three different ways). Radio-Electronics, MP Publishing, just to name a few. And, you can be sure that NL #6 will be one of the most important because of this effort.
STATUS OF MICROSYSTEMS INTERNATIONAL

WE'VE SAID BEFORE THAT INFORMATION CHANGES FAST IN THIS FIELD. NO SOONER HAD THE LAST ISSUE OF THE NL BEEN MAILED OUT THEN MICROSYSTEMS INTERNATIONAL ANNOUNCED THEIR BANKRUPTCY. IT WAS A BIG COMPLICATED DEAL INVOLVING CONGLOMORATE CORPORATE MANIPULATION, LOSS TO THE CANADIAN GOVERNMENT OF MILLIONS OF DOLLARS, AND LOSS TO US OF OUR PRICE COMPETITIVE 2ND SOURCE FOR 8080 AND 8080 MICROCOMPUTER CHIPS AS WELL AS THE MONITOR-8 PROM RAMS AND OTHER THINGS. IT TOOK EVERYONE BY SURPRISE. MAURY GOLDBERG OF MINI MICRO MART HAD MANY OF HIS ANNOUNCED PLANS AFFECTED. PRESENT STATUS SEEMS TO BE ABOUT AS FOLLOWS: MONITOR-8 ROMS WILL NOT BE AVAILABLE. MAURY GOLDBERG MAY GET A FEW BUT YOU'LL HAVE TO CONTACT HIM FOR THE PRESENT STATUS. THE 8080 MOD-8 BOARDS ARE UNAVAILABLE BUT TWO SOURCES ARE WORKING ON DEVELOPING THEIR OWN 8080 BOARDS FOR THE MOD-8. ALL MOD-8 BOARDS ARE AVAILABLE FROM SPACE CIRCuits BUT ONE OF THEM THAT USED A SPECIAL SINGLE SOURCE MIL 256 x 4 RAM WILL BE OF NO USE TO ANYONE. MONITOR-80, THE 8080 VERSION OF THE MONITOR-8 DOES NOT EXIST ACCORDING TO OUR BEST INFORMATION. MF8008 INFORMATION BOOKS WERE ORDERED DESTROYED BY MIL BUT SOME HAVE BEEN SALVAGED AND AN ANNOUNCEMENT WILL SOON BE MADE REGARDING THEIR AVAILABILITY. DOCUMENTATION IS STILL AVAILABLE FOR THE MOD-8 CASSETTE CIRCUIT BUT IT WILL PROBABLY NOT PROVE TO BE THE MOST POPULAR UNIT WITH THE MONITOR-8 ROM UNAVAILABLE. SOME MIL STUFF IS STILL AVAILABLE BUT TO OUR KNOWLEDGE, THEY ARE NOT DUMPING STUFF IN SUCH A WAY THAT WE CAN BENEFIT GREATLY FROM IT EXCEPT THRU SPECIAL DEALS FROM SOME OF OUR SUPPLIERS. SO MUCH FOR THAT.

DEALING WITH SUPPLIERS

IN OUR ENTHUSIASM TO GET A MACHINE RUNNING MOST OF US ARE EAGER TO MAIL AWAY LARGE CHECKS TO VIRTUALLY UNKNOWN COMPANIES. ONE HAS TO LOOK BACK ONLY A FEW MONTHS TO SEE HOW ONE OPERATOR GOT TO PEOPLE FOR $500,000 THIS WAY. WHEN YOU SEND OFF A CHECK, KISS IT GOODBY, BECAUSE YOU MAY NEVER SEE THAT MONEY AGAIN. YOUR ONLY PROTECTION IS TO DEAL WITH COMPANIES THAT HAVE AN ESTABLISHED REPUTATION. A FAVORITE GIMMICK IS TO AGREE TO SUPPLY SOMETHING AND SIT ON THE MONEY FOR MANY MONTHS BEFORE DELIVERING. INFORMATION YOU SEE IN THE NEWSLETTER IS FOR YOUR INFORMATION ONLY AND AN EFFORT IS BEING MADE TO KEEP YOU CURRENT ON OTHER PARTICIPANT'S EXPERIENCE WITH ALL SUPPLIERS BUT IT IS UP TO YOU TO VERIFY A COMPANY'S INTEGRITY AND ABILITY TO DELIVER. CAREFULLY CLARIFICATION BY MAIL REGARDING DELIVERY TIMES IS ESSENTIAL. ENCLOSURE A SELF-ADDRESSED STAMPED-ENVELOPE (SASE) FOR THE REPLY - POSTAGE CAN EAT A SUPPLIER ALIVE SENDING OUT REPLIES AND ADDRESSING ENVELOPES IS A VERY TIME CONSUMING AFFAIR. LET US KNOW IF YOU RUN INTO ANY TROUBLE SO WE CAN WARN OTHERS.

CURRENT NEWSLETTER STATUS

RESPONSE TO OUR $6.00 FOR 6 ISSUE CHARGE FOR MEMBERSHIP HAS BEEN GRATIFYING. NEARLY 300 PEOPLE HAVE SUBSCRIBED PUTTING US NEAR THE BREAK-EVEN POINT FOR 8-32 TO 48 PAGE NEWSLETTERS. AS NEW ORDERS COME IN WE WILL BE ABLE TO INCREASE THE SIZE OF THE NEWSLETTER IF YOU CONTINUE TO SEND IN NEWS THAT CAN BE PUBLISHED.

THIRD CLASS MAIL IS RIDICULOUSLY SLOW - OVER A MONTH IN MANY CASES - SO ALL FUTURE NL'S WILL BE SENT FIRST CLASS. THIS ONE'S SIZE WAS DETERMINED BY THE NUMBER OF PAGES THAT COULD BE SENT ON A 20 CENT STAMP.
I MUST APOLOGIZE FOR THE REPEATED MENTION OF CAMERA READY COPY IN THE LAST NEWSLETTER AND THE ATTEMPT TO BRIEZE PEOPLE INTO SENDING INFORMATION BY OFFERING REPRINTS OF USEFUL INFORMATION. THE MAIN PROBLEM WAS IN NOT EXPLAINING WHAT CAMERA READY COPY IS. THAT SIMPLY MEANS THAT INFORMATION IS TYPED ON 8 1/2 X 11 WHITE PAPER USING A NEW "BLACK" TYPEWRITER RIBBON (NO EZI ERASE PAPER PLEASE). SCHEMATICS SHOULD BE DRAWN NEATLY IN SOFT PENCIL OR BLACK INK. WHEN INFORMATION IS PROVIDED THIS WAY IT IS A SIMPLER MATTER TO CUT AND PAST IT IN THE APPROPRIATE ORDER SO IT CAN BE PHOTOGRAPHED TO MAKE OFFSET MASTERS. THIS SAVES RENUMBERING AND REDRAWING AND WILL ALLOW US TO PRODUCE MANY MORE PAGES OF MATERIAL. MANY OF THE ITEMS IN THIS NL WERE PROVIDED IN "CAMERA READY" FORM.

IT IS RAPIDLY REACHING THE POINT WHERE WE CAN AFFORD TO PRINT THE ITEMS THAT HAVE BEEN TOO BIG TO INCLUDE IN PAST NEWSLETTERS. MANY ITEMS WERE MENTIONED IN THIS NL AND ARE AVAILABLE FOR A SASE AND A COUPLE OF STAMPS TO PAY FOR THE Duplicating COSTS.

AN EFFORT HAS BEEN MADE TO INCLUDE ANY INFORMATION THAT WAS SENT IN THAT WOULD BE OF INTEREST TO OTHERS. A SCAN THROUGH ALL OF OUR MAIL (IN FOLDERS THAT STACK NEARLY 3 FEET HIGH), WILL BE MADE TO SEE IF ANYTHING WAS OVERLOOKED. YOU CAN HELP BY TELLING US IF WE LEFT OUT SOME MATERIAL THAT IS SIMPLE TO INCLUDE BUT HAVE BEEN EXCLUDED. MANY PARTICIPANTS SAY THAT THEY DO NOT HAVE ANYTHING TO CONTRIBUTE. IF YOU HAVE YET TO TELL US WHO YOU ARE AND WHY YOU ARE INTERESTED IN MICROCOMPUTERS YOU DO HAVE SOMETHING WORTHWHILE TO CONTRIBUTE. MANY HAVE WRITTEN AND TELEPHONED ASKING FOR SPECIAL ITEMS. FOR VARIOUS REASONS YOU MAY HAVE BEEN NEGLECTED OR OVERLOOKED. PLEASE TRY US AGAIN.

JOE CIMINO WILL SOON UPDATE OUR MAILING LIST. HE DEFINITELY WANTS YOU TO LET HIM KNOW IF YOU DO NOT WANT YOUR TELEPHONE NUMBER LISTED. IF YOU HAVE A NEED FOR ADHESIVE MAILING LABELS OF OUR MIST OF PARTICIPANTS, CONTACT HIM. NL #7 WILL CONTAIN A COMPLETE ADDRESS LIST OF EVERYONE THAT HAS CONTACTED US.

LAST MINUTE INFORMATION

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WE JUST RECEIVED A CATALOG FROM CYBERTRONIC SYSTEMS, PO BOX 18065, LOUISVILLE, KY 40218 ADVERTISING 8008'S @ $29.95, 4K X 8 2102 MEMORY BOARDS FOR $170.00, UNIVAC SERIES 70 MAG TAPE DRIVES FOR $350.00, AND MANY VERY INTERESTING INFORMATION. NOTHING IS KNOWN ABOUT THEIR RELIABILITY OR INTEGRITY. SEND A SASE FOR THEIR CATALOG.

OFFSET COPIES OF NEWSLETTERS 1 THRU 4 & 5 IF YOU HAVEN'T GOT IT

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OFFSET COPIES OF NEWSLETTERS 1 THRU 4 SHOULD BE BACK FROM THE PRINTER IN ABOUT THREE WEEKS. THE PRICE WILL BE $3.50, POSTPAID. FIRST CLASS MAIL. IF YOU ALREADY SENT $3.50, YOURS WILL BE SENT OUT AS SOON AS THEY ARE RECEIVED. IF YOU ARE INTERESTED AND HAVEN'T ORDERED YET, SEND A CHECK FOR $3.50 MADE OUT TO THE CABRILLO HIGH SCHOOL COMPUTER CENTER.

THE CABRILLO HIGH SCHOOL COMPUTER CENTER'S LINE PRINTER FINALLY ARRIVES!

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OUR CENTRONICS 508 INCREMENTAL PRINTER FINALLY ARRIVED AFTER ONLY FIVE MONTHS OF AGONIZING WAITING. IT MAY EVEN BE WORTH THE LONG WAIT. IT TAKES THE PLACE OF THE TELETYPE AND ACCEPTS CHARACTERS AT 120 CHARACTERS PER SECOND. HAS COMPLETE VERTICAL FORMAT CONTROL. UPPERCASE AND LOWERCASE ELONGATED CHARACTER CAPABILITY. AND MANY OTHER BELLS AND WHISTLES. NOTHING ATTACHES TO A COMPUTER WITHOUT A LITTLE PAIN AND WE STILL HAVEN'T GOT IT WORKING AT FULL SPEED. IT SEEMS THAT THEY SENT IT UP FOR A SERIAL INTERFACE INSTEAD OF A PARALLEL ONE EVEN THOUGH THE PARALLEL INTERFACE WAS INCLUDED. SINCE OUR CURRENTLY USED SOFTWARE IS TOO DUMB TO INSERT LINE FEED FULL CHARACTERS, WE CAN ONLY OPERATE IT AT A SERIAL RATE OF 30 CPS. SINCE IT'S BUFFERED WITH A 132 CHARACTER BUFFER, IT RUNS NEARLY AT FULL SPEED ON SHORT LINES. I HOPE TO HAVE THE PARALLEL INTERFACE RUNNING BEFORE LONG.

I HAVE BEEN USING OUR TEXT EDITOR TO PREPARE THE NEWSLETTER COPY AND HAD TO TRY IT TO SEE WHAT KIND OF OFFSET COPY IT MAKES. HOPE IT COMES OUT OK.

THANKS, HOPE TO HEAR FROM YOU SOON.

HAL SINGER & JOHN CRAIG

2
RESULTS OBTAINED FROM STANDARDIZATION PROPOSAL

THE FOLLOWING I/O STANDARDIZATION SCHEME WAS SENT OUT TO ABOUT 50 PEOPLE AND THEY WERE ASKED TO RESPOND TO IT. A SHORTENED AND SLIGHTLY UPDATED VERSION OF THE PROPOSAL, A REVIEW OF THE LETTERS RECEIVED, AND MY CONCLUSIONS FOLLOW.

REQUEST FOR REVIEW OF STANDARDIZATION SCHEME

EVERYONE TALKS ABOUT STANDARDIZATION BUT NO ONE WILL PROPOSE ANYTHING SO I'M GOING TO. ISN'T THAT BRAVE! PLEASE READ OVER THE MATERIAL CAREFULLY AND "THROW ROCKS AT IT". BE SURE TO OFFER POSITIVE SUGGESTIONS WHERE YOU DON'T AGREE.

DESIGN PHILOSOPHY

THIS IS TO BE AN EXTREMELY LOW COST EXPERIMENTER'S SYSTEM (UNDER $500) USING HOMEMADE EASILY CONSTRUCTED PERIPHERALS. IT IS EXPECTED THAT THE CPU BE SOME VERSION OF THE 8008 (PROBABLY A MARK-8). IF POSSIBLE, ALL PERIPHERALS SHOULD BE USEABLE ON AN 8080 SYSTEM (I.E. ALTAIR 8800) WITH MINIMAL HARDWARE AND SOFTWARE CHANGES. AT LEAST 1K OF MEMORY SHOULD BE AVAILABLE.

A COMPUTER'S USEFULNESS IS DEPENDENT ON NUMEROUS PERIPHERALS. THE HOBBYIST CAN BARELY AFFORD A SYSTEM AT ALL SO PERIPHERALS MUST BE EXTREMELY CHEAP AND EASILY CONSTRUCTED. THIS WILL BE A PROPOSAL FOR POSSIBLE PERIPHERALS, DEVICE CODES AND A DESCRIPTION WHERE POSSIBLE. NO ONE WILL HAVE THEM ALL. IT IS DESIGNED AS A SHOPPING LIST FOR THE HOBBYIST MUCH AS THE PDP-8 HANDBOOK IS. IT IS NOT INTENDED TO BE A CONSTRUCTION PLAN FOR ANYTHING. IF WE CAN AGREE ON A STANDARDIZATION SCHEME, PEOPLE CAN START PRODUCING DETAILED PERIPHERAL CONSTRUCTION PLANS. I HOPE THAT IT WILL ELICIT A GREAT DEAL OF DISCUSSION. COUNTER PROPOSALS, DETECTION OF ERRORS, ETC. SO A HARDWARE STANDARDIZATION SCHEME WILL EXIST THAT EVERYONE CAN LIVE WITH.

DISCUSSION OF POSSIBLE PERIPHERALS

1. FOUR TERMINAL DEVICES ARE PRESENTLY FEASIBLE.
   A. ASR33 AND KSR33 TTY'S (FOR THE RICH GUYS)
   B. 5 LEVEL (BAUDOT) TTY'S (BITTY) (ROBERT COOK HAS SEVERAL 100 OF THESE HE WILL OFFER FOR SALE SOON.)
   C. TV TYPEWRITER (TVT-1) OR SWTP TVT (TVT-2) AND KEYBOARD
   D. DR. SUDING'S 128 CHARACTER TVT AND KEYBOARD (MISSING SOME OF THE FEATURES OF THE SWTP ONE BUT MUCH CHEAPER TO BUILD AND THE 128 CHARACTER SET IS NICE. HIS 16 LINE BY 64 CHARACTER ONE SHOULD BE THE IDEAL TERMINAL.


   IT WOULD BE CONVENIENT TO HAVE A SWITCH TO CONVERT FROM A UART TYPE OF TERMINAL INTERFACE TO A SERIAL PULSE SYNTHESIS TYPE. BAUDOT TO ASCII AND VICE VERSA CODE CONVERSIONS IN SOFTWARE OR HARDWARE MUST BE FIGURED OUT ALSO.

   THOSE WITH ONLY 1 TERMINAL DEVICE WILL CONNECT IT AS A UART PARALLEL OR AS A SERIAL SYNTHESIS TTY UNIT. WITH MORE THAN ONE DEVICE, IT MAY BE DESIRABLE TO ALLOW CODE SWITCHING SO THAT THEY CAN BE USED IN DIFFERENT COMBINATIONS WITHOUT CHANGING SOFTWARE.

2. PROM FOR KEYBOARD MONITOR

   THE PAGE 0 OF MEMORY SHOULD BE SWITCH SELECTABLE SO THAT IT CAN EITHER BE 256 WORDS OF RAM OR A PROM LOADED WITH THE LAWRENCE LIVERMORE LABS OR THE DIGITAL EQUIPMENT CORP OCTAL DEBUGGING TECHNIQUE PROGRAM. WITH THIS TYPE OF PROGRAM, SIMPLY TOUCHING THE INTERRUPT BUTTON GIVES YOU COMPLETE TERMINAL DEVICE KEYBOARD CONTROL OF THE COMPUTER ALLOWING LOADING AND EXAMINING OF MEMORY LOCATIONS, READING A TAPE, AND STARTING PROGRAMS RUNNING AT A GIVEN MEMORY LOCATION. COST - ABOUT $30.

3. CASSETTE TAPE INTERFACE

   AN INTERFACE FOR LOADING AND DUMPING MEMORY FROM A CHEAP HOBBY QUALITY TAPE RECORDER IS NEEDED. AT LEAST SIX CIRCUITS ARE NOW KNOWN THAT WORK. THE CASSETTE LOAD AND DUMP ROUTINES CAN BE PUT IN PROM.

   COST - ABOUT $15 PLUS A $30 ELCHEAPO CASSETTE RECORDER PLUS THE COST OF PROMS FOR LOAD AND DUMP ROUTINES.

PAGE 3
4. Hand Operated Paper Tape Reader
   This will be a little unit that you feed the tape into and pull thru by hand at whatever speed you want. If your ambitious, you can add a motor. Cost - about $25, another $15 if you want a motor.

5. Paper Tape Punch
   Some people will have ASR33 TTY's to make 8 level paper tape. Bob Cook's Braudt Creed TTY's have a 5 level paper tape punch. You may be lucky enough to find a surplus paper tape punch cheap. It's nearly impossible to build one easily and cheaply. (Most programs will be saved on cassette anyway.)

6. Drop Thru Mark Sense Card Reader
   This unit would have a slot in the top and you simply drop the cards thru one-by-one and it reads them and stacks them. Cost - about $50.

7. Card Punch
   You may be able to find an obsolete IBM Keypunch that can be interfaced. It would be hard but possible to produce a unit that would type marks on a card. Tough but possible.

8. Oscilloscope Driver and Light Pen
   A minimal system can be built for $20 and a scope that is DC coupled on both the X and Y. An elaborate version is described in issues 1 thru 3 of the Computer Hobbyist. Cost - $50 for hardware plus a surplus radar scope unit.

9. Switch Relay Interface
   This is a set of 8 relays that can be selectively set or cleared from an output port and used to control whatever you want and 8 external switch setable flipflops whose condition can be read by an input port. Cost - about $25.

10. Multichannel Analog to Digital Converter
    James Fry supplied an 8 bit A to D converter circuit that can be built for about $15 plus the cost of the input multiplexer. Cost - under $25. (See NL #5)

11. Digital to Analog Converter
    As many of these as desired can be included. Cost - under $15 per channel.

12. Calculator Interface
    Dr. Suding has a scientific calculator interface with SR-50 arithmetic capability available that can be built for under $80. Mr. Titus will soon have a calculator interface construction article in R-E using a TI chip.

13. PROM Programmer
    Both Intel and MIL have published circuits for PROM programmers. Cost - about $60.

14. X-Y Plotter
    This will be easy if cheap stepping motors can be found; a little tougher if a servo system needs to be built. Tough but quite possible. Cost - under $100.

15. Digitizer
    This could be set up so that moving a stylus to a particular location moves by way of strings, the X and Y axis ten turn pots, which could be read by two analog to digital channels when the digitizer button is pushed. Cost - under $35.

16. IC Tester
    Someone will have to work this one out in detail. Cost - ?

17. Floppy Disk
    The Computer Hobbyist group and MITS have floppy's running. Rumor has it that Helmers of MF Publishing is thinking of organizing a group purchase but he refuses to answer letters. Cost - ?

18. Programmable Real Time Clock
    This would be a simple counter that can be loaded under program control and will count using the CPU clock and set a flag and or interrupt the computer when count reaches zero.

19. TV Graphics Terminal
    Dr. Suding is talking about a shift register unit that would turn a TV into a 128 x 128 dot graphics unit with a light pen.

20. Can you add to the list?
I/O PORT ASSIGNMENTS

At first one would think that the 8008 is limited with only 8 input ports. However, the accumulator is sent out on an input cycle during T1 of mem cycle 2 and is latched into IC8 and 9 in the Mark-8. By simply loading the A register immediate and doing an input instruction and decoding the value from IC8 and 9, any of the input ports can be multiplexed for 256 possible devices. I propose that input port 7 be multiplexed, with 0 thru 6 reserved for common devices for which you don’t want to go to this extra trouble.

With only 24 output ports, careful planning will be necessary to avoid using them up. These can be expanded also but it is more of a hassle. Multiplexed input ports can be used for control functions where no data needs to be sent out.

The following considerations went into choosing the specified I/O port assignments:

1) Old Intel developed programs (as well as MIL, PROLOG, and others) use a serial synthesis TTY connected to IPO BIT P, OP12 BIT 0, OP13 BIT 0, and the intr line. (OP12 is output port 2)
2) Lawrence Livermore Labs uses a parallel UART TTY design using IP2, OP15, and IP3 as a flag register.
3) Lawrence Livermore Labs uses a keyboard interface using IP4 with bit 7 as a flag.
4) Dr. Suding’s cassette interface presently uses IP1 bit 0 and OP11 bit 0.
5) Dr. Suding’s TVT presently uses OP16.

Input port assignments

INO SERIAL TTY BIT 0. Bits 1-7 used for intr purposes for those that care.
IN1 FLAG PORT (See flag port assignment section)
IN2 TTY READ DATA (UART PARALLEL INTERFACE)
IN3 FLAG PORT (See flag port assignment section)
IN4 KEYBOARD 0-6 DATA BIT 7 KEYPRESSED FLAG.
IN5 & 6 RESERVED FOR FLOPPY DISK.
IN7 MULTIPLEXED INPUT PORT WITH ASSIGNMENTS AS FOLLOWS:

### Multiplexed Input Port 7

<table>
<thead>
<tr>
<th>Input Port 7</th>
<th>Output Port Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN7 0-7</td>
<td>PAPER TAPE READER</td>
</tr>
<tr>
<td>10-17</td>
<td>PAPER TAPE PUNCH</td>
</tr>
<tr>
<td>20-27</td>
<td>MARK SENSE CARD READER</td>
</tr>
<tr>
<td>30-37</td>
<td>CARD PUNCH</td>
</tr>
<tr>
<td>40-47</td>
<td>OSCILLOSCOPE DRIVER</td>
</tr>
<tr>
<td>50-57</td>
<td>SWITCH RELAY INTERFACE</td>
</tr>
<tr>
<td>60-67</td>
<td>A-D CONVERTER</td>
</tr>
<tr>
<td>70-77</td>
<td>D-A CONVERTER</td>
</tr>
<tr>
<td>100-107</td>
<td>MORE D-A CONVERTERS</td>
</tr>
<tr>
<td>110-117</td>
<td>CALCULATOR INTERFACE</td>
</tr>
<tr>
<td>120-127</td>
<td>PROM PROGRAMMER</td>
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<tr>
<td>130-137</td>
<td>X-Y PLOTTER</td>
</tr>
<tr>
<td>140-147</td>
<td>DIGITIZER</td>
</tr>
<tr>
<td>150-157</td>
<td>IC TESTER</td>
</tr>
<tr>
<td>160-167</td>
<td>FLOPPY DISK</td>
</tr>
<tr>
<td>170-177</td>
<td>REAL TIME CLOCK</td>
</tr>
</tbody>
</table>

Note that at least 8 codes are reserved for each device which can include control of the device.

Input Flag Port Assignments

<table>
<thead>
<tr>
<th>Input Port</th>
<th>Output Control Port Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN0 FLAG AND INTERRUPT</td>
<td>OUT 11 CONTROL PORT 1</td>
</tr>
<tr>
<td>BIT 7 - 1 RESERVED FOR INTERRUPT</td>
<td>BIT 7 - 1 PRESENTLY UNASSIGNED OR RESERVED FOR PARALLEL CASSETTE</td>
</tr>
<tr>
<td>CONTROL FOR THOSE WHO NEED IT</td>
<td>BIT 0 DR. SUDING’S CASSETTE OUT</td>
</tr>
<tr>
<td>BIT 0 SERIAL TTY FLAG</td>
<td></td>
</tr>
<tr>
<td>IN1 FLAG PORT ONE</td>
<td>OUT 12 CONTROL PORT 2</td>
</tr>
<tr>
<td>BIT 7 - 1 PRESENTLY UNASSIGNED OR FOR PARALLEL CASSETTE</td>
<td>BITS 7 - 2 UNASSIGNED</td>
</tr>
<tr>
<td>BIT 0 DR. SUDING’S CASSETTE TAPE IN</td>
<td>BIT 1 PTR READ CHARACTER (IF MOTOR CONTROLLED)</td>
</tr>
<tr>
<td></td>
<td>BIT 0 SERIAL TTY OUT</td>
</tr>
</tbody>
</table>

Page 5
IN3 FLAG PORT 3 OUT 13 CONTROL PORT 3
BIT 7 KEYBOARD KEYPRESSED FLAG BIT 7 THRU 1 UNASSIGNED
6 TVT DATA RECEIVED FLAG BIT 0 SERIAL OR PARALLEL TTY
2-5 UNASSIGNED TAPE READER CONTROL
1 PARALLEL TTY SEND DONE FLAG
0 PARALLEL TTY WORD RECEIVED FLAG

THE STANDARDIZATION REPORT WAS SENT OUT JAN 10, 1975. IN THE FUTURE
SINCE MUCH HAS HAPPENED THAT HAS A BEARING ON PROPOSALS MADE
1) ADDITIONAL SYSTEMS I.E. INTELLECT-8 AND DEC'S MPS MODULES, ETC. HAVE
BEEN INTRODUCED THAT WRECK HAVOC WITH PREMISES BEHIND WHICH PORT ASSIGN-
MENTS WERE MADE
2) THE MIL MONITOR HAS COME AND GONE. BOB COOK HAS WRITTEN A KEYBOARD
MONITOR THAT IS DIRECTLY USEABLE WITH HIS CREED TTY'S. TERRY RITTER HAS HIS
EXECUTIVE MONITOR (FOR BAUDOT TTY) RUNNING
3) 2102 MEMORY, 1702A PROMS, 5202 AND 5203 PROMS HAVE COME DOWN TRE-
MENDOUSLY IN PRICE MAKING LARGE MODIFIABLE KEYBOARD MONITORS PRACTICAL.

OPINIONS OF THOSE THAT SENT RESPONSES TO THE STANDARDIZATION REQUEST.

RESPONSE TO THE PROPOSAL WAS NOT AS GREAT AS WAS HOPE FOR BUT
THOSE REPLYING DID MAKE EXCELLENT POINTS. THESE COMMENTS FOLLOW.

LARRY PLESKAC, 938 PAULA ST., ESCONDIDO, CA 92027 SUGGESTS THAT IT IS
OVERLY AMBITIOUS TO ASSIGN I/O PORTS FOR EQUIPMENT WHICH MOST PEOPLE
HAVE NOT USED. SINCE CASSETTES ARE NOT RANDOM MEMORIES, HE THINKS TWO
UNITS WOULD BE APPROPRIATE AND WANTS A STANDARD CASSETTE FORMAT. HE
POINTS OUT THE MINIMUM OF A REAL TIME CLOCK (SINCE ADDED TO THE LIST)
AND SUGGESTS THAT THOSE PEOPLE INTERESTED IN GAMES WILL NEED A RANDOM
NUMBER GENERATOR WHICH SHOULD BE DONE WITH HARDWARE RATHER THAN SOFT-
WARE BECAUSE IT USES TOO MUCH MEMORY WITH SOFTWARE. HE SAYS THAT ONE
REASON THAT WE HAVE HAD NO PROPOSALS FOR I/O STANDARDIZATION IS THAT
PEOPLE AREN'T FAR ENOUGH ALONG AND THAT A GOOD STANDARD CASSETTE FORMAT
WILL BENEFIT EVERYONE.

DALE BERGOREN, 9207 S.W. 43RD AVE., PORTLAND, OR 97219 HAS OPINIONS ALSO
BASED ON BIG COMPUTER EXPERIENCE. HIS SUGGESTIONS: 1) SWITCH OR JUMPER
SELECTION OF PERIPHERAL PORTS. 2) MAKE HARDWARE DO THE WORK AND KEEP
SOFTWARE SIMPLE. AVOID SOFTWARE TIMING LOOPS, KEEP PERIPHERALS ASYNCH-
RONOUS AND AVOID CPU WAIT ON PERIPHERALS. 3) KEEP CONVERSIONS EXTERNAL
TO THE CPU (EXCEPT POSSIBLY BAUDOT/ASCII). USE CONTROLLERS FOR INTER-
FACE-ING DEVICES SO ONE SOFTWARE ROUTINE CAN BE USED FOR SEVERAL DEVICES
BY CHANGING DEVICE ADDRESSES. 4) TRY TO KEEP THE "STANDARD" DEVICES
ON REGULAR I/O PORTS AND KEEP THE SPECIAL ONES ON MULTIPLEXED PORTS.
5) TRY TO PUT INPUT AND OUTPUT FOR EACH DEVICE ON LIKE NUMBERED I/O
PORTS AND RESERVE PORT NUMBERS TO CORRESPOND TO INTERRUPT NUMBERS.
HE FAVORS SCRAPING THE PORT SCHEME ALTOGETHER AND IMPLEMENTING A DEVICE
NUMBERED UNIVERAL BMD IDEA. CONTACT HIM IF YOU ARE INTERESTED IN PURSUING
THIS LINE OF ATTACK. 6) TRY TO DEFINE STANDARDS RATHER THAN TRY TO
REACH AGREEMENT ON HARDWARE DESIGN, I.E. 800 BPI, PHASE ENCODED, RS232C,
ETC.

ROBERT SWARTZ, 195 IVY LAND, HIGHLAND PARK. IL 60035 DOESN'T LIKE THE PORT
ASSIGNMENTS SINCE THEY DON'T MATCH UP WITH THE INTELLECT-8 OR MIL'S MOD-8.
(I THINK THE TTY ASSIGNMENTS ARE THE SAME AS FOR THE MIL MOD-8.)
THE UPWARD COMPATIBILITY OF THE MOD-8 TO 8050'S AND THE 2K MONITOR-8
ROM ARE IMPORTANT REASONS TO RETAIN MOD-8 PORT CONFIGURATIONS. A CHEAP
FROM PROGRAMMER IS AVAILABLE ON THE MIL MOD-8 BACKPLANE ($22 PLUS $40
TO STUFF IT). THE MOD-8 USES OUT1 3 0-7, OUT 11 0-7, OUT12 1&2, INF1 0-7 FOR
FOR THE PROGRAMMER AND OUT12 BIT 0 FOR TTY OUT. OUT13 BO FOR TTY
READER CONTROL, AND INF3 BIT 0 FOR TTY SERIAL IN. HE THINKS A STANDARD
SYSTEM SHOULD FEATURE: 1) 8050 TO 8050 UPWARD COMPATIBILITY. 2) GOOD
MECHANICAL CONSTRUCTION WITH BOARD EDGE CONNECTORS. 3) A GOOD BUFFERED
BUS DESIGN. 4) A SYSTEM SETUP THAT DOES NOT REQUIRE A SCOPE
4) NOTE: BOB'S POINTS WERE MADE LONG BEFORE MIL'S BANKRUPTCY.

P.S. MAX L. MANN, 17 MUNROE ST. FT BRAGG, NC 28557 SAYS HE IS
COMPLETELY SATISFIED WITH THE POSSIBLE MOD-8.

PAGE 6
WILLIAM SEVERENCE, CENTER LOVELL, MN 04016, (207)925-2271 SAYS THAT MUCH OF HIS THINKING IS GEARED TO LARGE MACHINES BECAUSE OF PAST EXPERIENCE. HE EXPECTS TO DO EXTENSIVE SOFTWARE DEVELOPMENT INVOLVING MUCH FILE I/O AND IS IN FAVOR OF AS ADVANCED AN I/O STRUCTURE AS POSSIBLE, WITH AS MUCH WORK DONE BY HARDWARE AS POSSIBLE SUCH AS SERIAL TO PARALLEL CONVERSION. HE AGREES WITH MULTIPLYING PORT SEVEN AND WANTS DEVICE ACTIVITY HANDLED BY A PRIORITY INTERRUPT SYSTEM USING PORT O AS DESCRIBED IN MP PUBLISHING'S ECS-5 ARTICLE. HE IS IN FAVOR OF USING THE MP PUBLISHING TECHNIQUE OF SENDING OUT A CONTROL WORD AND INPUTTING A STATUS WORD IN A SINGLE INSTRUCTION. HE ALSO THINKS THAT A STANDARD CASSETTE FORMAT IS THE MOST DIFFICULT BUT MOST IMPORTANT STANDARD TO AGREE ON AND INSISTS ON USING A UART HARDWARE IMPLEMENTATION. AGAIN HE IS IMPRESSED WITH THE ECS-6 AND ECS-7 TAPE CONTROLLER. HE SUGGESTS A BLOCKED TAPE FORMAT OF 256 WORDS WITH AUTOMATIC MOTOR CONTROL. THE IN4 BIT 7 KEYPRESSED FLAG AND IN3 BIT 7 FLAGS ARE REDUNDANT. INO COULD ALSO OUTPUT AN INTERRUPT CONTROL WORD MAKING OUTO10 UNNECESSARY AND ALLOWING ITS USE FOR THE LED DISPLAY REGISTER. HE FAVORS USE OF PROM'S FOR A BOOTSTRAP CASSETTE LOADER AND AN ODT WHICH WOULD BE NICE BUT NOT NECESSARY IF YOU HAVE AN OCTAL KEYBOARD ENTRY SYSTEM. HE MENTIONS THAT SOFTWARE FORMAT STANDARDIZATION IS AS IMPORTANT AS HARDWARE AND THAT INTEL'S FORMAT BE FOLLOWED EXACTLY. HE SUGGESTS OCTAL FOR ALL NUMBERS EVEN THOUGH HEX MIGHT BE LESS AWKWARD FOR 8 BIT WORDS SINCE HE INTENSLY DISLIKES HEX NOTATION.

TERRY RITTER, 2524B GLEN SPRINGS WAY, AUSTIN, TX (512) 441-0036 SAYS THAT US STANDARDIZERS ARE ONLY A SMALL PORTION OF THE 8008 OWNERS. MOST HAVE THE INTEL PORT CONFIGURATION WIRED IN AND MOST DO NOT HAVE THE TV TYPEWRITER. IT IS USUALLY REASONABLE TO PLACE THE EXPECTED SMALL SYSTEM USES ON THESE PORTS: INPUT PORTS 0--ASCII KEYBOARD 1--CASSETTE OUTPUT PORTS 0--DISPLAY 1--CASSETTE 2--VIDEO 3--SPOOL 4--TTY. MORE STANDARDIZATION THAN ABOVE MIGHT DO MORE HARM THAN GOOD. TWO VERY POWERFUL HARDWARE ADDITIONS, A PUSH/PULL STACK, AND PROGRAM COUNTER ACCESS MIGHT BE INCLUDED AND USE FOUR INPUT PORTS BETWEEN THEM BUT PROVIDE THE ONLY KNOWN MEANS FOR PROVIDING THE 8008 WITH TRUE INTERRUPT AND MACHINE-LANGUAGE TRACE CAPABILITIES. IT IS IMPOSSIBLE TO HARD STANDARDIZE ANY DEVELOPING SYSTEM WITHOUT RESTRICTING ENGINEERING OPTIONS. FOR EXAMPLE, THE AFSK (RTTY) CASSETTE STORAGE SYSTEM MAY BECOME WIDELY USED YET ALTERNATE SYSTEMS WILL SOON APPEAR WITH MUCH GREATER STORAGE RATES, AND WE WILL AGAIN HAVE STANDARDIZATION PROBLEMS. IF POSSIBLE, MULTIPLE OPTIONS SHOULD BE COMPLETELY SPECIFIED, RATHER THAN STANDARDIZED.

J. PAUL FARR, 3723 JACKSTADT, SAN PEDRO, CA 90731 OBJECTS TO THE LARGE NUMBER OF PORTS DEDICATED TO SERIAL DATA DEVICES, WITH AN ATTENDANT SOFTWARE SERIAL TO PARALLEL CONVERSION. IT SEEMS THAT WITH A PROCESSOR AS SLOW AS THE 8008 AND WITH THE LIMITED MEMORY MOST OF US CAN AFFORD, THAT SERIAL DATA HANDLING BY THE CPU SHOULD BE AVOIDED AS MUCH AS POSSIBLE. HE LIKES THE IDEA OF USING THE 8-INPUT PORT MODIFICATION SUGGESTED BY MR. TITUS IN R-E WITH PORT IN-7 BEING USED AS A BUS. WE MAY WANT TO BE A LITTLE MORE JUDICIOUS IN ALLOCATING INPUT PORTS IN-0 THRU IN-6 AS THESE ARE ADDRESSED BY THE SIMPLE ONE BYTE INP INSTRUCTION. MAYBE ONE OR TWO CAN BE USED FOR FLAGS, ONE FOR KEYBOARD, AND TWO OR THREE FOR BULK DATA AND PROGRAM STORAGE ON TAPE OR DISK. ON THE ASSIGNMENT OF OUTPUT PORTS, WE MAY WANT TO THINK IN TERMS OF MAKING 2 OF THE 24 PORTS INTO AN OUTPUT BUS, ONE PORT THE ACTUAL 8 BIT OUTPUT AND THE OTHER PORT AN 8 BIT DEVICE SELECT (256 POSSIBLE). HE SAYS THAT DON TARBELL HAS CAUTIONED HIM AGAINST NOT ALLOWING FOR ENOUGH OUTPUT CONTROL PORTS. DISK DRIVES AND OTHER PERIPHERALS REQUIRE QUITE A FEW BITS OF CONTROL. EVEN AUTOMATIC CONTROL OF A CASSETTE OR TWO CAN USE UP HALF OF AN OUTPUT PORT. HE AGREES WITH THE IDEA THAT LOTS OF PERIPHERALS ARE NEAT BUT DOESN'T NECESSARILY THINK NUMEROUS PERIPHERALS ARE REALLY NECESSARY. DR. SUDING HAS DONE ONE HECK OF A LOT OF WORK WITH NEARLY NONE AND NOT TOO MUCH MEMORY EITHER. PAUL IS USING THE 256 WORD ODT IN PAGE 0 AND THINKS THIS IS A FANTASTIC TOOL FOR PROGRAM DEVELOPMENT AND GENERAL MARK-8 OPERATION FROM THE KEYBOARD. HE WOULD LIKE TO SEE THIS PROGRAM BECOME THE STANDARD SOFTWARE COMPONENT OF ALL USER GROUP MACHINES.
LAURENCE PLATE JR., 2320 SKYLINE WAY, SANTA BARBARA, CA 93109 SAYS THE KEYRESSED FLAG SHOULD BE ASSIGNED ELSEWHERE AND IN4 BIT 7 RESERVED FOR PARITY AS HE HAS HAD EXPERIENCES WITH PARITY PROBLEMS IN THE PAST AND WANTS TO RETAIN THE PARITY BIT FOR HIS TVT WHICH WILL EVENTUALLY CON- TAIN PARITY BIT LOGIC. THE INPUT PORT ASSIGNMENTS SEEM TO BE CROWDED, HENCE IT MAY BE WISE TO ADD ONE OR TWO MORE PORTS TO BE MULTIPLEXED AND ASSIGN THE FLOPPY DISK TO THAT PORT AND LET THE REST OF THE ASSIGNMENTS STAND FOR FUTURE USES. HE SAYS THAT NATIONAL HAS A ROM CHIP THAT DOES BAUDOT TO ASCII CONVERSIONS (MM5220BL) AND TWO NEW CHIPS WHICH DO ASCII TO BAUDOT (MM3501 TL AND MM5221 TM). LARRY SAYS THAT HE ONCE DESIGNED A PAPER TAPE READER THAT USED A BLOCK OF ALUMINUM DRILLED FOR PHO CELETS AND THE SPOKET HOLE WAS USED TO TRIGGER RECEIVING OF THE DATA. HE SAYS WE NEED A MEMORY STANDARDIZATION SCHEME AND A NEW MEMORY LOGIC DESIGN TO ALLOW FOR 16K MEMORY. HE IS CONVERTING TO PLUGGABLE BOARDS AND SUPPLIED A CAREFULLY DRAWN TABLE OF THE MARK-8 BUS SIGNALS BOTH SOURCE AND DESTINATION WHICH WILL BE INCLUDED IN THE NEXT NEWSLETTER.

THE DIGITAL GROUP HAS PROBABLY DONE MORE FOR SYSTEM STANDARDIZATION THAN ANYONE BY PUBLISHING DR. SUDING'S MARK-8 MODIFICATIONS AND HIS CASSETTE TAPE RECORDER CIRCUIT. THEY HAD TO LOSE A BUNDLE ON THEIR #$7.50 DOCUMENTATION PACKAGE. IF YOU HAVE SEEN IT, YOU KNOW WHAT I'M TALKING ABOUT. IN ANY CASE THIS IS ONE EXAMPLE OF WHAT THEY INTEND TO CONTINUE DOING IN THE FUTURE. THEY ASKED THAT WE INCLUDE THE LOAD DUMP ROUTINES FOR DR. SUDING'S CASSETTE CIRCUIT THAT WAS INCLUDED IN THE LAST NEWSLETTER. THEY NOTE THAT THE 5 VOLT ZENER WAS SHOWN BACKWARDS IN THE NEWSLETTER COPY OF THE CIRCUIT.

PROGRAM: CASSETTE DUMPER FOR COLD START - SHORT FORM

<table>
<thead>
<tr>
<th>OCTAL ADDRESS</th>
<th>OCTAL CODE</th>
<th>OPERATION</th>
<th>OCTAL ADDRESS</th>
<th>OCTAL CODE</th>
<th>OPERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>003000</td>
<td>056</td>
<td>Load H with 000</td>
<td>003030</td>
<td>016</td>
<td>Load B with 040</td>
</tr>
<tr>
<td>003001</td>
<td>000</td>
<td></td>
<td>003031</td>
<td>040</td>
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<tr>
<td>003002</td>
<td>066</td>
<td>Load L with 000</td>
<td>003032</td>
<td>011</td>
<td>Decrement B</td>
</tr>
<tr>
<td>003003</td>
<td>000</td>
<td></td>
<td>003033</td>
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<td>Jump not zero</td>
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<td>026</td>
<td>Load C with 010</td>
<td>003034</td>
<td>032</td>
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</tr>
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<td>003005</td>
<td>010</td>
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<td>036</td>
<td>Load D with 000</td>
<td>003036</td>
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<td>003007</td>
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<tr>
<td>003010</td>
<td>103</td>
<td>Input L</td>
<td>003040</td>
<td>024</td>
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<tr>
<td>003011</td>
<td>044</td>
<td>AND A with 001</td>
<td>003041</td>
<td>003</td>
<td>Store D in mem</td>
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<tr>
<td>003012</td>
<td>001</td>
<td></td>
<td>003042</td>
<td>050</td>
<td>Increment L</td>
</tr>
<tr>
<td>003013</td>
<td>110</td>
<td>Jump if not zero</td>
<td>003043</td>
<td>060</td>
<td>Jump not zero</td>
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<td>003014</td>
<td>010</td>
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<td>003045</td>
<td>004</td>
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<tr>
<td>003016</td>
<td>016</td>
<td>Load B with 060</td>
<td>003046</td>
<td>003</td>
<td>Increment H</td>
</tr>
<tr>
<td>003017</td>
<td>060</td>
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<td>003047</td>
<td>050</td>
<td>Load A with H</td>
</tr>
<tr>
<td>003020</td>
<td>011</td>
<td>Decrement B</td>
<td>003050</td>
<td>035</td>
<td>Compare A with 004</td>
</tr>
<tr>
<td>003021</td>
<td>110</td>
<td>Jump not zero</td>
<td>003051</td>
<td>074</td>
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</tr>
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<td>003022</td>
<td>020</td>
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<td>004</td>
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<tr>
<td>003023</td>
<td>003</td>
<td></td>
<td>003053</td>
<td>110</td>
<td>Jump not equal</td>
</tr>
<tr>
<td>003024</td>
<td>103</td>
<td>Input L</td>
<td>003054</td>
<td>004</td>
<td></td>
</tr>
<tr>
<td>003025</td>
<td>003</td>
<td>Add D to A</td>
<td>003055</td>
<td>003</td>
<td></td>
</tr>
<tr>
<td>003026</td>
<td>012</td>
<td>Shift right</td>
<td>003056</td>
<td>000</td>
<td>Halt</td>
</tr>
</tbody>
</table>

COMMENTS: This routine is hand keyed into the upper portion of the 1K 8008 microprocessor when power is first applied. The program deserializes the output of the cassette, and loads the 8-bit bytes into memory starting at byte 0. The speed is approximately 40 bytes/second (1K in 25 sec.).

Begin this program by doing a Restart 025 while the cassette is playing the constant tone leader prior to the data portion. The timing constants at 003017 and 003031 assume the 20µs cycle time of the Mark-8 (use of a 4Mhz crystal).
PROGRAM: CASSETTE LOADER (loads storage contents onto cassette) - SHORT FORM

<table>
<thead>
<tr>
<th>OCTAL ADDRESS</th>
<th>OCTAL CODE</th>
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<th>OCTAL ADDRESS</th>
<th>OCTAL CODE</th>
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<td>Load C with 377</td>
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<td>Load A with H</td>
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<tr>
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<td>003261</td>
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<td>003263</td>
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<tr>
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<td>Decrement B</td>
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<td>Compare A with D</td>
</tr>
<tr>
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<td>110</td>
<td>Jump not zero</td>
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<td>150</td>
<td>Jump if equal</td>
</tr>
<tr>
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<td>003274</td>
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<td>066</td>
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<td>003276</td>
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<td>003224</td>
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<td>Load D with 003*</td>
<td>003300</td>
<td>306</td>
<td>Load A with L</td>
</tr>
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<td>003*</td>
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<td>003301</td>
<td>274</td>
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<td>Load E with 377</td>
<td>003302</td>
<td>150</td>
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<td>001</td>
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<td>003327</td>
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COMMENTS: *Set byte 003225 to the address of the highest byte page in your system:

1K = 003 (shown)
1.5K = 005
2K = 007

Begin this program by doing a Restart 015 after having placed the cassette in record and running clear of the leader.

IV-18
DR. SUDING, C/O DIGITAL GROUP, PO BOX 6528, DENVER, CO 80206 RECOMMENDS STANDARDS FOR A FRONT PANEL AND POWER SUPPLY. HE SAYS A MEANINGFUL FRONT PANEL SHOULD HAVE DIGITAL READOUT OF HIGH AND LOW ADDRESS, MEMORY DATA, AND ONE OUTPUT PORT. IT SHOULD HAVE KEYBOARD ENTRY WITH OCTAL DATA ENTRY, INTERRUPT, EXAMINE & DEPOSIT KEYS, A DEPOSIT ENABLE TOGGLE SWITCH, LOAD HIGH, LOAD LOW ADDRESS, RUN AND STOP KEYS, A DIGITAL READ-OUT OF THE OCTAL ENTRY, A POWER SWITCH AND A POWER ON INDICATOR. THE POWER SUPPLY SHOULD BE CAPABLE OF +5 AT LEAST 5 AMPS, -9 V @ 1 AMP MINIMUM, BOTH WITH OVERVOLTAGE PROTECTION, + OR - 12 VOLT SUPPLIES FOR OP AMP USE AND A FAN FOR COOLING. DR. SUDING THINKS THAT TWO PORTS SHOULD BE RESERVED FOR ALL THE MISCELLANEOUS APPLICATIONS. IMPORTANT DEVICES SHOULD RECEIVE PERMANENT ASSIGNMENTS AS FOLLOWS:
1) INPUT KEYBOARD - ASCII, 7 BITS WITH 8TH BIT FOR STROBE, INPUT PORT 0 10 PIN CONNECTOR TO INCLUDE GND & +5 FOR KEYBOARD LOGIC.
2) TV READOUT, BNC CONNECTOR TO VIDEO OUTPUT AND USE OF OUT PORT 6.
3) CASSETTE INPUT & OUTPUT, INPUT PORT 1 BIT 0 AND OUTPUT PORT 1 BIT 0, SERIALIZE AND DESERIALIZE UNDER SOFTWARE CONTROL.
4) TTY - IF SERIAL, SHARE PORT 1 WITH CASSETTE, IF PARALLEL, THEN PORT 2 INPUT AND OUTPUT.
5) CALCULATOR INTERFACE, USE INPUT PORT 6 AND OUTPUT PORT 7.
6) MISC. I/O CAN BE RANDOMLY ASSIGNED TO PORTS 3 & 4.
7) GRAPHICS OPERATION (OSCILLOSCOPE, TV VECTOR/RASTER GRAPHICS GENERATOR & LIGHT PEN) ON PORT 5 I/O.

DR. SUDING SUGGESTS FORGETTING PAPER TAPE COMPLETELY & USING CASSETTE AND STAYING AWAY FROM KEY PUNCHES.

RAYMOND G. STEVENS, RGS ELECTRONICS, 3650 CHARLES ST., SUITEK, SANTA CLARA, CA 95050, (408) 247-0158 SAYS THAT ALL THE MODIFICATIONS TO THE MARK-8 I/O CURRENTLY BEING MADE ARE SLOWLY BUT SURELY MAKING IT MORE LIKE THE RGS 008-A I/O AT THE EXPENSE OF GREAT COMPLICATION AND EXPENSE TO THE EXPERIMENTER. IF HE COULD COUNT ON SELLING ENOUGH UNITS, HE WOULD DEVELOP A CARD THAT WOULD CONVERT THE MARK-8'S PORT STYLE I/O INTO THE 008A'S UNIVERSAL BUS I/O.

J. A. TITUS, TYCHON, INC., PO BOX 242, BLACKSBURG, VA 24060 (703) 951-9030 THINKS THAT THE ODT SHOULD NOT BE IN THE BASE PAGE SINCE IT WOULD BE IMPOSSIBLE TO DEBUG PROGRAMS USING THIS AREA. IT SHOULD BE PUT UP HIGH IN MEMORY AND A RESTART LOCATION USED TO GET TO IT. A STANDARDIZED PRIORITY INTERRUPT SCHEME SHOULD BE DEVELOPED. HE HAS CONSTRUCTED A PAPER TAPE READER USING A LEDEX STEPPING SWITCH DRIVE AND H-38 MATCH-STICK TI PHOTODIODES AND WILL PROVIDE A CONSTRUCTION PACKET AS PART OF OUR PROJECT ASSIGNMENT PROGRAM TO BE DESCRIBED LATER. ANYONE DEVELOPING AN INTERFACE DESIGN SHOULD OVER DESIGN IT BY PROVIDING ALL NECESSARY FLAGS AND PULSES THAT COULD BE POSSIBLY NEEDED SO IT CAN BE USED WITH A WIDE VARIETY OF CPU SYSTEMS. EVEN IF ALL THE SIGNALS ARE NOT USED, THEY SHOULD BE AVAILABLE, OR AT LEAST DOCUMENTED. HE SAYS NO ONE HAS MENTIONED USE OF ASYNCHRONOUS COMMUNICATIONS BETWEEN PERIPHERALS AND REMOTE COMPUTERS. THIS IS A USEFUL TECHNIQUE AND SHOULD BE MADE AWARE OF IT IF THEY ARE USING ANY REMOTE SENSORS OR DIGITAL DATA SOURCE. HE ALSO SUGGESTS THAT WE LOOK AT THE STANDARD INTERFACE THAT HEWLETT-PACKARD IS TRYING TO GET ADOPTED BY THE ANSI. THIS IS A 16 LINE PARALLEL INTERFACE THAT USES EIGHT LINES FOR ADDRESS AND DATA AND EIGHT LINES FOR FLAGS, ETC. IT WAS REVIEWED IN "ELECTRONICS", NOV 14, 1974, PAGES 95-106. HE SUGGESTS THAT ANY INTERFACE OR DEVICE SUBMITTED FOR USE BY OTHER PARTICIPANTS MUST BE THOROUGHLY TESTED BY ANOTHER INDEPENDENT GROUP SO THAT BAD IDEAS AND MARGINAL DESIGNS DON'T CREEP IN THAT COULD CAUSE A LOT OF DISAPPOINTMENT AMONG USERS, MOST OF WHOM ARE ON A LIMITED HOBBY BUDGET. WHEN APPROVAL IS FINAL, EACH GROUP SHOULD SUBMIT COPY-READY ARTWORK FOR REPRODUCTION.
NAT WADSWORTH, PRESIDENT, SCELBI COMPUTER CONSULTING, INC., 1322 READ-
BOSTON POST ROAD, MILFORD, CT 06460 (203) 874-1573 SAYS THAT TO AT-
TEMPT TO STANDARDIZE ON THE USE OF SELECTED DEVICES FOR SELECTED
PORTS HANDBACKS THE LESS ENDOWED USER, I.E. THOSE WITH LESS OPERATING
I/O PORTS AND ESSENTIALLY NEGATES ONE OF THE POWERFUL ASPECTS OF A
COMPUTER - THE ABILITY TO ACCOMMODATE HARDWARE VARIATIONS BY SUBSTI-
TUTING EASILY CHANGED SOFTWARE. INSTEAD OF ATTEMPTING TO STANDARD-
IZE DEVICE ASSIGNMENTS, HE THINKS IT WISER TO STANDARDIZE ON SOFTWARE
PROCEDURES, SUCH AS ESTABLISHING FORMATS FOR SUBROUTINING, SO THAT THE
NUMBER OF ACTUAL SOFTWARE CHANGES (GENERALLY TO SELECT THE APPROPRIATE
I/O PORT CODES) WOULD BE MINIMIZED AND LOCALIZED WITHIN A LARGE PRO-
GRAM. A WELL DESIGNED PROGRAM NEED GENERALLY ONLY CALL ONE OR TWO I/O
SUBROUTINES THAT ACTUALLY CONTAIN PORT DEFINING I/O INSTRUCTIONS AND IT
IS A SIMPLE MATTER FOR A USER TO DEFINE THE PORTS FOR THE INDIVIDUAL'S
HARDWARE FACILITY. AN AREA MORE SUITABLE TO STANDARDIZATION WOULD BE
GUIDELINES TO ESTABLISH BIT POSITION ASSIGNMENTS FOR I/O DEVICES, I.E.
A CONVENTION SUCH AS: A) AN OUTPUT DEVICE USING TWO PORTS, ONE FOR
DATA AND ONE FOR CONTROLS, SHOULD HAVE DATA ON THE LOWER VALUE
PORT, CONTROL SIGNALS ON THE NEXT HIGHER PORT. B) AN OUTPUT DEVICE
USING ONE PORT FOR DATA AND CONTROLS SHOULD HAVE CONTROL LINES CONNECT-
ED TO THE MOST SIGNIFICANT BITS, DATA ON THE LEAST SIGNIFICANT BITS.
C) POSSIBLY RECOMMEND BIT ASSIGNMENTS FOR SERIAL I/O DEVICES SUCH AS
B7 FOR OUTPUTTING DATA, B0 FOR INPUTTING DATA. IN GENERAL, WE SHOULD
WORK TOWARDS STANDARDIZATION OF SOFTWARE TECHNIQUES THAT WILL REDUCE THE
WORK INVOLVED IN ADAPTING A PROGRAM TO AN INDIVIDUAL'S PHYSICAL SETUP
WHILE STILL PROVIDING THE INHERENT FLEXIBILITY THAT IS THE GREAT ASSET
OF A COMPUTER WHILE AVOIDING ATTEMPTS TO STANDARDIZE ON PHYSICAL HARD-
WARE WHICH OFTEN NECESSITATES MATERIAL EXPENSE. AS A GENERAL RULE,
A HOBBYIST IS LOOKING TO KEEP FINANCIAL EXPENSE TO A MINIMUM. BUT
CONVERSALLY, THERE IS THE TIME AND INTEREST TO MAKE SOFTWARE CHANGES WHICH
CAN GET AROUND THE HARDWARE LIMITATIONS. THAT, INDEED, IS ONE REASON
A COMPUTER HOLDS SUCH ATTRACTION!

CONCLUSIONS

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IT SEEMS THAT WE ARE INDEED TOO FAR ALONG TO PRODUCE THE
"SYSTEM" TYPE OF STANDARDIZATION THAT WOULD HAVE BEEN NICE. EVERY-
ONE'S DEVELOPMENT WORK HAS HEADED IN A DIFFERENT DIRECTION AND OUR ONLY
HOPE NOW IS TO HOP ONTO SOMEONE'S BANDWAGON THAT HAS DONE IMPORTANT
DEVELOPMENT WORK AND USE HIS I/O CONFIGURATION. THE DIGITAL GROUP AND
THE COMPUTER HOBBYIST GROUP ARE BOTH COMMITTED TO HIGH QUALITY DESIGN
AND DOCUMENTATION IN THE HOPE OF ATTRACTING A FOLLOWING IN THEIR RESPECTIVE
DIRECTIONS.

IT SEEMS THAT THE GOAL OF Producing THE $500 COMPLETE HOBBY
COMPUTER SYSTEM IS WHAT WE WOULD LIKE TO STRIVE FOR. AT THE RISK OF
HURTING SOME FEELINGS, I THINK WE MUST IGNORE THE DESIRES OF THE "BIG
COMPUTER BOYS" THAT WANT TO MAKE AN 8008 INTO AN IBM 370. TO THIS END
WE MUST:
1) DO EVERYTHING POSSIBLE WITH SOFTWARE RATHER THAN HARDWARE. MEMORY IS
GETTING CHEAPER AND IT IS EASY TO STUFF MEMORY BOARDS. ONCE SOME MEM-
ORY IS WORKING, IT IS EASY TO LET THE COMPUTER CHECK OTHER MEMORY BOARDS.
A HOBBYIST HAS TIME TO MAKE SOFTWARE CHANGES AND DO SOFTWARE DEVELOPMENT
(INDED THAT MUST BE ONE OF THE REASONS HE BUILD THE SYSTEM IN THE FIRST
PLACE) BUT HE DOESN'T NECESSARILY HAVE THE MONEY AND OFTEN TIMES DOES
NOT HAVE THE KNOWLEDGE TO GET EXOTIC HARDWARE SCHEMES CONSTRUCTED
AND DEBUGGED.

2) INTERRUPTS HAVE NO PLACE IN THE SMALL HOBBY SYSTEM. WITH SMALL MEM-
ORY SIZE, THE LACK OF CAPABILITY FOR DOING INTERRUPTS WITHOUT EXTENSIVE
HARDWARE ADDITIONS IN AN 8008, AND WITH INEXPERIENCED PROGRAMMERS, IT
WILL BE NEARLY IMPOSSIBLE TO ACCOMPLISH ANYTHING WITH INTERRUPTS ANY-
WAY. THEY AREN'T REALLY NEEDED, ADD EXTRA EXPENSE, SO WHY TRY TO IN-
CLUDE THEM.

3) WITH A GOOD KEYBOARD MONITOR, THE HOBBYIST IS WASTING HIS MONEY AND
A GOOD DEAL OF TIME TRYING TO INCLUDE A FRONT PANEL. A PROM WITH A
KEYBOARD MONITOR AND AN INTERRUPT PUSHBUTTON ARE ALL THAT IS REALLY
NECESSARY.
THE STATUS OF PERIPHERALS TO DATE IS AS FOLLOWS:

1) TERMINALS A) TVT-1 LOTS AROUND, SCROLLING MODS AVAILABLE. ALL ERRORS HAVE BEEN FOUND BUT PROBABLY NOT THE BEST DESIGN TO START NOW.
B) TVT-2 NICE DESIGN. FAIR PRICE. KIT AVAILABLE FROM SWTP, PC BOARDS AVAILABLE FROM SWTP, IC PARTS KIT AVAILABLE FROM MINI MICRO MART.
C) SUDING 8X32 TVT, $95 KIT AVAILABLE FROM DIGITAL GROUP (SEND SASE FOR DETAILS) D) SUDING 16X64 TVT -- STATUS UNCERTAIN, CONTACT DIGITAL GROUP FOR DETAILS E) CREED TTY'S SEE NL#5

2) KEYBOARD MONITORS A) LAWRENCE LIVERMORE LABS 256 WORD ODT WRITEUP UCID-16507 AVAILABLE FROM US ATOMIC ENERGY COMMISSION, DIV. TECHNICAL INFO., OAK RIDGE, TN. B) MIL MONITOR-8 ROM'S MAY EXIST BUT NOT LIKELY. WRITEUP AVAILABLE IN MIL MF8008 MANUAL BUT THEY ARE TOUGH TO GET. C) BOB COOK HAS A CREED TTY KEYBOARD MONITOR.

3) CASSETTE TAPE UNIT ONLY TWO UNITS APPEAR IN THE RUNNING NOW. AT LEAST SEVEN THAT WORK ARE PRESENTLY AVAILABLE. A) THE SUDING DIGITAL GROUP UNIT IS POPULAR, IS BEING PUSHED HARD AS A STANDARD BY THE DIGITAL GROUP. A PC BOARD IS AVAILABLE FOR $4.00, A PARTS KIT FOR $19.00 AND AN ASSEMBLED AND TESTED UNIT FOR $24.00.
B) THE COMPUTER HOBBYIST GROUP DESCRIBED A CASSETTE UNIT THAT THEY INTEND TO PROMOTE AND SUPPORT IN THE LATEST ISSUE OF THE COMPUTER HOBBYIST. THEY WILL HAVE PC BOARDS, PARTS KITS, AND SOFTWARE AVAILABLE.
C) THE MIL CASSETTE STILL LOOKS GOOD BUT WITHOUT MONITOR-8 ROMS, IT WILL NOT BE SUPPORTED. THE NICE PART ABOUT THE CASSETTE PICTURE IS THAT ALL OF THESE INTERFACES ARE CHEAP ENOUGH SO A GUY CAN BUILD ONE OF EACH IF HE WANTS TO.

4) PAPER TAPE READERS - MR. TITUS HAS PROMISED US A WRITEUP ON HIS AND AS SOON AS I GET CAUGHT UP, I'LL WRITE A CONSTRUCTION ARTICLE FOR MINE.

5) PAPER TAPE PUNCH - THE CREED TTY'S INCLUDE A 5 LEVEL PUNCH AND THE CREED MONITOR CONTAINS DUMP AND LOAD ROUTINES.

6) THRU 7 NO NEW INFO.

8) GRAPHICS TERMINALS - SEE THE COMPUTER HOBBYIST, ISSUES 1, 2, & 3 FOR COMPLETE CONSTRUCTION INFO ON AN ELABORATE UNIT. DR. SUDING IS GOING TO DEVELOP A RASTER SCAN TV UNIT WITH LIGHT PEN.

9) THRU 11 NO NEW INFO.

12) CALCULATOR INTERFACE - DR. SUDING'S DESIGN IS COMPLETE AND AVAILABLE FROM MINI MICRO MART. SEE BACK OF NL FOR INFORMATION.

13) PROM PROGRAMMER - AN EARLY EDITION OF THE INTEL 8008 DATA BOOK INCLUDED COMPLETE DESIGN INFORMATION FOR A PROM PROGRAMMER. THE MIL MOD-8 BACKPLANE BOARD (STILL AVAILABLE) HAS A PROM PROGRAMMER BUILT IN THAT REQUIRES ABOUT $40.00 IN PARTS.

14) THRU 18 NO NEW INFO.

TO PUT SOME DIRECTION INTO PERIPHERAL DEVELOPMENT IT IS NECESSARY TO "ASSIGN" PROJECTS TO INDIVIDUALS. WE CAN'T REALLY ASSIGN PEOPLE SO WE ARE INSTEAD ASKING THAT YOU VOLUNTEER TO DEVELOP AND PRODUCE A CAREFULLY DOCUMENTED CONSTRUCTION PACKAGE FOR ONE OF THE PERIPHERALS ABOVE. IT MATTERS NOT AT ALL IF SEVERAL PEOPLE ARE WORKING ON THE SAME DEVICE. PERHAPS THEY CAN TEAM UP OR AT LEAST COMMUNICATE AND SHARE IDEAS. THESE PACKAGES WILL BE MADE AVAILABLE AT REPRODUCTION AND MAILING COSTS TO ALL PARTICIPANTS. ONE OF OUR SUPPLIERS CAN HELP MAKE PC BOARDS AND PARTS KITS AVAILABLE.

PLEASE WRITE & INDICATE WHICH PROJECT YOU ARE INTERESTED IN DEVELOPING. THE NEXT NEWSLETTER WILL CONTAIN A LISTING OF PROJECTS AND THOSE COMMITTED TO CONSTRUCTION PROJECT WRITEUPS.

ALTHOUGH WE CERTAINLY WANT TO DEVELOP 8008 PERIPHERALS... THE AREA OF GREATEST NEED IS PROBABLY FOR ALTAIR 8800 PERIPHERALS. THERE ARE AN ENORMOUS NUMBER OF PEOPLE THAT PROBABLY HAVE THE BASIC KIT AND THOUGHT THEY WOULD HAVE A RUNNING COMPUTER THAT WOULD DO SOMETHING USEFUL ONLY TO FIND OUT THAT THEY WOULD HAVE TO SPEND MANY HUNDREDS OF DOLLARS TO OBTAIN PERIPHERAL KITS AND SOFTWARE PACKAGES. ANY HELP WE CAN PROVIDE THESE PEOPLE WILL BE GREATLY APPRECIATED.
AN ALTERNATIVE TO AN 8080 SYSTEM

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DR. MARK SEBERN, PROJECT LEADER, ULTRA LOW COST SYSTEMS, RESEARCH AND DEVELOPMENT GROUP, DIGITAL EQUIPMENT CORPORATION (DEC), 146 MAIN STREET, MAYNARD, MA 01754. (617) 897-5111 EXT. 4413 (WAGJMS/WA1I01)

HAS BEEN A LONG TIME FOLLOWER OF THE MICRO-8 USER GROUP AND SENT DETAILED INFORMATION ON THE LSI-11. ALTHOUGH HE POINTS OUT THAT ITS NOT QUITE PRICED FOR THE HOBBYIST YET, HE THINKS WE'LL SEE HOW CLOSE THAT DAY REALLY IS. (WOW! WOULDN'T IT BE FUN TO SEE SOME OF THE PROJECTS THEY ARE WORKING ON FOR THE FUTURE IN MAYNARD.)

DEC'S LSI-11 IS A COMPLETELY COMPATIBLE PDP-11 (16 BIT MACHINE WITH AN INCREDIBLY VERSATILE INSTRUCTION SET) WITH 4K OF RAM ON A SINGLE 8.5" BY 10" BOARD. IT INCORPORATES A COMPLETE ASCII CONSOLE (ODD-11, I.E. KEYBOARD MONITOR) IN THE MICROCODE OF THE PROCESSOR WHERE IT CAN'T BE BOMBED, A 16 BIT I/O PORT (DMA PORT), POWER FAIL/AUTO RESTART, REAL TIME CLOCK INPUT, AUTOMATIC PRIORITY INTERRUPT ARBITRATION AND VECTORED INTERRUPT HANDLING AND SELLS FOR $990 FOR ONE. $653 FOR 50-99 AND $634 FOR 100-199. YOU WOULD HAVE TO ADD A BACKPLANE ASSEMBLY ($116 FOR 50-99) AND A POWER SUPPLY (+5 @ 3 AMPS AND +12 AT 1.5 AMPS MINIMUM) AND A TUT AND YOU HAVE A 4K PDP-11 BACKED BY THE DECUS USERS ORGANIZATION (175 PROGRAMS IN THEIR PROGRAM LIBRARY AND GROWING DAILY, FREE MEMBERSHIP, AND REASONABLE PROGRAM ACQUISITION COST) AND WITH RELIABLE SOFTWARE SUPPORT (AT A COST) BY DEC.

COMPARE THAT TO AN ALT AIR 8800. THE BASIC MACHINE IS NOW $550. YOU'D NEED 2 4K MODULES TO EQUAL THE 4K OF 16 BIT WORDS IN THE LSI-11 AT ABOUT $250 EACH. EVEN IF THE OTHER THINGS WERE AVAILABLE YOU'D HAVE ABOUT THE SAME MONEY INVOLVED AND LET'S FACE IT, AN 8080 IS A LONG WAY FROM BEING EQUAL TO A PDP-11.

ALL WE NEED NOW IS FOR SOMEONE TO PUT TOGETHER A PACKAGE AROUND THIS, GET DELIVERY ESTIMATES, AND COLLECT DEPOSITS FOR AT LEAST 50 AND YOU CAN HAVE YOUR VERY OWN PDP-11 FOR UNDER $1000! ADD ANOTHER 4K OF MEMORY AT $413 (FOR 50-99) AND YOU CAN RUN A SUPER BASIC.

WRITE DEC, COMPONENTS GROUP, MR2-2, ONE IRON WAY, MARLBOROUGH, MA 01752 FOR DETAILS OR CALL TOLL FREE (800) 225-9480, 8:30-5:30 EST. (MA RESIDENTS DIAL (617) 481-7400).

FLASH: JUST RECEIVED A CALL FROM BOB ALBRECHT OF PEOPLE'S COMPUTER CO. (PCC), PO BOX 310, MENLO PARK, CA 94025. HE SAYS THEIR ORGANIZATION WOULD ENTERTAIN THE IDEA OF ACTING AS THE OEM (ORIGINAL EQUIPMENT MANUFACTURER) TO COLLECT AT LEAST 50 ORDERS TO OBTAIN THE QUANTITY PRICE IF ENOUGH PEOPLE ARE INTERESTED. IF YOU WOULD BE INTERESTED (SERIOUSLY), WRITE BOB AT PCC.

HAPPENINGS AT THE COMPUTER HOBBYIST MAGAZINE WORKSHOP

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STEVE STALLINGS AND HAL CHAMBERLIN, COMPUTER HOBBYIST, BOX 295, CARY, NC 27511. (919) 467-3145 OR (919) 815-7283 (EVENINGS OR WEEKENDS) CALLED AND DESCRIBED YET ANOTHER CASSETTE UNIT THEY HAVE BEEN WORKING ON THAT WILL BE DETAILED IN THEIR MARCH ISSUE. IT'S BIT RATE IS 500 BITS/SEC. BIT ASYNCRONOUS WITH "HANDSHAKING" WITH THE CPU ON BOTH RECORD AND PLAYBACK ALLOWING IT TO WORK WITH ANY CPU CLOCK RATE. MODULATION IS PULSES WHICH ARE USED DIRECTLY REQUIRING NO PHASE LOCKED LOOP OR TUNED FILTERS. IT USES +5 VOLTS ONLY, ABOUT 8 IC PACKAGES, THEY HOPE TO BE ABLE TO SUPPLY A PCB BOARD, AND THEY WILL SUPPORT IT WITH HARDWARE AND SOFTWARE AND RELEASE PROGRAMS TO TCH READERS. (AT FIRST WE HAD NONE, NOW WE HAVE SIX OR SEVEN CASSETTE UNITS THAT WORK. WHAT DO WE DO NOW?)

PLEASE SEND $6.00 FOR 12 MONTHLY ISSUES TO THE TCH GUYS. THEY DO A BEAUTIFUL JOB ON THEIR MAGAZINE, SELL IT FOR A BARGAIN PRICE, AND WOULD LIKE TO MAKE SOME MONEY. IF YOU SUPPORT THEM WITH A SUBSCRIPTION, PERHAPS THEY WILL DO A LITTLE BETTER THAN JUST BREAK EVEN.

THEY HOPE TO SEE SOME OF YOU AT THE DAYTON HAMFEST IN APRIL. THEY WILL BE THERE WITH A DEMO SYSTEM TO GENERATE INTEREST IN COMPUTERS AS A HOBBY AMONG THE HAMS.


NEW MEMORY COMPONENT JUST ANNOUNCED BY SIGNETICS

A DATA SHEET FOR A NEW MEMORY COMPONENT THAT WAS JUST ANNOUNCED BY SIGNETICS ON APRIL 1ST WAS SENT IN TO US BY WALTER M. WHITE, 343 S. MADISON AVE., PASADENA, CA 91101. THE POTENTIAL USE OF THIS DEVICE IN HOBBY SYSTEMS SEEMS OF SUCH IMPORTANCE THAT THE FIRST PAGE OF THE DEVICE DATA SHEET IS INCLUDED IN THE APRIL ISSUE OF THIS NEWSLETTER FOR YOUR INFORMATION. WRITE YOUR LOCAL SIGNETICS DISTRIBUTOR FOR ADDITIONAL INFORMATION AND PRICING.

FULLY ENCODED LENGTH, RANDOM ACCESS
WHITE-ONLY MEMORY

FINAL SPECIFICATION (10)

DESCRIPTION
The Signetics 2600 Series 9040XN Random Access Write-Only Memory employs both enhancement and depletion mode P-Channel, N-Channel, and n-channel MOS devices. Although a static device, a single TTL level clock phase is required to drive the on-board multi-port clock generator. Data refresh is accomplished during C2 and LH periods.[11] Quadrature outputs (when applicable) allow expansion in many directions, depending on organization.

The static memory cells are operated dynamically to yield extremely low power dissipation. All inputs and outputs are directly TTL compatible when proper interfacing circuitry is employed.

Device construction is more or less S.O.S. [2].

FEATURES
• FULLY ENCODED MULTI-PORT ADDRESSING
• WRITE CYCLE TIME 80ns (MAX. TYPICAL)
• WRITE ACCESS TIME [3]
• POWER DISSIPATION 10W/BIT TYPICAL
• CELL REFRESH TIME 2ms (MIN. TYPICAL)
• TTL/DTL COMPATIBLE INPUTS [4]
• AVAILABLE OUTPUTS "n"
• CLOCK LINE CAPACITANCE 2pF MAX. [5]
• VCC = +10V
• VDD = 0V ± 2%
• VFF = 6.3VAC [6]

APPLICATIONS
DON'T CARE BUFFER STORES
LEAST SIGNIFICANT CONTROL MEMORIES
POST MORTEM MEMORIES (WEAPON SYSTEMS)
ARTIFICIAL MEMORY SYSTEMS
NON-INTELLIGENT MICRO CONTROLLERS
FIRST-IN NEVER-OUT (FINO) ASYNCHRONOUS BUFFERS
OVERFLOW REGISTER (BIT BUCKET)

PROCESS TECHNOLOGY

1. "Neu" channel devices enhance or deplete regardless of gate polarity, either simultaneously or randomly. Sometimes not at all.
2. "S.O.S." copyrighted U.S. Army Commissary, 1940.
3. Not in use.
4. You should drive these inputs from TTL, the method of choice.
5. Measure at 1Vdc, 25mVac, 1.9nF in series.
6. For the filaments, what else!

BIPOLAR COMPATIBILITY
All data and clock inputs plus applicable outputs will interface directly or nearly directly with bipolar circuits of suitable characteristics. In any event use 1 amp fuses in all power supply and data lines.

INPUT PROTECTION
All terminals are provided with slip-on latex protectors for the prevention of Voltage Destruction. (P.O.L. packaged devices do not require protection).

SILICON PACKAGING
Low cost silicon DIP packaging is implemented and reliability is assured by the use of a non-hermetic sealing technique which prevents the entrapment of harmful ions, but which allows the free exchange of friendly ions.

SPECIAL FEATURES
Because of the employment of the Signetics' proprietary Sanderson-Rabbet Channel the 25120 will provide 50% higher speed than you will obtain.

COOLING
The 25120 is easily cooled by employment of a six foot fan, 1/2" from the package. If the device fails, you have exceeded the ratings. In such cases, more air is recommended.

BLOCK DIAGRAM

PART IDENTIFICATION

TYPE "n" TEMP. RANGE PACKAGE
25120 0 0 to -70°C Whatever's Right

7. You have a dirty mind. S.E.X. is Signetics Extra Secret process, "One Shovel Full to One Shovel Full", patented by Yagura, Kashioh, Converse and Al. Circa 1921.
8. J. Kane cuts it rough (see humor note).
9. See "Modern Production Techniques" by T. Arets (not yet written).
10. Final until we get a look at some actual parts.
11. Coffee breaks and lunch hours.
12. Due credit to EIMAC for inspiration.

(APRIL FOOL)
MARK-8 USER GROUP SURVEY

Joe Cimmino says he has received about 55% of the user surveys back so far. That means that 45% of you have it sitting on your "I've got to do this some day" pile. Please fill out whatever is applicable and get it mailed back. Joe went to a lot of work and expense to mail these and it would be awful if we didn't get worthwhile information back. Do it now!

Joe has asked for about 15 pages in NL#7 for reporting results of the survey and his announcement about a software library service. He will also include a sample program, and demonstrate what proper documentation is all about.

COMPUTER ALTERNATIVES INDEX (COMINDEX)

Computer Alternatives seems to be the latest buzz word. No one has really told me what it means but I've got some vague ideas. Bob Wallace, PO Box 5415, Seattle, WA 98105 publishes "COMINDEX", a directory of groups and people interested in the use of computers as a community communications tool, and a list of papers, articles, and other information available for copying costs. The "COMINDEX" will also try to include other areas of alternative computer use such as access to hardware, simulation of systems, creativity in graphics and games, and social/political research. Subscription to "COMINDEX" is $2.00 for one full directory and three updates. Write and include a SASE for additional information.

RESOURCE ONE NEWSLETTER

You may be interested in the Resource One Newsletter, 1380 Howard St., San Francisco, CA 94103. This group obtained a surplus XDS-940 time share computer and is now devoted to the following problems: Can this tool of militarized society be made directly useful to people? How? They are dependent largely on foundations for their support but are also soliciting tax deductible donations. Write and include an SASE for information.

DIGITAL GROUP ACTIVITIES

The Digital Group, PO Box 6528, Denver, CO 80206 is the best example of what happens when a group of interested & clever guys get together and share labor and resources. They are delivering on their $8 documentation package and comments coming in indicate unanimous acclaim. The software documentation and cassette tape 2K monitor system have been sent out. The electronic documentation package has been or soon will be mailed out. Dr. Suding insisted that a copy of his scientific calculator interface be included. (This is neat! Mini micro mart is supposed to have a complete package containing PC board and parts available soon for $69.95. With 256 words of memory and a suding Tut, a program is available that simulates an SR-50 calculator using a Mark-8. This should solve problems for people looking for a floating point package if they can live with the calculation speed.)

Everyone has probably seen the Digital Group's letter to the editor in the April R-E. That was written in August 74 so you can get a rough idea of non-advertising lead times in national magazines. The following is an excerpt from their latest letter dated 21 March:
The digital group is literally exploding, thanks to your support, and now has 4 major efforts going ahead full out.

1. Top priority - support of Dr. Suding's efforts at as high a quality level as possible.

2. We now have about 100 requests and SASE's for the digital group clearinghouse. We are debating on various alternatives and options to complement rather than supplant other efforts such as the Micro-8 Newsletter. (Please remember, that letter was sent to R/E in August, 1974.) Naturally, you will be kept informed of any and all developments and we certainly invite your comments!

3. PC Boards - as you probably guessed, we ran into a non-performance problem with the TVT board from one of our former participants. That problem has been rectified totally by a new individual who is a PC Development professional. His work is both fast and good. He is also very eager to get other boards going.

4. Parts and Kits - We had no desire to become another parts house. However, the mail started coming in and people kept asking for kits, parts, availability and etc. (Lots of Doctors.) And then in walked the manager of a parts house that has been in business for 15 years and who is very eager to contribute to the Microprocessor experimenter effort. (He's also now building a Suding-8.) His prices are reasonable, if not outstanding (ex - 1101's for $1.40), and he is willing to supply kits of new, guaranteed parts for about anything we can come up with. Therefore, we will be offering most developments in the following modes:
   a. Major chip(s)
   b. PC Board
   c. Major chip(s) and PC Board
   d. Complete parts kit
   e. Assembled and tested units
   
   We are offering full parts kits and assembled units primarily as a convenience for those who desire it. We expect to remain very competitive and offer substantial value but are not trying to do an MITS (we REALLY don't want to become an MITS - maybe we can goad them into being a little more honest and reasonably priced on peripherals.)

STATUS OF PROJECTS

TVT - Board now in final design stage. Character generator chips will be available at a discount in 2 weeks with luck, 4 weeks without.

Cassette Interface - Board being produced by company in Colorado Springs - available soon - method and price yet to be determined.

Scientific Calculator Interface - Chip, board, and kit should be available very soon through Mini-Micro Mart (if Maury can deliver - MOS Technology has 8 week lead times and no quantity break until 5000 units!) The digital group will serve as backup and will supply software (lots happening here!). You won't believe how powerful this combination is!

Dr. Suding's highest priority design project right now is 4K dynamic RAMs. As fast as he perfects the design, we will do a board and make kits available. Should be in the 1 to 2 month timeframe. With any luck, 4K's should drop in price again (now $12 in 100s) and be even more cost-effective.

BASIC - We will be adapting a subset of BASIC to the Scientific calculator interface as soon as possible but it looks like we'll need the 4Ks.

8800 support and adaptations are being implemented but so far on a relatively low-priority level.
Adam Trent's hint in the vol. 1 #4 NL about using Augat pins for it's on the memory board works very well except that many ordinary diagonal cutters will not grip the pin head well enough to pull it out.

A finer pair of cutters, the Hunter A92xS (available from National Camera, Englewood, Colo, as catalog #N-3224) work much better in removing the Augat pins. They are also far superior to ordinary cutters for fine work around PC boards.

One of the least expensive, as well as most efficient, ways of checking fine soldering is to look with an 8x magnifier mounted in a plastic barrel, that's sold by photo shops for about $4. Hold the lens upside down, so as to focus close enough and light the PC board both in front and back.

Another handy hint: an audible continuity tester, as simple as a battery and buzzer in series, is a great convenience in testing for solder bridges.

LOCAL GROUPS

PART OF THE FUNCTION OF THE USER GROUP IS GETTING PEOPLE TOGETHER. YOU SHOULD HAVE A PRETTY GOOD IDEA WHETHER ANY PARTICIPANTS ARE NEAR YOU BY NOW. THE UPDATED ROSTER HAS BEEN POSTPONED AGAIN TILL NEXT ISSUE. EVERYONE HAS HEARD OF THE DENVER BASED DIGITAL GROUP. THEY ARE A PRIME EXAMPLE OF WHAT CAN BE DONE WHEN A BUNCH OF GUYS GET TOGETHER AND SHARE RESOURCES.

WE WERE EVEN ABLE TO GET TOGETHER A GROUP IN SLEEPY OLD LOMPOC! OUR FIRST MEETING WAS HELD MARCH 19 AT THE CABRILLO COMPUTER CENTER AND WAS ATTENDED BY 4 PEOPLE FROM SANTA BARBARA, 1 FROM PASO ROBLES, AND 13 PEOPLE FROM THE LOMPOC-SANTA MARIA-VANDENBERG AIR FORCE BASE AREA.

OUR NEXT MEETING IS SCHEDULED FOR APRIL 16, 7:30 PM IN THE CABRILLO COMPUTER CENTER. MR. BOYCE SHOVED OFF HIS NEARLY COMPLETED ALTAR 8800+ MY PARTIALLY COMPLETED 8008 SYSTEMS WERE ON DISPLAY. (I MAY BE THE VERY LAST ONE TO GET A MARK-8 RUNNING), THE HOMEMADE PAPER TAPE READER WAS DEMONSTRATED AND OUR PDP-8 WAS LOADED WITH A 4K BASIC SO PEOPLE COULD SEE HOW MUCH FUN A 6K BASIC FOR AN 8008/8080 WOULD BE.

OUT LATEST INFO ON LOCAL GROUPS IS AS FOLLOWS: CONTACT:

DENVER AREA - DIGITAL GROUP, PO BOX 6528, DENVER, CO 80206

WASHINGTON DC AREA - JOE CIMMINO, 19304 RICHWOOD COURT, BROOKEVILLE, MD 20729

CHICAGO AREA - ROBERT SWARTZ, 195 IYV LANE, HIGHLAND PARK, IL 60035 472-6660 DAYS AND 432-6408 EVENINGS

BAY AREA - FRED MOORE, 2100 SANTA CRUZ AVE., MENLO PARK, CA 94025

SANTA BARBARA, SANTA MARIA, LOMPOC, VANDENBERG AFB AREA - TED SALLUME, 945 VIA FARGO, SANTA MARIA, CA 805-674-4541 OR 805-856-3236 OR THE CABRILLO COMPUTER CENTER OR HAL SINGER, 805-735-1596

LA AREA - DE WALTER EKSTRAND, PO BOX 1260D, SOUTH GATE, CA 90280 (HE WANTS TO START AN LA GROUP)

PLEASE KEEP US UP TO DATE ON LOCAL GROUP ORGANIZATIONS AND WHAT IS HAPPENING. IT WOULD BE IDEAL IF ONE MEMBER FROM EACH GROUP PREPARED A CAMERA READY PROGRESS REPORT FOR EACH NEWSLETTER.
NEWSLETTER
Issue number one  Fred Moore, editor, 2100 Santa Cruz Ave., Menlo Park, Ca. 94025  March 15, 1975

AMATEUR COMPUTER USERS GROUP
HOMEBREW COMPUTER CLUB . . . you name it.

Are you building your own computer? Terminal? Teletype or typewriter? I/O device? Or are you buying time on a time sharing service?

If so, you might like to come to a gathering of people with like-minded interests. Exchange information, swap ideas, talk shop, help work on a project, whatever...

This simple announcement brought 32 enthusiastic people together March 5th at Gordon’s garage. We arrived from all over the Bay Area—Berkeley to Los Gatos. After a quick round of introductions, the questions, comments, reports, info on supply sources, etc., poured forth in a spontaneous spirit of sharing. Six in the group already had homebrew systems up and running. Some were designing theirs around the 8080 microprocessor chip; several had sent for the Altair 8800 kit. The group contained a good cross section of both hardware experts and software programmers.

We got into a short dispute over HEX or Octal until someone mentioned that if you are setting the switches by hand it doesn’t make any difference. Talked about other standards: re-start locations? input ports? better operating code for the 8080? paper tape or cassette or paper & pencil listings? Even ASCII should not be assumed the standard: many 5 channel Model 15 TTYs are about and in use by RTTY folks. Home computing is a hobby for the experimenter and explorer of what can be done cheaply. I doubt that standards will ever be completely agreed on because of the trade-offs in design and because what’s available for one amateur may not be obtainable for another.

Talked about what we want to do as a club: quantity buying, cooperation on software, need to develop a cross assembler, share experience in hardware design, classes possibly, tips on what’s currently available where, etc. Marty passed out M.I.T.’s Application Manual on the MF8008 and let it be known that he could get anything we want. Steve gave a report on his recent visit to M.I.T.S. About 1500 Altairs have been shipped so far. M.I.T.S expects to send out 1100 more this month. No interfaces or peripherals are available until they catch up with the mainframe back orders. Bob passed out the latest PCC and showed the Altair 8800 which had arrived that week (the red LEDs blink and flash nicely). Ken unboxed and demonstrated the impressive Phi-Deck tape transport.

What will people do with a computer in their home? Well, we asked that question and the variety of responses show that the imagination of people has been underestimated. Uses ranged from the private secretary functions: text editing, mass storage, memory, etc., to control of house utilities: heating, alarms, sprinkler system, auto tune-up, cooking, etc., to GAMPS: all kinds, TV graphics, x-y plotting, making music, small robots and turtles, and other educational uses, to small business applications and neighborhood memory networks. I expect home computers will be used in unconventional ways—most of which no one has thought of yet.

We decided to start a newsletter and meet again in two weeks. As the meeting broke up into private conversations, Marty held up an 8008 chip, asked who could use it, and gave it away!

NEXT MEETING WEDNESDAY, MARCH 19th, 7 PM at
Stanford’s Artificial Intelligence Laboratory, Conference room,
Arastradero Road in Portola Valley. Look for this road sign:
D C Power Lab

Announcement
Texas Instruments Learning Center is presenting an early morning home television series, April 15 - 18, on “Introduction to Microprocessors.” In the San Jose - Bay Area this program will be on channel 11 at 6:00 AM.
HOW MUCH POWER SUPPLY?
BY STEVE CIARCIA
41 HILTOP DRIVE
WEST HARTFORD, CT 06107

DESIGNING POWER SUPPLIES IS NO EASY BUSINESS. THE NEW SERIES OF THREE TERMINAL REGULATORS BEING SOLD HAVE LED THE HOBBYIST INTO A FALSE SENSE OF SECURITY. SINCE THESE CHIPS PROVIDE SUPPOSEDLY FAILSAFE OPERATION AND HAVE THEIR OWN THERMAL OVERLOAD SHUTDOWN ABILITY, MANY FORGET THAT THIS USUALLY DOES NOT EXTEND TO THE OTHER EXTERNAL COMPONENTS.

IN GENERAL, IF THE HOBBYIST HAS ONLY A SLIGHT KNOWLEDGE OF SUCH THINGS AS CAPACITOR RIPPLE CURRENT RATINGS, DIODE SURGE CURRENTS, TRANSFORMER SOURCE RESISTANCES, THE DERATING EFFECTS OF ELEVATED TEMPERATURES, AND OVERVOLTAGE PROTECTION, HE SHOULD CONSIDER PURCHASING A COMMERCIAL POWER SUPPLY RATHER THAN DEVELOPING ONE. THE PROBLEM WITH THIS IDEA IS, OF COURSE, THE COST OF HIGH CURRENT SUPPLIES.

$175 WOULD BE CONSIDERED MODEST AND COULD AMOUNT TO CONSIDERABLY MORE DEPENDING ON THE CONFIGURATION AND REQUIREMENTS. THIS LEAVES ANOTHER ALTERNATIVE; THERE ARE TWO WAYS TO LEARN THINGS IN LIFE: THROUGH TRIAL AND ERROR OR SOMEONE TELLS YOU. TRIAL AND ERROR CAN BECOME VERY EXPENSIVE IF ONE WIPES OUT 100 OR 50 CHIPS IN A COMPUTER WHILE TRYING TO DESIGN A POWER SUPPLY. THIS NEWSLETTER IS DEDICATED TO THE IDEA THAT THERE HAS TO BE A BETTER WAY THAN THAT.

THIS IS NOT AN ENGINEERING DISSERTATION WITH ALL THE FUNNY LOOKING MATH THAT ALL OF US HAVE FORGOTTEN ANYWAY. IT WILL ATTEMPT TO ENLIGHTEN AND EDUCATE THE CURIOUS, PROVIDE DESIGN CONFIGURATIONS TO THE DEDICATED, AND PROBABLY BORE TO DEATH ANYONE WHO REALLY KNOWS HIS STUFF. OUR ATTENTION WILL BE FOCUSED ON REQUIREMENTS FOR SYSTEMS SUCH AS THE MARK-8 AND THE SCELBI-'88. BOTH OF THESE COMPUTERS ARE SOLD WITHOUT POWER SUPPLIES AND IT IS LEFT TO THE INVENTIVENESS OF ITS OWNER AS TO THE TYPE OF "KLUGE" HE PUTS TOGETHER IN AN EFFORT TO GET "ON LINE". IT IS USUALLY AT THIS POINT THE TERM "SMOKE TEST" IS APPLICABLE BUT IT IS HOPED THAT THIS FATE CAN BE SUCCESSFULLY AVOIDED.

FIRST OF ALL, HOW MUCH POWER SUPPLY DOES ONE ACTUALLY NEED TO POWER A TYPICAL MARK-8? SHOULDN'T ONE USE A SINGLE LARGE MASTER SUPPLY AND RUN POWER LINES TO THE CPU AND ALL PERIPHERALS OR WOULD INDIVIDUAL SUPPLIES BE PREFERABLE? IS A 25 AMP SUPPLY BETTER THAN A 5 AMP? WHAT IS AN OVERVOLTAGE CROWBAR AND AT WHAT VOLTAGE SHOULD IT TRIGGER?

ENOUGH QUESTIONS FOR THE MOMENT. IT IS A SURE BET THERE WILL BE MANY MORE. IT HAS TO BE ASSUMED FROM THE START THAT THIS DISCUSSION IS DEDICATED TO FINDING A CHEAP SOLUTION AS WELL AS AN ADEQUATE DESIGN. THOUGH IT WAS INITIALLY INTIMATED THAT 3 TERMINAL REGULATORS MAY NOT NECESSARILY BE "GOD'S GIFT TO THE COMPUTER HOBBYIST" THEY ARE CHEAP, WORK WELL WHEN PROPERLY APPLIED, & CUT DOWN COMPONENT COUNT CONSIDERABLY. MOST PEOPLE WOULD PREFER TO DO AS LITTLE CONSTRUCTION WORK AS POSSIBLE SO THAT IS THE TYPE OF POWER SUPPLY DESIGN WE WILL INVESTIGATE. THE TYPICAL POWER SUPPLY REQUIREMENTS FOR THESE MINICOMPUTERS WITH 1K OF 1101 RAM'S IS +5 VOLTS AT 3 AMPS AND -9 VOLTS AT 1 AMP. FOR EACH ADDITIONAL 1K OF 1101'S IT TAKES ABOUT 1 AMP OF +5 VOLTS AND 1 AMP OF -9 VOLTS. THIS WOULD MEAN THAT A 4K/1101 SYSTEM WOULD REQUIRE A TOTAL OF +5 VOLTS AT 6 AMPS AND -9 VOLTS AT 4 AMPS. A COMPARABLE SYSTEM WHICH USES 2102 RAMS WOULD REQUIRE +5 VOLTS AT 3 AMPS AND -9 VOLTS AT 50 MA. FOR A 1K SYSTEM, A 4K/2102 SYSTEM WOULD HAVE +5 AT 6 AMPS BUT NO MORE -9 VOLT REQUIREMENT. HEAVEN FORBID THAT ANYONE GETS TO 16K OF 2102'S (THAT TAKES A LOT OF BREAD!) BECAUSE IT WOULD NEED ABOUT 15 TO 18 AMPS OF +5 VOLT POWER. DON'T LET THESE FIGURES SCARE YOU BECAUSE IN THE REAL WORLD OF COMPUTERS THESE ARE VERY SMALL POWER SUPPLIES. THE CONTROL DATA SYSTEM 17, WHICH IS A 32K/16 BIT MINI, HAS A +5 VOLT 42 AMP SUPPLY.

WHAT ALL THIS BOILS DOWN TO IS THAT YOU STILL DON'T KNOW HOW BIG A SUPPLY TO BUILD. DON'T FORGET THE PERIPHERALS. ARE THEY GOING TO BE POWERED BY THE SAME POWER SUPPLY AS THE COMPUTER? IF SOMETHING LIKE THE TUT OR A SIMILAR CRT IS USED IT REQUIRES +5 VOLTS AT 1/2 TO 1 AMP AND -12 AND -5 VOLTS AT AROUND 85 MA. A CASSETTE INTERFACE, DEPENDING WHETHER IT USES UART OR STRAIGHT TTL CAN USE +5 AT 100 MA. AND -12 AT 50 MA. PROM'S ARE COMPARABLE TO 1101'S.
Obviously the computer is the main consideration. It has to be decided before one lays out the cash just how big a supply is eventually going to be needed when all that garbage you never thought you'd get is suddenly there. In general, I would assume that not too many people will have more than a 4k system and most will suffice with 1k or 2k. There of course will be an occasional 8k as I plan. Logically, those who plan 4k should provide 6 amps at 5 volts as a minimum. In these current ranges there are minimal differences between supplies of 4, 6, and 8 A. They all generally use the same regulator and just change the input filtering and heat sink cooling as necessary.

Since economy, versatility, and effectiveness are the main considerations, the following supply configuration would more than adequately suffice:

The supply should be a variable voltage (5 to 15) floating output design. The regulator section should be capable of 5 amps in free air and 10 to 15 amps with forced air cooling. Since the output is floating, all supplies (+5, -9, etc) would have exactly the same regulator but with the output voltage and input filter adjusted accordingly. A block diagram for a +5 and -9 volt supply would be as illustrated in Figure 1.

Since both regulators are the same there is less testing involved, fewer part types to order, and it allows the computer configuration to be changed in midstream, say from 1101's to 2102's. The former large -9 volt supply could be reversed and set at +5 volts and used to power a large section of memory for instance.

The following is the detailed schematic of one of these building block type supplies which uses readily available parts and is fairly inexpensive. See Figure 2.

It is not my intention to put a schematic and parts list before the reader and suggest that only the components I have chosen will work. This circuit is very dependable and operates quite successfully with the components indicated. But, in order to satisfy the dedicated readers, I'd like to outline some "seat of the pants" methods for component selection.

Few people realize how to choose the correct value of input filter capacitors and generally "luck out" by choosing the largest one they can find. This will usually provide more than adequate ripple filtering but can lead to diode rectifier breakdown because of the tremendous surge currents required to charge this bargain basement special. Sudden applications of raw AC to electrolytic filter caps when the rectifier breaks down can lead to an immediate understanding of the term "smoke test". When designing power supplies, it is best to work from the output back, taking into consideration the worst case operating mode of each component. Neglecting the esoteric mathematics of a complete design specification, and realizing the room temperature...
Operating mode of hobby electronics: Much can be assumed and eliminated. A typical design progression should be: choose an output voltage and current. A good suggestions would be 5 volts at 6 amps using the regulator type previously described. A three terminal regulator such as the LM309 requires approximately a 3 volt higher input than output. That is, for a 5 volt regulated output, the regulator must have a worst case minimum of 8 volts of ripple free DC on the input to operate reliably. If the regulator were set at 15 volts out, the minimum input should be 18 volts. The external components attached to the LM309 are current amplifiers (the 309 is a one amp device) and the entire regulator section can be treated as a single component with adjustable voltage selection (Figure 3).

Figure 3. Regulator Wiring Similarity
POWER DISSIPATION IS STILL A FACTOR TO BE RECONSIDERED WITH AS MUCH OF THE SINGLE REGULATOR WOULD BE. POWER DISSIPATION (IN WATTS OF HEAT BUILT UP IN THE REGULATOR) IS DEFINED AS THE OUTPUT VOLTAGE MINUS INPUT VOLTAGE TIMES THE CURRENT PASSING THROUGH IT. IN THE 5 VOLT UNIT, THE INPUT IS 10 Volts AND THE OUTPUT IS 5 Volts, AND ONE IS DRAWING 5 AMPS, THIS IS A MORE THAN MODEST 25 WATTS. THE MAXIMUM RATING OF A 2N3055 IS 15 AMPS WITH 115 WATTS OF POWER. LOOSELY SPEAKING, THIS WOULD MEAN THAT A 5 AMP 5 VOLT SUPPLY COULD HAVE NO HIGHER THAN A VIN) OF 23 Volts. THE CLINCHER IS THAT THE HEAT MUST BE CONTINUOUSLY REMOVED FROM THE TRANSISTOR, FANS, OR A COMBINATION OF THEM. HEAT SINKS WHICH ARE COMMERCIALEY SOLD AND FOR EXAMPLE RATED AT 20 WATTS USUALLY MEAN THAT THE UNIT WILL COOL (BE CAREFUL OF THIS WORD!) A DEVICE WHICH HAS A CONTINUOUS POWER DISSIPATION OF 80 WATTS AND HOLD THE TEMPERATURE BUILD UP TO NO HIGHER THAN A MODEST 150-200 DEGREES F. (RIGHT ON!). IF YOU WANT ONE THAT WILL TAKE THAT 80 WATTS AND STAY ABOUT 120 DEGREES F (REASONABLE), IT SHOULD HAVE A COMMERCIAL RATING AROUND 60 TO 100 WATTS WHICH IS A LITTLE MORE EXPENSIVE. NOW COMES THE SEAT OF THE PANTS ENGINEERING FOR THE HOBBYIST. IF YOU CALCULATE THAT THE POWER DISSIPATION IS ABOVE 25 WATTS; FORGET ALL THE COMPUTATIONS AND GO BUY A MUFFIN FAN. IT WILL COOL YOUR POWER SUPPLY AND KEEP ALL THOSE TEMPERATURE FALLOUT REJECTS WHICH YOU BOUGHT FROM THE MAIL ORDER HOUSE IN SPEC. WITH A GOOD FAN, A 25 WATT RATED HEATSINK CAN GO 100 WATTS EASILY (DON'T EVER EXCEED THE TRANSISTOR POWER RATING). IT IS DEPENDENT ON SOME THINGS NOT COVERED BY THIS SEAT OF THE PANTS METHOD) AND STAY AT A VERY REASONABLE TEMPERATURE.

UP TO THIS POINT WE HAVE CONCERNED OURLSEFES MAINLY WITH THE REGULATOR AND IT'S MINIMUM INPUT REQUIREMENTS. THE TRANSFORMER, RECTIFIER, AND FILTER SECTION HAS TO BE DEIGNED TO PROVIDE THE DESIRED INPUT IF THE SUPPLY IS TO WORK. PREVIOUSLY IT WAS MENTIONED THAT AN 8 VOLT NO RIPPLE INPUT IS NEEDED FOR A FIVE Volt SYSTEM AND 16 Volts FOR A 15 Volt UNIT. OBVIOUSLY THE TRANSFORMER CHOSEN HAS TO BE CAPABLE OF SUPPLYING THE DESIRED VOLTAGE AND CURRENT CAPACITY FOR THE APPLICATION. A THREE AMP SUPPLY CANNOT BE MADE USING A ONE AMP TRANSFORMER. BY THE SAME TOKEN, BE CAREFUL OF USING A TRANSFORMER AT IT'S FULL RATED CURRENT BECAUSE IT WILL GET HOT. IT IS MY EXPERIENCE THAT SOME UNITS LIKE THE RADIO SHACK 1-2 AMP SERIES ARE GOOD FOR ABOUT 3/4 AMP CONTINUOUS BUT GOOD GOOD LUCK TO YOU AT 1-2 AMPS. BUY THE BEST TRANSFORMER IN YOUR PRICE RANGE THAT WILL DO THE JOB; YOU WON'T BE SORRY. A GOOD MARGIN IS ABOUT 20% RESERVE CAPACITY. THE TRANSFORMER IS NOT SUPPLYING A CONTINUOUS STEADY CURRENT TO THE FILTER BUT RATHER SHORT BURSTS WHICH CAN BE MUCH HIGHER THAT THE AVERAGE RATING AS QUOTED. THE RECTIFIER SHOULD NOT BE NEGLECTED BECAUSE IT HAS TO BE ABLE TO HANDLE THESE SURGE CURRENTS. THE WEAK POINT OF THE TRANSFORMER IS ON INITIAL TURN ON WHERE IT MUST INSTANTLY CHARGE THAT GIANT BARGAIN BASEMENT CAPACITOR WHICH FOR A SPLIT SECOND APPEARS AS A DEAD SHORT (THE LARGER THE CAP, THE LONGER THE SHORT) THE ONLY SAVING GRACE IS THAT THE TRANSFORMER HAS A CERTAIN MAXIMUM CURRENT LIMITATION. IF THE SOURCE RESISTANCE OF THE TRANSFORMER IS ABOUT 0.1 OHM (LOOSELY INTERPRETED AS THE SECONDARY WINDING RESISTANCE AND THIS IS NOT UNUSUAL FOR BIG ONES LIKE THIS) AND THE FILTER CAP CHARGES FROM 0 VOLTS TO 12 Volts, FOR AN INSTANT I(MAX) = E(MAX)/R(CAP). I = 12/0.1 = 120 AMPS! SOME WHAT LOWER CURRENTS WILL BE REQUIRED DURING STANDARD CHARGING CYCLES AND YOU THOUGHT YOU'D SQUEEZE BY WITH A 6 AMP BRIDGE ON A 6 AMP SUPPLY. WELL, IT ISN'T ALL THAT BLEAK SINCE THIS SAME BRIDGE WILL PROBABLY HAVE A SURGE CURRENT RATING OF 100 AMPS AND A CONTINUOUS RATING OF 6 AMPS. THIS IS A LITTLE TOO CLOSE. PICK SOMETHING LIKE THE MD4980 SERIES WHICH HAS A 25 AMP CONTINUOUS WITH 300 AMP SURGE RATING. THIS BRIDGE WILL MORE THAN SUFFICE FOR A 12 AMP SUPPLY IF THE FILTER CAP IS CHOSEN CORRECTLY.

THE NEXT BIG CONSIDERATION IS THE FILTER CAPACITOR. A LITTLE WAVEFORM ANALYSIS MUST BE PRESENTED HERE SO THE NOVICE APPRECIATES THE DERIVATION AND THE LEARNED SYMPATHY. FIGURE 4 SHOWS THE FILTER SECTION WITH A 9 VOLT TRANSFORMER. THE OUTPUT VOLTAGE FROM THE TRANSFORMER IS 9 VOLT RMS AS IT PASSES THROUGH THE BRIDGE THERE IS ABOUT A 3/4 VOLT DROP ACROSS EACH CONDUCTING DIODE (2). THIS MEANS THAT THE PEAK VOLTAGE PRESENTED TO THE CAPACITOR IS GOING TO BE ABOUT:

\[ V(\text{peak}) = (\text{secondary RMS} - \text{diode drop})(1.414) \]
\[ = (9 - (0.75)(2))(1.414) = (7.5)(1.414) = 10.6 \text{ VOLTS PEAK} \]

BUT REMEMBER \[ V(\text{peak}) = |V(\text{in DC})| + |V(\text{ripple})| \]
Figure 4: Filter Circuit Waveforms

It has already been determined that 8 volts is the minimum V(IN) for a 5 volt supply. Thus the capacitor must be of sufficient size to always stay charged above 8 volts. That means that of that 10.6 volts, 2.6 volts can be ripple. Generally, that's cutting it close. Two volts should be the maximum. Capacitor size can be determined as follows:

\[ V_{ripp} = 2 \text{ volts} \quad I(\text{continuous}) = 6 \text{ amps} \]

\[ I = \frac{C(DV/DT)}{1} \quad \text{OR} \quad I = \frac{C(V_{ripp})}{\text{charging time}} \]

\[ C \text{ is in farads} \quad I \text{ in amps} \quad DV \text{ in volts} \quad DT \text{ in seconds} \]

\[ DT = 8.3 \times 10^{-1}(-3) \text{ for full wave bridge} \]
\[ DT = 16.6 \times 10^{-1}(-3) \text{ for half wave} \]

Plugging these values in gives:

\[ 6 = \frac{C(2/8.3 \times 10^{-1}(-3))}{C = 6(8.3 \times 10^{-1}(-3)/2} \]
\[ C = 0.02490 \text{ farads or 24.900 microfarads} \]

(Don't forget, caps have a +50% -10% tolerance usually)

This should be considered the minimum acceptable choice. 50,000 microfarad would be required for a 10 amp supply. Over 120,000 microfarad may introduce charging current problems, excessive diode heating, and require a more in depth analysis of the whole mess. The system presented here is designed for 5 or 6 amps but can easily supply 12 amps or more if one rereads this presentation and selects the appropriate filter cap, cooling system, and transformer bridge combination. If 2N3055 appears inadequate, substitute a 2N3771. It is rated for 200 watts at 30 amps and would be virtually blowout proof in these current ranges.

Let's presume that you've taken my word so far and built the supply, or at least a close approximation. Now of course, comes the fun part of hooking it all up and turning on the power. It cannot be suggested strongly enough the necessity for overvoltage protection in the form of an SCR crowbar circuit. The SC8LB-18H has a fused overvoltage sensing system on each card but it should be considered only as a last chance protection. Normally 7400 series logic has a specified operating range of 4.75 to 5.25 volts. Operating below this range will cause random and indeterminant operation. Voltages not too much above these can cause overheating and eventual failure. Standard overvoltage circuits are designed to protect against a total catastrophic failure of the reg-
This type failure mode results in the application of full filter voltage to the supply output. In the 5 volt supply discussed earlier, 10.6 volts would be put across the TTL logic. I don't think many IC's would survive!

The standard overvoltage circuit is illustrated in Figure 5.

This circuit is the standard method and will provide protection against catastrophic failure. But consider the hobbyist's operating mode for a minute. He is using 7400 logic, may possibly have gotten some marginal chips without knowing it from magazine advertisers or fly by night companies; and probably does not have the extensive test equipment to diagnose intermittent bit loss when operating out of spec. The system shown above will not trigger the SCR unit approximately 7.5 volts above that voltage. The SCR will clamp the supply to ground and blow the fuse. This is of course the desired result. At 7 volts nothing occurs and this can be as bad as 10 volts on some chips. A lower Zener diode voltage can be selected but the variation in Zener diodes and SCR's will still only allow the combination to be set at a trigger voltage of plus or minus 1 volt of where you might think you are. An alternative approach is to design a system which still incorporates the SCR crowbar but allows the trigger voltage to be precisely determined. Since such a system would require a voltage reference circuit as an integral part, it can also be used in a like manner to signify a low voltage condition. The circuit for this device would appear as in Figure 6.
R(1) AND Z(1) FORM A REFERENCE VOLTAGE CIRCUIT. OPERATIONAL AMPLIFIERS A(1) AND A(2) OPERATE AS COMPARATORS AND TRIGGER OVERTURNOVER (A(2)) AND UNDERTURNOVER (A(1)) BASED ON THE SETTINGS OF R(3) AND R(2) RESPECTIVELY. THIS CIRCUIT ALLOWS THE TRIGGER POINT TO BE SET AT A PRECISE VALUE AND IN PRACTICE WILL ACTUALLY TRIGGER WITHIN PLUS OR MINUS 3 MV OF THIS SETTING. AS SUGGESTED, THE OVERVOLTAGE SENSOR IS SET ABOVE 5 VOLTS, USUALLY BETWEEN 5.25 AND 5.50 V. WHILE THE LOW VOLTAGE SENSOR IS SET AT 4.75 V. VOLTAGE OUTPUTS BELOW 4.75 VOLTS WOULD TURN ON A LOW VOLTAGE INDICATOR LIGHT BUT WOULD NOT TRIGGER THE SCR. THIS CIRCUIT PROTECTS AGAINST MARGINAL OPERATION AS WELL AS CATASTROPHIC FAILURE.

OF COURSE, AFTER READING ALL THIS, IT IS NOT EXPECTED THAT EVERY-ONE WILL BECOME A POWER SUPPLY EXPERT. I DO NOT PRETEND TO BE, BUT I FEEL THAT THE UNIQUENESS OF THE APPLICATION ALLOWS CONSIDERABLE POETIC LICENSE TO BE TAKEN. THE ASSUMPTIONS MADE AND PRESENTED HERE ARE BASED UPON CONSIDERABLE EXPERIENCE AND EXPERIMENTATION. IT IS HOPED THAT THE COMPUTER HOBBYIST WILL EXTRACT THAT INFORMATION MOST USEFUL TO HIM AND BUILD THE BEST SYSTEM WITHIN HIS ABILITIES. IT IS TO THAT END THAT THIS NEWSLETTER IS DEDICATED.

(EDITOR’S NOTE: AS FAR AS WE KNOW, MINI MICRO MART, 1618 JAMES STREET, SYRACUSE, NY 13203 IS ATTEMPTING TO SUPPLY COMPONENTS AND PC BOARDS FOR STEVE’S DESIGNS. SEND THEM A SASE FOR INFORMATION AND ESTIMATED DELIVERY DATES.)

PAST AND FUTURE -- ONE MARK-8

by Terry F. Hutter
2524 Glen Springs Way
Austin, TX 78741 (512)441-0036

From the beginning, when The Machine first started executing test sequences, it was obvious that the tedious process of program entry (via front-panel switches) had to go. Accordingly, effort was placed into the design of a cheap and unique magnetic-core ROM system for storage of keyboard control software. Keyboard control was chosen for many reasons: a personal dislike for TTY sounds, TTY confinement to a particular sitting position, more available commands on the keyboard, and BCD numbers available from masked ASCII.

After several months, reasonable software systems for keyboard programming and Baudot octal dumping were tested complete, and allowed the necessary 256-bytes of hand-threaded transformer ROM to be placed into service. Subsequently, the addition of four push-button interrupt commands: HALT, NO-OP, RETURN, and RESTART TO EXECUTIVE has almost eliminated the need for switches.

The Mini-Executive deserves special mention, for in 128 ROM bytes, located anywhere in memory, it allows keyboard programming to replace switch programming. It is also compatible with the basic Mark-8 (in my implementation the keyboard strobe activates a NO-OP interrupt, but other schemes could be used). Required, upon power-up, is the entry of eight steps into RAM via the front-panel switches; full keyboard control is then obtained. ASCII numbers 0 through 7 are not keyboard commands, and are thus octal masked (b_7-b_0) and shifted into the Port 0 display from the right, allowing octal program entry. Ten commands are implemented:

- H display H on Port 0
- L display L
- M display M
- 8 load H from display
- 9 load L
- . load M
- SPACE increment H, L and display H
- BACKSPACE decrement H, L and display H
- CAROT call sub at H, L
- PRINT call Baudot octal dump sub, start dump at H, L
The particular keys used for these commands reflects those available on my keyboard, which has a separate numeric pad and special-function keys. Non-implemented commands (+) and (-) are intended for text-editing bubble up/down systems which would appropriately modify the internal "jump to" addresses when machine-language steps were to be added or deleted.

Other commands are "easily" implemented by inclusion in the command look-up table; some other useful commands would be:

- call CRT octal program-display system
- call CRT register trace system
- call dump to tape system
- call tape dump check system
- call store from tape system
- call EROM erased check system
- call program EROM system, etc.

It would be nice if the Mini-Executive appropriately set the TTY and CRT ports whenever accessed. Further, the addition of an audible tone-feedback system in which commands were confirmed by output of a different beep-tone or sequence, would allow more confident and error-free program entry and editing, as well as impressing everyone.

These commands constitute a very bottom-of-the-line control system for machine language programming. It is a common mistake to consider machine language work as a tedious necessary evil. Not only is machine language most efficient in use of our scarce memory resource, but (assuming some text-editing programs) it is far superior to Assembler in ease-of-use, and as being commonly thought to be the next step up. Sophisticated languages are nice, but remember that a debugged language implementation may take several man-YEARS of effort. Spend a fraction of that time developing machine-language routines, and you have a system that grows with you.

For the next few years anyway, it may be desirable to consider one type of small computer system oriented around an EROM main memory. Here RAM would be used primarily as scratchpad, and the EROM's used like disk is used in larger systems (almost). Certainly all command implementations would be in EROM, with larger programs or systems on tape. Who will sell me a 1702 programmer board?

---

ROBERT W. KELLEY, 5806 MT. TERMINAL DR., WACO, TX. 76710 THINKS THIS WOULD BE A GOOD TIME FOR THE GROUP TO ESTABLISH A COMPUTER LITERATURE LENDING LIBRARY. THIS COULD BE A FILE CONTAINING REPRINTS OF MAGAZINE ARTICLES, TECHNICAL PAPERS ON COMPUTER HARDWARE, SOFTWARE, ETC.

THE COLLECTION AND DISTRIBUTION OF THIS MATERIAL COULD BE ADMINISTERED BY A COMMITTEE. COST OF DISTRIBUTION SHOULD BE BORNE BY THE USER.

Editors Note: LET US HEAR FROM YOU 'GUYS' THAT WOULD CONTRIBUTE.
MORE SCROLLING MODIFICATIONS FOR THE TUT-1

R. D. HOGG, 2516 CASTILLO, SANTA BARBARA, CA 93105 IS NEARING COMPLETION OF HIS PHD IN ELECT. ENGR. AT UNIV. OF CA AT SANTA BARBARA. HE BUILT THE TUT-1 AND HAS INSTALLED THE FOLLOWING SCROLLING MODS. (SCROLLING MEANS ALL LINES POP UP ONE, BOTTOM LINE CLEARS, TOP LINE IS LOST.) HE SAYS:


THERE ARE A COUPLE OF MINOR MODIFICATIONS THAT MUST BE DONE TO THE TUT. FIRST, ON THE TIMING BOARD, CUT THE FOIL BETWEEN TEST POINT K AND PIN 5 OF IC7 (7432). RUN A WIRE FROM PIN 5 IC7 TO PIN 40 OF THE MOLEX CONNECTORS. NEXT CUT THE FOIL LEADS GOING TO PINS 24 AND 25 FROM THE CLEAR (HOME) SWITCH ON THE MOTHER BOARD. THE SWITCH CONTACT THAT DID GO TO PIN 25 SHOULD BE CONNECTED TO PIN 9 OF THE 7400 IN THE SCROLLING CIRCUIT. THIS WILL GIVE THE SAME SWITCH FUNCTIONS AS IS SHOWN IN THE SCROLLING SCHEMATIC. AN ALTERNATE WAY TO DO THIS IS TO REMOVE THE CLEAR (HOME) SWITCH ENTIRELY AND INSTALL A SWITCH IN ANOTHER LOCATION AS SHOWN IN THE SCROLLING SCHEMATIC. THE LAST MODIFICATIONS ARE TO CUT THE FOIL ON THE CURSOR BOARD THAT GOES FROM IC3 (7473) PIN 9 TO IC4 (74197) PIN 1. PUT A SWITCH IN AS SHOWN BELOW:

```
CURSOR BOARD (SCROLL) IC4 (74197 Pin 13)

(Not Scroll) IC4 (74197 Pin 1)
```

IF ONLY SCROLLING IS TO BE USED, PIN 9 OF IC3 CAN BE PERMANENTLY CONNECTED TO PIN 13 OF IC4. FINALLY, MAKE THE CHANGE SHOWN BELOW TO THE INPUT ON THE MOTHER BOARD. (THIS CHANGE SHOULD BE MADE TO THE INPUT EVEN WITHOUT THE SCROLLING BEING USED IF THE UART BOARD DESCRIBED IN R-E, FEB 1975 IS USED AS HE CLEAR THE INPUTS BY SHORTHCUT THE OUTPUTS OF THE 74157 MULTIPLEXERS TO GROUND WHICH IS A VERY BAD PROCEDURE.)

```
+5 Pin 25
Old Keyboard Power

Present Circuit On Mother Board
Add Diodes In Series With Keyboard

+5 To Keyboard Or UART Board
```

NOTE THAT THE KEYBOARD POWER SUPPLY IS NOW PERMANENTLY CONNECTED TO THE +5 SUPPLY. IT DOES NOT HURT THE KEYBOARD OR UART BOARD NOW TO HAVE A1 THRU A5 GROUNDED.

THE SCROLL COMMAND CAN COME FROM A KEYBOARD SWITCH. MINE IS CONNECTED TO THE CARRIAGE RETURN, OR A SEPARATE SWITCH IF YOU DO NOT WANT TO SEPARATELY DECODE THE CARRIAGE RETURN CODE. SOME KEYBOARDS, SUCH AS THE SWP KEYBOARD, HAVE AN EXTRA KEY WITH WHICH SEPARATE LEADS CAN BE USED. WITH THIS METHOD OF DOING THE SCROLLING, THERE ARE NO ADJUSTMENTS TO MAKE AND IT WILL NOT UPSET THE OPERATION OF THE TUT WHEN SCROLLING IS NOT USED.
R.D. Hogg's TVT-1 Scrolling Circuit

Here is an addition to the above scrolling circuit which automatically scrolls at the end of a line. Also included is a modification which allows CR switch to be used for scrolling.

Automatic End Of Line Scroll

Changes If You Wish To Use CR For Scroll (Does not apply if separate switch is used.)

Larry Pleskac, 938 Paula Street, Escondido, CA 92027 has already installed Mr. Hogg's scrolling circuit and is very pleased with its performance. He suggested that this be included. "This is a simple mod to the TVT so the keyboard will cause it to scroll. Remove C5 from the cursor board. Connect a wire from the 0-1 cap input of the scroll mod to Pin 41. On the cursor board, connect pin 41 to "A". The carriage return will now cause the TVT to scroll. Also, it is funny this hasn't been published yet. To get the computer to cause the TVT to scroll on CR/LF, LOAD 025. This isn't the octal sum of 015 (CR) and 012 (LF) or the logical AND, but it works."
It has been found that the key pressed output of the SWTP keyboard encoder is not sufficiently debounced to drive the Ext. Int. Latch of the Mark 8 as indicated in Appendix A-3 of NL Vol. 1, No. 5. Also, it is advantageous to have a multiplexed interface allowing for use of the TVT alone ("LOCAL") or with the Mark 8 ("LINE"). The accompanying diagram shows this interface constructed of 4 IC's. Keyboard debouncing is best accomplished by the elaborate circuit shown in Fig. 8 of the TVT manual. To provide an insertion point for the interface, make the following modification using the spare stack connectors 11 and 12.

With the interface connected as shown, it is unnecessary to use a 74123 monostable to condition the Mark 8 Output Port Strobe as is shown in Appendix A-3 of NL Vol. 1, No. 5 and in the Mark 8 manual. Of course, it is still necessary to use a software delay loop when outputing to the TVT.

In addition, it was found that the CLEAR function as designed by Don Lancaster for the TVT did not work due to the introduction of random characters should switch S6 of the TVT release the ground on diodes D10-D14 before the ground on stack pin 24 is returned. To overcome this, I have made use of the strobe function of the 74157 data selectors in the interface. When the "CLEAR" button is pressed, a logic 0 appears on stack pins 2 - 8. Also, this allows for the use of a separate push button switch for the "HOME UP" function. To make this modification, cut the foil leading from pin 23 to the cathodes of diodes D10-D14 on the Main Frame circuit board; and remove the existing CLEAR-HOME switch S6; finally, insert the switches and inverter shown on the accompanying diagram. The "CLEAR" function is now TTL compatible, also.

For those that care, the "ERASE TO END OF LINE (EOL)" and "ERASE TO END OF FRAME (EOF)" functions may be provided by the following circuit. "EOL" may be driven optionally by update line "A" from the cursor board for use when carriage returning.
TVT - MARK 8 INTERFACE AND MODIFICATIONS
To CLEAR CIRCUITRY (page 2)

Notes:
1) Connections $P_0 - P_6$
   refer to Mark 8 output port.
2) Connections B1-B7
   refer to keyboard output.
3) $23, 24, 35, 36$
   refer to TVT stack pins.
4) See accompanying text
   for TVT modifications.

---

William E. Severance, Jr.
Walter Lovell, Maine  02016

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Any touch typist using this keyboard and encoder will be confused by the upside down pairings of the four keys (, and <); (, and >); (- and =); and (/ and ?). Normally, the pressing "SHIFT" forces a logic 0 onto output line B5. For these four cases, B5 should remain 0 until "SHIFT" is pressed at which time it should go to logic 1. The following circuit detects this special case and accordingly inverts the "SHIFT" action. At the same time, it allows for the standard TTY characters of ["SHIFT K"]; ["SHIFT M"]; and ["SHIFT N"]. For these, the keyboard matrix must be redefined so that "K" is ASCII 133, "M" is 135, and "N" is 136. Looking at the keyboard matrix of the instruction manual, this places these keys as follows:

This is easily wired, getting us the old "↑" key back as a spare. Designations B1-B6 below refer to pins at the output connector. Break connections to Pin 1 of IC1 and Pin 7 of IC2 and then wire the circuit below. (I used IC sockets and point to point wiring.)

By William E. Severance, Jr.
Center Lovell, Maine 04016
ROBERT SWARTZ, 195 IVY LANE, HIGHLAND PARK, IL 60035 472-6660 DAYS, AND 432-6423 EVENINGS IS USING THE POWER SUPPLY CIRCUIT SHOWN BELOW TO POWER HIS MIL MOD-8 COMPUTER. HE HAS HIS MOD-8 RUNNING BEAUTIFULLY AND ALSO DEBUGGED ONE FOR THE UNIVERSITY OF CHICAGO. HE IS GOING TO SERVE AS THE MONITOR-8 SPECIAL INTEREST GROUP EDITOR AND WILL HAVE A SECTION SOON WHICH WILL EXPLAIN BOARD ERRORS ON THE MOD-8 BOARD SETS AND OTHER THINGS OF INTEREST TO MOD-8 USERS.

* NOT NECESSARY BUT IMPROVES RIPPLE REJECTION 
& TRANSIENT RESPONSE (IF NOT IN PLACE
DO NOT SHORT TERMINAL #1 TO GND)

** NEEDED FOR STABILITY

NOTE: CENTER TAP OF XFORMER MUST BE GROUNDED
SINCE IT IS USED AS TWO DISTINCT XFORMERS
WITH TWO HALF-WAVE RECTIFIERS

POWER SUPPLY

BY

ROBERT SWARTZ

GREGG WEBER, 1000 PLAZA DR. ** APT. 311-C ** STATE COLLEGE, PA 16801 IS A SENIOR IN EE AT PENN STATE. HIS MARK-8 WAS RUNNING IN NOV. WITH AN ASCII KEYBOARD, A TUT, AND A CASSETTE MODEM. HE HAS ACCESS TO A PDP-10 AND SEVERAL PDP-8 S AND IS WILLING TO COPY PROGRAMS FROM ONE FORMAT TO ANOTHER ON A LIMITED BASIS. HIS CASSETTE MODEM IS SIMILAR TO PHIL MORK'S (NL #4) BUT USES A UART. HE RECORDED AND VERIFIED OVER 10^6 BITS WITH NO ERRORS BUT FOUND THAT ON SOME DAYS, TIMING & FREQ. ADJUSTMENTS MUST BE RESET TO COMPENSATE FOR CHANGES IN TAPE SPEED. FIGURING 1/2 THE SPEED ERROR IN RECORING AND 1/2 IN PLAYBACK, A MAXIMUM SPEED ERROR OF 2.8% OF NOMINAL IS NECESSARY FOR TAPE EXCHANGE IF TAPES ARE TO BE TRADED WITHOUT ERRORS. (JIM FRY DID THE SAME CALCULATION AND CAME UP WORRIED.) COMMON CASSETTE UNITS, ESPECIALLY THE CHEAPOS, WILL NOT BE THIS ACCURATE. THIS CAN BE SOLVED BY 1) SHORTER WORD LENGTHS OF 4 BITS AS IN SCBBL. 2) DON LANCASTER'S AMPLITUDE MODULATED CLOCK AND 3) GREGG'S SOLUTION. RECORDING AN AGREED UPON TEST WORD AT THE BEGINNING OF THE TAPE WHICH CAN BE SAMPLED BY SOFTWARE TO SET UP PROPER READING SPEED. HE SUPPLIED A COPY OF HIS KEYBOARD LOADER PROGRAM WHICH ACCEPTS OCTAL PROGRAM ENTRY, DUMPS MEMORY IN OCTAL ON THE TUT, AND EXECUTES PROGRAMS IN MEMORY. HE WILL SOON ADD CASSETTE LOAD AND DUMP ROUTINES. A LISTING IS AVAILABLE FOR A SASE AND 20 CENTS IN STAMPS.

LESTER C. WARD, BOX 351, MANEO, NC 27954 IS A FIELD ENGINEER FOR WESTINGHOUSE. HE GOT HIS MARK-8 RUNNING JUST AFTER CHRISTMAS, HE USED MOLEX SOCKET PINS THRUOUT AND HAS A SWTP KEYBOARD. HE SUPPLIED A PROGRAM WHICH CONVERTS THE KEYBOARD 0-7 KEYS INTO OCTAL FORMAT AND ENTERS IT IN MEMORY. IT WILL BE SUPPLIED WITH GREGG WEBER'S REPRINT ABOVE.
DR. GEORGE L. HALLER, 1500 GALLEON DR., NAPLES, FL 33940 SUPPLIED THE INTERFACE FOR A TVT-1 TO A SCHELBI COMPUTER SHOWN BELOW. A PROGRAM FOR THIS INTERFACE WHICH ACCEPTS A CHARACTER, PRINTS IT ON THE TV, AND STORES IT IN MEMORY WHICH CAN BE DUMPED AS A SUBROUTINE OF THE PROGRAM IS INCLUDED. HE SAYS HIS GOLF HANDICAP PROGRAM WORKS GREAT. (MAYBE HE'LL BE WILLING TO SUPPLY THIS ONE TOO) HE HAS AN ORDER IN FOR A 9K ALT AIR 8800.

![Diagram of SCHELBI-TO-TVT INTERFACE](image)

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**SCHELBI-TO-TVT INTERFACE**

003 000 056 SET MEMORY
003 001 005
003 002 066
003 003 000
003 004 125 SET INPUT LATCH
003 005 111 INPUT
003 006 248 SET S FLAG
003 007 120 IS THEIR A CHAR.
003 010 005 NO. GO BACK
003 011 003
003 012 370 LOAD CHAR.
003 013 060 INL
003 014 110 IS PAGE FULL
003 015 028
003 016 003
003 017 050 INH
003 020 106 GO TO OUTPUT
003 021 026
003 022 003
003 023 104 GO BACK FOR
003 024 004 NEXT CHAR.
003 025 003
003 026 123 OUT TO TVT
003 027 026 TIME DELAY
003 030 004
003 031 031
003 032 110
003 033 031
003 034 003
003 035 021
003 036 110
003 037 031
003 040 003

GO BACK TO 023
SET MEMORY
FOR OUTPUT
PROGRAM ASCII KEYBOARD TO
LAM TV TYPEWRITER AND TO MEM-
IS IT A O R Y. STARTS AT 003-000 THRU
377 003-041.
YES
GO TO HALT
NO GO TO PROGRAM DUMPS MEMORY INTO THE
OUTPUT TV TYPEWRITER. STARTS AT
003-042 THRU 003-067
INL
IS L 000
GO TO NEXT PAGE
GO BACK FOR
NECT CHAR.
HALT

NOTES: THIS PROGRAM IS SET-
UP FOR SCHELBI KEYBOARD INTER-
FACE WHICH REQUIRE OUTPUT 125
TO SET LATCH FOR NEXT CHARACTER.
TVT TYPEWRITER IS THE RE MODEL
BY LANCASTER WITH C-17 ON CUR-
SOR BOARD CHANGED TO 0.68 UFD.
MEMORY LOADED INTO PAGE 005
AND SUCCEEDING PAGES.

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ERIC SCHOTT, 808 14TH AVE., JANITA, ALTOONA, PA 16601 FINDS THE BOOKLET FORMAT AWKWARD SINCE HE PREFERENCES TO PUNCH 3 HOLES AND PLACE THEM IN A THREE-RING NOTEBOOK. HE PROPOSED A NON-REDUCED FORMAT AND A REDUCED FORMAT WHICH MADE GOOD SENSE SO WE'RE TRYING IT FOR THIS ISSUE. IT WILL REMAIN STANDARD FOR THE NEXT 6 ISSUES UNLESS SOMEONE COMES UP WITH A VERY CONVINCING ARGUMENT AGAINST IT.

HE SUGGESTS THAT A CONVENTION BE HELD TO FINALIZE A STANDARDIZATION PROPOSAL. HE SUGGESTS CHICAGO OR PERHAPS THE 1975 NCC IN CALIF.

D. MILLER, 1191 RISA PLACE, SANTA ANA, CA 92705, (714)-838-0070 (AFTER 7 PM) HAS A LISTING OF PERIPHERAL EQUIPMENT HE ACQUIRED RANGING IN PRICE FROM $250 TO $3000. WRITE HIM IF YOUR INTERESTED.

ADAM TRENT, BENDIX, BOX A, ASCENSION, PATRICK AFB, FL 32825 SAYS HE ORDERED A $38 POWER SUPPLY FROM ELECTRONICS UNLIMITED IN OLNAY, MD AND HAS ONLY A CANCELED CHECK TO SHOW FOR IT AFTER SEVERAL MONTHS AND SEVERAL LETTERS. (A LETTER DOMATING TO REPORT THEM TO THE POST OFFICE IF THEY DO DIRECT MAIL ADVERTISING HAS PROVED EFFECTIVE IN A FEW OTHER SITUATIONS. HIS SWP KEYBOARD HUNG UP TOO. HE BAILED OUT AT A LOSS AND PURCHASED A CLARE/PENDAR MAGNETIC REED SWITCH KEYBOARD FROM HERBACH & RADEMAN, 401 E. ERIE AVE., PHILADELPHIA, PA 19134 FOR $40 THAT IS NICE AND HE WAS IMPRESSED WITH THEIR SERVICE.

TO REMOVE SURPLUS WIREWRAP PINS, HE HAS HAD GOOD LUCK USING A THIN LEAD MECHANICAL PENCIL AND A LIGHT HAMMER TO POUND THEM OUT. HE SAYS HE JUST RECENTLY DISCOVERED THE VIRTUES OF VEROBOARD AND WILL USE IT FOR MOST OF HIS FUTURE PROJECTS.

HE HOPES TO RUN INTO SOME OF THE PARTICIPANTS AT THE DAYTON HAMFEST SINCE HE'S PLANNED HIS VACATION AROUND IT.

STEVE WASH, 7277 BLUFF ACRES DR., GREENWOOD, IN 46142 HAS FOUND IT EXCITING TO WATCH THE HOBBY COMPUTER GROUP MUSHROOM INTO SOMETHING REALLY BIG, SORT OF ANALOGOUS TO THE ENTHUSIASM GENERATED BY PDP-8 USERS.

HE IS EMPLOYED BY INDIANA UNIVERSITY-PURDUE UNIVERSITY AT INDIANAPOLIS IN APPLICATIONS PROGRAMMING ON MINICOMPUTERS. HE WOULD LIKE TO RUN A MICROCOMPUTER ON INTERRUPTS. (FOR A PROFESSIONAL PROGRAMMER LIKE YOU STEVE) THAT MAY MAKE SENSE. FOR A HOBBYIST WITH SMALL MEMORY CONFIGURATIONS AND VIRTUALLY NO PROGRAMMING SKILL, IT SEEMS HOPELESSLY DIFFICULT.) HE PROPOSED SOME PRELIMINARY IDEAS FOR A PERIPHERAL FUNCTION PORT AND SUGGESTS ADDING A REAL TIME CLOCK TO THE MARK-8. HE WILL SUPPLY DETAILS AND SCHEMATICS AS SOON AS HE GETS THESE DESIGNED AND RUNNING.

DAVE CHAPMAN, 3420 S. PERRINS RD., MEMPHIS, TN 38118 CAME THRU WITH BEAUTIFUL SCHEMATIC DRAWINGS OF THE PRECISION SYSTEMS POWER SUPPLY. SEND A SASE AND 30 CENTS IN STAMPS FOR A PHOTOCOPY. (LATEST REPORTS ARE THAT PRECISION SYSTEMS HAS LONG SINCE SOLD THEIR SUPPLY AND THAT THEY DON'T EVEN ANSWER THE PHONE OR LETTERS NOW.)

H. N. CAMPBELL, RD 3- BROCKWAY ROAD, MORAVIA, NY 12118, (315)497-0239 TOOK A COUPLE OF MONTHS GETTING MARK-8 COMPONENTS, A COUPLE OF WEEKS ASSEMBLING, AND IT LOOKS LIKE A COUPLE OF YEARS TROUBLESHOOTING. HIS PROBLEM SEEMS TO BE BAD IC'S. MORAL, USE SOCKETS AND/OR CHECK OUT THE IC'S CAREFULLY. (A MARK-8 IC CHECKER PERIPHERAL HAS TO BE A HIGH PRIORITY PROJECT FOR SOMEBODY. WE COULD SURE USE IT.)

BRIAN M. CHESIRE, WASPPOK, 113 E. ELBERTA #8, ATWATER, CA 95301 WAS A HAM FOR 8 YEARS AND AN ELECTRONIC TECH FOR 10 AND WASN'T INTERESTED IN COMPUTERS UNTIL HE READ THE NEWSLETTER AND SOME RECENT ARTICLES. HE WILL BUILD ONE SOON AND IS STILL TRYING TO DECIDE WHICH ONE.

OTTO BARTH, ELBA TOOL CO., 601 ESTES AVENUE, SCHAUMBURG, IL 60172, (312)894-4100 SAYS THAT ALL THAT RGS DOES IS ADVERTISE. HE STILL HASN'T RECEIVED HIS KEYBOARD ENTRY KIT WHICH WAS PAID FOR ON OCTOBER 3, 1974. HE GOT THE WIRE WRAP VERSION WHICH HE DESCRIBES AS A HELL OF A JOB BUT HE LIKED IT AND CHANGES ARE EASILY MADE. HE HAS HIS DOUBTS ABOUT RGS'S I/O AND IS CONSIDERING GOING TO SOMEBODY ELSE FOR PC BOARDS. HE SAYS THE MANUAL ISN'T WORTH THE PAPER ITS PRINTED ON.
JOHN C. NEVES, 930 PALO ALTO AVE., PALO ALTO, CA 94301 WOULD LIKE TO SEE A CATCHER MORE ALL-ENCOMPASSING NAME LIKE "MICROCOMPUTER HOBBISTS" OR SOMETHING LIKE THAT. HE PROPOSES THIS VOLUME SUGGESTION FOR MARK-8 BOARD USERS. THE BOARD HAS CONNECTOR SPACINGS THAT ARE THE REGULAR EDGE CONVECTOR SPACING SO FILE THE EDGES OF THE BOARDS SO THEY WILL PLUG RIGHT INTO THE CONVECTORS. THIS MAKES TROUBLE SHOOTING AND MAKING CHANGES EASIER.

KEN A. MCGINNIS, MD., PO BOX 2078, SAN MATEO, CA 94401 ORDERED 32 3102'S FROM JIM FRY AND 2 PHI-DECKS; A CASSETTE DECK THAT FEATURES COMPLETELY ELECTRONIC CONTROL, CAN SEARCH A 30-MINUTE CASSETTE IN 20-25 SECS., IS DUAL TRACK, AND HAS OTHER IMPRESSIVE SPECIFICATIONS. KEN SAYS HE WOULD SUGGEST ANYONE ELSE WANTING THEM TO ORDER THRU HIM SINCE THE COMPANY WILL TOTAL ORDERS FOR ONE YEAR FOR DISCOUNT. 1 COSTS $25, 10 COST $85, ETC. REQUEST INFORMATION FROM THE ECONOMY CORPORATION, PO BOX 25308, OKLAHOMA CITY, OK 73125 (405) 588-8444-EXT. 76. (JIM FRY AND ONE OTHER PARTICIPANT ALSO SENT IN INFO ON THE PHI-DECKS.)

KEN THINKS THE ALTAIR 8800 IS A FANTASTIC UNIT AFTER USING BOB ALBRECHT'S PCC INIT. HE SUGGESTS THAT IF YOUR NOT COMMITTED TO AN 8080, DO SOME SERIOUS STUDY ON 8080'S. THE INTERRUPT ON THE 8080 MAY BE WORTH THE PRICE DIFFERENCE.

KEN ALSO SUPPLIED A CALCULATOR INTERFACE THAT WILL BE INCLUDED IN THE NEXT NEWSLETTER.

MR. PAUL FARR, 3723 JACKSTRADT ST., SAN PEDRO, CA 90731 SAYS PAUL MORK'S MUSIC PROGRAM WAS JUST TOO MUCH! PAUL HAS FINISHED A TARBELL CASSETTE INTERFACE AND IS TOTALLY IMPRESSED. HE HAS NOT HAD A BAD TRANSFER IN WEEKS ON STEADY USE USING A MODEL 3913A MONTGOMERY WARD CASSETTE MACHINE. IT IS COMPATIBLE WITH ANSI STANDARD. 800 BITS/INCH, 1500 BPS PER SEC., PHASE ENCODED FORMAT. 256 BITS LOADS IN 2 SECONDS.

HE SAYS ELECTRONICS HAS ALWAYS BEEN A FASCINATING EVER CHANGING FIELD BUT HE HAS NEVER BEEN INVOLVED IN ANY PASTIME AS EXCITING, FAST MOVING AND ENGROSSING AS THIS AMATEUR COMPUTER ACTIVITY (AND HE'S TRIED SOME PRETTY INTERESTING THINGS LIKE SOARING AND HANG-GLIDING!)

VICTOR W. AMOTH & THOMAS R. AMOTH, 228 FOX ROAD, MEDIA, PA 19063 ARE A FATHER AND SON TEAM. SON TOM DESIGNS AND DEBUGS CIRCUITS THAT FATHER VICTOR BUILDS. A 28 PAGE DISSERTATION BY TOM WAS INCLUDED ON MARK-8 AND TUT SUBJECTS. (I'M STILL INVOLVED IN READING IT AND WILL DECIDE HOW TO GET THE INFORMATION TO PARTICIPANTS NEXT ISSUE.)

DOUG AAMOLD, #9 COLONIAL VILLAGE, BROOKINGS, SD 57006 LOANED ME A COPY OF THE ALTAIR 8800 MANUAL. HE SUGGEST THAT IT MAY HELP IN EVALUATION OF THE SYSTEM AND THAT MITS AT PRESENT SEEMS TO BE RELUCTANT TO OUTPUT MUCH DOCUMENTATION. SO CAREFUL CONSIDERATION IS WARRANTED. HE NOTES ALSO THAT THE 8101 USED FOR MEMORY SEEMS TO BE RATHER DIFFICULT TO GET HOLD OF.

GERALD MCKEE, PO BOX 4667, SAN JOSE, CA 95126 HAS A RUNNING RGS-008A WITH 2K OF MEMORY AND A SNO01 CASSETTE PERIPHERAL. UNFORTUNATELY HE'S A TV BROADCAST ENGINEER THAT HAS BEEN OUT OF WORK NEARLY A YEAR AND WOULD APPRECIATE ANY EMPLOYMENT LEADS. DUE TO NECESSITY, HIS RGS COMPUTER, TUT, HAM AND TEST EQUIPMENT AND OTHER STUFF ARE FOR SALE. SEND A SASE FOR DETAILS.

DE WALTER EKSTRAND, PO BOX 1290D, SOUTH GATE, CA 90280 IS BUILDING A MARK-8 AND HAS ORDERED 2 ALTAIR 8800'S WHICH WILL BE USED AS A PROCESSOR FOR A DIABLO PRINTER AND RTTY 19, 32 & 33'S INTERFACED TO A S11100 INTELLIGENT TERMINAL ON PHONE LINES. HE HAS SHEET METAL EQUIPMENT AND MAY BE ABLE TO HELP OTHERS WITH CUSTOM WORK. HE WOULD LIKE TO HELP START A LOCAL GROUP IN THE LA AREA.

MICHAEL E. LINDSEY, 2625 FAIRGREEN DR., PITTSBURGH, PA 15241, (412)835-9126 HAS AN INTELLEC-8 CROSS ASSEMBLER RUNNING ON A PDP-10 AND WILL BE ABLE TO ASSEMBLE CODE FOR ANYONE THAT SENDS HIM A SOURCE DECK OR PAPER TAPE AND RETURN POSTAGE. HE CAN ALSO RUN FORTRAN, BASIC AND ALGOL PROGRAMS FOR YOU ON A LIMITED BASIS.
GARY E. JOHNEY, PSC BOX 6967, APO SAN FRANCISCO, CA 96237 CAN READ AND
WRITE INTO MEMORY ON HIS MARK-8 BUT CAN'T GET PAST THE FIRST TEST. SO
FAR HE HAS FOUND SIX BAD I/EU IC'S.

JONATHAN A. TITUS, TYCHRON, PO BOX 242, BLACKSBURG, VA 24060 (703)951-
9030 SUGGESTS THAT EVERYONE SEND INFORMATION IN IN A STANDARD FORMAT,
READY FOR PUBLICATION. EACH COULD THEN BE ASSIGNED A TECHNICAL REPORT
NUMBER AND ABSTRACTS COULD BE PRINTED IN THE NL'S AND PARTICIPANTS COULD
ORDER COPIES AT A COST TO COVER COPYING AND MAILING. THIS WOULD
TEND TO CULL OUT JUNK MATERIAL SINCE PEOPLE WOULD NOT BE WILLING TO PUT
TIME IN ON IT. (IT SEEMS A LITTLE EARLY TO BE TOO RESTRICTIVE.
NEWSLETTERS USUALLY DIE BECAUSE PEOPLE QUIT SUPPLYING MATERIAL. LET'S
KEEP IT EASY FOR THE PRESENT AND SOMEHOW WE'LL TRY TO PUT SOME ORDER
INTO THE MATERIAL SUBMITTED.) MR. TITUS SAYS EL INSTRUMENTS, 61 FIRST
ST., DERBY, CT 06418 WILL BE ANNOUNCING AN 8080 SYSTEM SOON. HE REPORTS
THAT HE HAS HAD AN OPPORTUNITY TO TALK WITH OTHER MICROPROCESSOR USERS
AND THAT IT SEEMS NO ONE IS VERY IMPRESSED WITH THE ALTAIR 8800 SYSTEM.
MR. TITUS DID A SLICK PROMOTIONAL JOB BUT THEY ARE SLOW TO DELIVER AND HE
UNDERSTANDS THAT MANY OF THE PERIPHERALS MENTIONED IN THEIR ADS SIMPLY
DON'T EXIST. MR. TITUS SAYS HE WILL BE HAPPY TO PUT TOGETHER SOME
INFO ON THE INEXPENSIVE PAPER TAPE READER AND WILL SUBMIT IT AS THE
FIRST TECHNICAL REPORT.

JIM MCCORD, 330 VEREDA LEYENDA, COLETA, CA 93017 HAS A TUT RUNNING AND
HOOKED TO AN OLD HONEYWELL 112 THRU A SERIAL I/EUT INTERFACE. HE HAS
ADDED SCORING TO HIS TUT (TRY DAVE HOGG'S CIRCUIT). HE'D LIKE A DENSER
DISPLAY. (WRITE THE DIGITAL GROUP AND ENCOURAGE THEM TO RUSH THE 16
LINE, 64 CHARACTER DR. SURING UNIT TO COMPLETION.) JIM IS GOING TO
BUY AN ALTAIR 8800 AND THINKS THAT THE PRE MARCH 1 PRICE WAS A LOSS
LEADER AND THAT THEY PLANNED TO MAKE IT UP ON THEIR PERIPHERALS. JIM
IS VERY INTERESTED IN A BASIC. HE IS PLEASED WITH JAMES AS A SUPPLIER--UNRELIABLE QUICK SERVICE, LOW FAILURE RATE, AND QUICK REPLACEMENT OF
BAD PARTS. HE SAYS THAT THE INTERSIL PDP-8 CHIP IS AVAILABLE NOW.
(PLEASE GET ME MORE INFO ON THIS AVAILABILITy QUICK.) CAN ANYBODY
RECOMMEND A BEGINNERS INTRO TO DIGITAL ELECTRONICS THAT WILL BRING A
NOVICE UP TO THE LEVEL NECESSARY TO MAKE EFFECTIVE USE OF SOMETHING LIKE
THE TTL COOKBOOK.

R. RILEY, PULSAR R & D LABORATORIES, PO BOX 4310, FLINT, MI 48504 WANTS
TO CONTACT OTHERS INTERESTED IN BUYING A 16 BIT, 1.6 MICROSEC 1K WORD
COMPUTER FOR UNDER $1000 AND A DUAL CASSETTE UNIT FOR UNDER $200 PER
PAIR. HE NEEDS $5 TO COVER PRINTING, HANDLING, AND POSTAGE COSTS. (I
SUGGESTED TO HIM THAT PEOPLE ARE GETTING TIRED OF BUYING $5 "PIGS IN
A POKE" AND THAT A LITTLE MORE INFORMATION WOULD SEEM NECESSARY.
A 4K PDP-11/45 I CAN BE OBTAINED FOR UNDER $1000 AND THE CASSETTE DECKS
SOUND LIKE PHI-DECKS. HE'S GOING TO HAVE TO SEND MORE INFO THAN THAT
BEFORE I'LL RECOMMEND THAT YOU SEND $5 ON AN INFO PACKAGE.)

ROBERT SWARTZ, 195 IUY LANE, HIGHLAND PARK, IL 60035, 472-6660 DAYTIME,
422-6432 EVENINGS IS OUR MOD-8 CONFIGURATION EXPERT. HE HAS HIS
OWN SYSTEM RUNNING BEAUTIFULLY AND HAS RECENTLY DEBUGGED ONE FOR THE
UNIVERSITY OF CHICAGO. HE IS GOING TO SEND MATERIAL FOR A SPECIAL MOD-8
SPECIAL INTEREST SECTION FOR THE NL AND IS HARD AT WORKING DESIGNING A
CIRCUIT FOR THE CHANGE OVER TO THE 8080 SINCE MIL'S BANKRUPTCY CUT
OFF THE FORMER SOURCE OF THEM. HE LUCKED OUT AND OBTAINED ONE OF THE
MONITOR-8 HOM'S WITH A BAD BIT AND HAS IT RUNNING OK NOW AND IS VERY
IMPRESSED WITH IT. IF YOUR PLANNING A MOD-8, IT WILL BE WORTH YOUR TIME
TO CONTACT ROBERT FIRST.

KENNARD STAMBARG, 5009 GUIDE MERIDIAN, BELLINGHAM, WA 98225, 734-9424
SAYS THE NL HAS OPENED UP A NEW WORLD OF WHAT CAN BE FOR HIM AND THAT
HE HAS TO FIGHT THE urge TO START ON ALL FRONTSS TRYING TO CATCH UP WITH
EVERYONE OVERNIGHT.
MAJ ROGER L. SMITH, SMITH ENTERPRISES, 4501 E. NANCY LANE, PHOENIX, AZ 85040, (602) 968-0774 GOT SEVERAL REQUESTS AFTER HIS RE UART ARTICLE APPEARED FOR AN ASCII TO BAUDOT CONVERTER. HE SAYS ITS BEST TO HANDLE IT WITH SOFTWARE BUT THERE ARE MANY HAMS AND OTHERS THAT ARE USING BAUDOT TTY'S WITHOUT A COMPUTER THAT ARE STILL INTERESTED IN HARDWARE CONVERSION. ITS COMPLICATED BUT CAN BE DONE WITH $11 WORTH OF IC'S. HE HAS AGREED TO PUBLISH THE CONSTRUCTION PLANS BUT MR. SMITH HAS AGREED TO SEND AN ADVANCE COPY TO THOSE INTERESTED FOR $1.00 TO COVER XEROX COST. THE ASCII TO BAUDOT CONVERTER WITH PCB BOARD SHOULD BE AROUND $20 AND BAUDOT TO ASCII WOULD ADD ANOTHER $10 OR SO. HE ALSO HAS AN UP-TO-DATE ARTICLE ON PROMS IN R-E AND ANOTHER ON UARTS IN P-E.

MAYNARD M. DYE, 4986 SAN JOAQUIN DR., SAN DIEGO, CA 92109 (714) 274-8406 CANCELLED HIS ORDER FOR AN ALTAIR 8800, ORDERED A CREED TTY FROM WILCOX ENTERPRISES, AND A KEYBOARD FROM MICRO-MINI-MART. HE'S TRYING TO DECIDE WHICH CPU CONFIGURATION TO USE AND PRESENTLY FAVORS THE MIL-MOD-8 VERSION. (WITH THE DEMISE OF MIL, CHECK CAREFULLY TO FIND OUT WHAT KIND OF DELIVERY YOU CAN GET BEFORE SENDING MONEY TO ANYONE.) HE WILL USE HIS COMPUTER TO 1/3 ALL OF HIS MOTEL BOOKKEEPING RECORDS AND HIS PERSONAL INCOME TAX RECORDS.

J. A. STARK, MD., 485-34TH ST., OAKLAND, CA 94609 ORDERED 24 2102'S FROM JIM FRY AND HAS MODIFIED THE HARD-8 MEMORY BOARD AND IS WILLING TO SEND US THE CHANGES NECESSARY. HE SAYS HE MAY NEVER DO ANOTHER BIG PROJECT WITHOUT PLATED THRU HOLES AND HAS HAD A BAD TIME WITH THE WIRED BUS AND IS REPLACING IT WITH MOLEX CONNECTORS. HE INTENDS TO TRY THE MOD-8 VERSION SOON.

R.S. FORMAN, 2421 N.W. JOHNSON, PORTLAND, OR 97210 HAS PURCHASED THE $9 ALTIAIR 8800 CONSTRUCTION MANUAL.

GARY W. KRAMER, PURDUE UNIVERSITY, DEPT. OF CHEM., WEST LAFAYETTE, IN 47907 IS A RESEARCH ASSISTANT AND WILL USE A MARK-8 AS A FRONT END PROCESSOR/BUFFER FOR A HP9820 PROGRAMMABLE CALCULATOR WHICH WILL ALLOW THEM TO INTERFACE THEIR GAS CHROMATOGRAPHS TO THE CALCULATOR. THE MICRO WILL BE A FANCY DATA BUFFER WHICH WILL FEED DATA INTO THE CALCULATOR. GARY SUGGESTS LOOKING INTO THE MONOLITHIC SYSTEMS MEMORY ARRAY OR THE DATARAM MINI CORE MEMORY AVAILABLE THRU ALTAIR ELECTRONICS. HE HAS A SET OF EACH AND SAYS THEY ARE NICE BOARDS WITH GOOD DOCUMENTATION, ESPECIALLY THE DATARAM UNIT.

ROBERT E. WHITEMOYER, MD., OLD DOLLAR RD., BOX 13, RD #1, HEUVELTON, NY 13654 IS AN EYE SPECIALIST AND IS RESEARCHING A SYSTEM TO HANDLE OFFICE A COUNTING, MEDICAL FORMS, AND DATA PROCESSING. HE QUESTIONED HEATHKIT FOR INFORMATION ON UPCOMING KITS BUT THEY WOULD NOT COMMENT. (THAT PROBABLY MEANS THEY ARE ABOUT TO ANNOUNCE ONE.) HE WOULD LIKE TO DO SOME MEDICAL INSTRUMENTATION ON ELECTRICAL MANIFESTATIONS OF THE VISUAL SYSTEM ALSO.

W. H. BURTNER, RR2, BOX 267, VALPARISO, IN 46383 SAYS HE GOT THE RGS-008A PC BOARD KIT AND ITS A REAL TINKER TOY JOBBIE. THE I/O DEVICE IS A SOCKET WITH NO PLACE TO MOUNT IT. THE MANUAL IS 25 PAGES NOT WORTH THE PRICE OF THE PAPER. HE FEELS EVEN WORSE WHEN HE COMPARES IT TO THE ALTAIR 8800 KIT HE JUST RECEIVED. ALL FIRST CLASS MATERIAL AND A REALLY SHARP LOOKING RIG. THE SWTP TTV-II COMES AS TWO PC BOARDS AND A HANDFUL OF PARTS. THEY SAID "NO CASE" BUT HE COULDN'T BELIEVE THEY WOULD NOT FURNISH SOME KIND OF CHASSIS TO MOUNT IT ON. IT WORKS GREAT--BUT WHAT A HASSLE TO GET IT ALL TOGETHER. WOULD YOU BELIEVE HE ALSO HAS A MARK-8 UP AND RUNNING THAT WILL BE USED TO CONTROL A MUSIC SYNTHESIZER.

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DESEY A. COLSTROM, 5750 W. MADISON ST., MINNEAPOLIS MINN 55414.

Occasionally comes across paper tape punches and readers, card readers, 944 tape heads & drives, and keyboards. You can send him a $ for current or future items and prices. He will include documentation when possible. (PLS note that the address given above is correct... the one in Vol. #5 is not.)

D.V. FESTAND, P.O. BOX 1860, SOUTH GATE CA 90249, RECOMMENDS A BOOK ENTITLED “INTRODUCTION TO DATA PROCESSING” FOR THOSE IN NEED OF A GOOD BASICS BOOK (AND ALSO FOR THOSE COMPLAINING ABOUT THE 8080 HEX). IT’S PUBLISHED BY PREVIISS HALL AND THE AUTHOR IS FR CRAWFORD (LIB CODE NUMBER IS 651.26).

K.V. HAMILTON, DARTEK ELECTRONICS, P.O. BOX 2449, DARTMOUTH NOVA SCOTIA B2Y 4A5, WILL GLADLY PROVIDE A FLYER LISTING PARTS AND PRICES TO ANY OF YOU CANADIANS HAVING TROUBLE GETTING PARTS.


DAVID YULKE, 121 LIBERTY AVE., SILDEN N.Y. 11784, WILL BE OFFERING A PROM PROGRAMMING SERVICE AFTER APRIL 15TH. HE WILL CHARGE $5 TO PROGRAM YOUR CHIP. THE PROGRAM SHOULD BE SENT TO HIM ON PAPER TAPE IN RVPF, HEX, OR OCTAL (MONITOR-8) FORMAT. HE CAN HANDLE 1709, 1709A, 5209, AND 5209S. HE IS WORKING ON A UART COMPATIBLE VERSION OF MONITOR-8 AND HAS MODIFIED THE LOAD SYMBOLIC & PROM PROG ROUTINES. HE’LL SUPPLY A LISTING AS SOON AS IT IS THOROUGHLY DEBUGGED.

J. SCOTT WILLIAMS, PO BOX 932, BELLEVUE, WA 98216, IS QUITE ENTHUSIASTIC ABOUT DR. SUDING’S VIDEO GRAPHICS WORK BECAUSE OF THE POSSIBILITIES OFFERED FOR MICROCOMPUTER GAMES. (AND GAMES IS HIS GAME)

W.H. BURTNER, RR8 BOX 247, VALPARAISO IND 46383, HAS ADDED TWO 4K BOARDS OF 210P’S TO HIS MARK-R’S ORIGINAL 1K AND IS HAVING DECODING PROBLEMS (THE 1K SHOWS UP IN THE HIGHER ADDRESSES & INTERFERES WITH THE NEW MEMORY). IF ANYONE COULD OFFER HIM A HELPING HAND HE WOULD BE APPRECIATED. HE IS ALSO CURRENTLY INVOLVED IN THE CONSTRUCTION OF AN ALTAR 1800 AND JUST ORDERED A CREED TTY FROM BOB COOK.

PAUL E. FEICK, INTERMOUNTAIN COMPUTERIZED BUSINESS SYSTEMS, 1105 MALA DRIVE, LAYTON UTAH 84041, IS OWNER/MANAGER OF I-C-B-S, AND PLANS TO USE THE ALTAR 1800 THE RECENTLY ORDERED TO CUTOVER ON THE TELEPHONE AND CPU EXPENSES INCURRED BY HIS BUSINESS. HIS SYSTEM WILL EVENTUALLY HAVE THE TUT II, CASSETTE STORAGE, HS PRINTER AND USE BASIC AS THE PROGRAMMING LANGUAGE.

MORRIS KRIEGER, 37 EIGHTH AVENUE, BROOKLYN N.Y. 11217, WOULD LIKE TO SEE SOMETHING LIKE A HEARTHKIT INSTRUCTION SHEET (WRITTEN IN LAYNEV’S LANGUAGE) FOR THE CONSTRUCTION OF A MARK-R (AND ALSO SOMETHING TO CLEAR UP SOME OF THE TERMS WHICH ARE CONSTANTLY BEING THROWN HIS WAY). IF SOMEONE IN HIS AREA HAS A MARK-R UP AND RUNNING (OR BUILDING) AND WOULD LIKE TO SHOW IT OFF, THERE’S A GOOD CHANCE THAT MR. KRIEGER WOULD APPRECIATE AN INVITATION TO COME OVER AND SEE IT.

RICHARD P. KINZA, 4415 WHITE ACRES RD., CLARENCE N.Y. 14031, IS STILL IN THE CONSTRUCTION STAGE WITH HIS MARK-R. HE JUST ORDERED A CREED TTY AND IS INTERESTED IN BUILDING A 5 LEVEL PT READ.

THE MARCH 77 ISSUE OF 73 MAGAZINE HAS AN ARTICLE ON A 5 LEVEL READ.

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JOHN W. CHOCHRAN, PO BOX 966, JESUP, GA 31545 HAS ORDERED SOME PARTS FOR THE MIL MOD-8080. HE ALSO SENT CLIPPINGS FROM "ELECTRONIC NEWS" ON MIL'S BANKRUPTCY AND THE TI MICROPROCESSOR PROGRAM ON TV STARTING APRIL 15.

TIM RAND, 59 WILLENTON OACKS, STORRS, CT 06268 SAYS HE IS VERY EXCITED ABOUT EVERYTHING THAT IS GOING ON. IT SEEMS TO HIM THAT A WHOLE GANG OF COMPUTER HOBBYISTS SPRANG UP FROM NOWHERE. (NOW, HOW CAN WE CONVINC THOSE OLD TUBE TV MEN AT RADIO-ELECTRONICS AND POPULAR ELECTRONICS THAT THIS IS TRUE AND GET SOME CONTINUITY IN THEIR TECHNICAL AND PROJECT ARTICLES.) HE IS PUTTING OFF CONSTRUCTION FOR A WHILE. HE'S INTERESTED IN COMPUTER GAMES AND GRAPHICS AND WILL BUILD A POWERFUL DISPLAY PROCESSOR AND INTERFACE IT TO A MARK-8. HE WAS A PROGRAMMER FOR 10 YEARS BUT IS NOW A DIGITAL DESIGN ENGINEER WORKING ON DATA GENERAL NOVA SYSTEMS.

DAVID F. STOUT, 717 SARANAC DRIVE, SUNNYVALE, CA 94087 (408) 736-0846 HAS BUILT A TVT AND IS HALF FINISHED WITH A MARK-8. HE INTENDS TO EXPLORE THE POSSIBILITIES OF USING THE MARK-8 TO CONTROL AN ELECTRONIC MUSIC SYNTHESIZER.

GEORGE TATE, 3544 DANLIA AVE., LA, CA 90026 WAS UNHAPPY WITH MITS'S RESPONSE TO OUR REQUESTS FOR I/O INFORMATION AND IS WRITING THEM WITH HIS FEELINGS ON THE PROBLEM. HE HAS AN 8800 ORDERED WITH 4K OF MEMORY AND PARALLEL I/O PORT. HE SUGGESTS THAT A WAY OF COUNTERING THEIR RESPONSE IS BY ALL 8800 USERS EXCHANGING INFO ON OPTIONS THAT THEY BUY SO OTHERS CAN DUPLICATE THEM AT LOWER COST.

EDWARD C. EPPL, SWAN LAKE CHRISTIAN CAMP, VIBORG, SD 57070 WILL START A MICROCOMPUTER PROJECT AS SOON AS HE CAN GET THE FINANCES FIGURED OUT. HE'S AN ELECTRONICS INSTRUCTOR AT FREEMAN JUNIOR COLLEGE AND PLANS TO USE HIS MACHINE FOR TEACHING IN HIS Classes.

DONALD K. ABEL, 7054-25TH N.E., SEATTLE, WA 98115 (206) 525-7764 WROTE MITS STATING THAT DUE TO THEIR LACK OF COOPERATION WITH THE MICRO-8 USER GROUP, HE WAS CANCELING HIS $1000 ORDER. HE HAS A SCHELBI-8H KIT THAT WORKED THE FIRST TIME HE TURNED IT ON. HE HAS ORDERED THE SCHELBI TAPE AND TTY INTERFACE. (AFTER YOU SEE THE PDP-11/LSI YOU'LL BE MOST HAPPY YOU CANCELLED WITH MITS.)

O.C. TASKER, PO BOX 166, ROMNEY, WV 26757 HAS COMPLETED HIS MARK-8 AND IS STARTING ON THE 7 INCH COMPUTER HOBBYIST GRAPHICS DISPLAY. HE HAS AN M-15 TTY AND M28 REPERF AND TD. FOR A POWER SUPPLY, HE USED FOUR 6 AMP-HOUR SURPLUS NI CAD CELLS AND AN UNFILTERED BATTERY CHARGER. THE -9 VOLTS WAS OBTAINED FROM A +5 TO -9 CONVERTER THAT WAS PART OF A SOLID STATE MEMORY SOLD BY ALTAJ. HE IS USING AN 8008-1 BUT IT WILL NOT RUN AT 800 KC. I SUGGESTED THAT HE USE THE BUS LOAD SWITCHING CIRCUIT IN THE INTEL MCS-8. ANY OTHER SUGGESTIONS?

JOHN W. NALL, PO Box 1563, TALLAHASSEE, FL 32304 SUGGESTS DIFFERENT NL EDITORS FOR EACH OF THE FOLLOWING SPECIAL INTEREST GROUPS: 1) HAM RADIO ENTHUSIASTS. 2) SOFTWARE NUTS 3) HARDWARE NUTS 4) COMPUTER APPLICATIONS.

WILLIAM PARRISH, PARRISH SOLID STATE POWER SYSTEMS, 127 WINFIELD AVE., JERSEY CITY, NJ 07305 OWNS TO OFFER 5 VOLT 3 AMP POWER SUPPLIES FOR $75. -- HE OFFERS A SPECIFICATION MANUAL FOR $1.50 TO MICRO-8 PARTICIPANTS THE COST OF WHICH WOULD APPLY TO THE PURCHASE OF THE POWER SUPPLY. (THE MANUAL I RECEIVED CONTAINED NO CIRCUITS AND NO SPECIFICATIONS.) HE SAYS HE IS USING ALL BRAND NEW PARTS AND WILL SEND A COMPONENT LIST IF YOU WANT TO SEE WHY HE IS ASKING $75 FOR THIS UNIT.

HE SAYS ALL DC COMMONS FROM POWER SUPPLIES AND PC BOARDS SHOULD TERMINATE AT ONE POINT ONLY AND THAT THIS POINT SHOULD BE TIED TO EARTH GROUND TO MINIMIZE NOISE PROBLEMS. ALSO MAKE ALL GROUND WIRES AS HEAVY AS POSSIBLE.
WALTER M. WHITE, 343 S. MADISON AVE., 18, PASADENA, CA 91101 WONDERS IF THERE IS ANY THOUGHT TO STARTING A SOFTWARE LIBRARY. (JOE CIMMINS HAS THE ONLY PLANS THAT WE KNOW ABOUT AND HE HAVEN'T FIRMED THINGS UP YET.) IN THE MEANTIME, THE CABRILLO COMPUTER CENTER WILL ATTEMPT TO DISTRIBUTE SOFTWARE OF GENERAL INTEREST. WRITE DIRECTLY TO THE AUTHOR FOR SPECIAL ITEMS.) HE WARNS THAT THE MARK-8 CLOCK DOES NOT MEET INTEL'S MINIMUM PULSE WIDTH SPEC OF 700 NS FOR PHASE 1 AND 550 NS FOR PHASE 2. THE MARK-8 CLOCK IS ONLY 500 NS WIDE. HIS CIRCUIT BELOW MEETS SPECS BUT RESULTS IN A SLOWER CLOCK RATE OF 444 KHZ INSTEAD OF 500 KHZ. HE IS WORKING ON A COLOR, VARIABLE CHARACTER SIZE TV WHICH IS HALF FINISHED. IT USES THE MOTOROLA MC6801 UPPER & LOWER CASE CHARACTER GENERATOR AND WILL DISPLAY 32 LINES OF 64 CHARACTERS WITH VIDEO INJECTED DIRECTLY INTO THE VIDEO AMP OF THE TV. HE ALSO SUPPLIED A MEMORY CHECKING PROGRAM WHICH WE'LL SEND YOU COPIES OF FOR A SASE AND 30 CENTS IN STAMPS. IT CONTAINS A NEAT RANDOM NUMBER GENERATOR THAT MAY BE USEFUL IN OTHER PROGRAMS. WALTER IS PARTICULARLY INTERESTED IN A FLOATING POINT PACKAGE. CAN ANYBODY HELP HIM OUT?

**8008 CLOCK**

![Diagram](image)

Unused pins 2, 3, 7 & 8 of both 7476's are connected together and tied to +5v through a 1K resistor.

George Fischer, Staten Island, N.Y. received his Altair 8800 kit and had it 95% complete within two weeks. Regarding the Altair for the hobbyist, he is optimistic. First, it fills a need as an easy to assemble, attractively cased mini. Second, add-ons can come from the hobby environment as well as MITS.

George is also building M F Publishing's EOS 8008 system. This project requires a lot more effort but he expects to learn a lot more from it.
And, from John Craig.....

NEW ADDITIONS TO THE ROSTER

Jan Turner, 301 Ocean Ave. #8, Santa Monica CA 90402, would like some suggestions regarding the best kit to build. Mr. Farr?

D.A. Powell-Williams, 6023 S.E. Marine Drive, Burnaby B.C. Canada V3N 2X8

Don Hartley, Route 1, Box 329, Yorkville ILL 60560, sent us a photo of his completed Mark-8 and TVT (as of last Nov., even). He has a very sharp octal entry and display setup (from Dec Pop Electronics) and plans to use his Mark-8 for weather research, graphics, and learning programming. He could use some help and pointers in basic programming techniques. (Just remember, Don, if you can't get started on a program.... do a LOAD A, and take it from there!)

James E. Connaway, 639 Frederick St. S.W., Vienna VA 22180, and.....W4ESN. (NOTE: if you HAMS come up with a time and frequency we'll sure be glad to publish it.)

Daniel L. Pastell, 2904 Via De La Guerra, Palos Verdes Estates CA 90274.

Robert Baer, 921 Lincoln Ave., Palo Alto CA 94301

Brian Chesire --WA5PPO/L--., 113 E. Elberta #8, Atwater CA 95301

Robert G. Confrey, PSC Box 4636, Beale Air Force Base CA 95903

Beardsley Ruml II, 3306 Cathedral Ave. N.W., Washington D.C. 20008, is a lawyer interested in reducing the cost of legal services to middle and low income consumers thru the use of computers.

Steven A. Fischer, Box 337 SDSM&T, Surbec Center, Rapid City S.D. 57701, is in the process of purchasing "a computer based on INTEL's 8080." (Would that be an Altair 8800, Steve?)


Robert E. Smallwood, 20-12 St. N.W., Calgary Alberta Canada, T2N 1Y3, says that C&C Specialists, P.O. Box 7847, Stanford CA 94307, owes him $10. Has anyone else had dealings with this company?

Thomas J. Young, 327 Duxbury Rd., Silver Spring MD 20904, is in the process of building his Mark-8.

H.N. Campbell, R.D. 3 - Brockway Road, Moravia N.Y. 13118, finished his Mark-8 about three months ago and has been troubleshooting it ever since trying to get it up and running. He wouldn't object to an offer of help from anyone in the area.

Oh, and here is a good one!! Tom Boyko, Varian Data Machines, 12062 Valley View, Suite 204, Garden Grove CA 92645. Tom is a Customer Engineer with Varian and I had him as a student in a disc class several weeks ago. (As a matter of fact, he was the only student!) We probably spent 60% of our time discussing the Mark-8 and 40% discussing the Diablo Disc. He got so fired up about this thing that he went home and started on a wire-wrap version and had 256 words of memory ready to go within 24 hours. (& he's sharp, so watch out for him!)

John Bird, Assoc. Professor, Community College of Baltimore, 2901 Liberty Heights Ave., Baltimore MD 21215

Michael A. Carlisle, 25 Twain Ave., Berkeley CA 94708

Bob Anders, P.O. Box 2063, Davidson N.C. 28036, is a senior chemistry major and has built his Mark-8 for an independent study project in on-line control of chemical instrumentation. He expressed his gratitude for the de-bugging tips in previous newsletters and reports that James Electronics provided him with speedy service and reliable components. He is, of course, interested in A/D and D/A interfaces.
Charles Musitano, Boeing, 4 Valley View Drive, Goddard Kansas 67052, is (I believe) either building an 8080 or is interested in it. (Actually, if he's building it....that would mean he's also interested in it!)

Jerry M. Newcomb, 825 Pacific Terrace, Klamath Falls OR 97601

Bob Pearce, 28 Hakim Street, Danbury Conn. 06810, recently bought the Mark-8 PC boards from M&R Enterprises and they recommended he contact us before he started construction. I like that.

Bill Seward, Dept. of Physics, Pomona College, Claremont, California 91711

Bob Wallace, P.O. Box 5415, Seattle, Washington 98105

Mark Yoseloff, Dept. of Math, Arizona State University, Tempe, Arizona 85281

We got hold of a copy of the AMATEUR COMPUTER SOCIETY NEWSLETTER put out by Stephen B. Gray, Amateur Computer Society, 260 Noroton Ave., Darien Conn. 06820. If you're interested, the subscription cost is $5 and the NL is published every two or three months. (subscription and membership for $5)

Dan L Kniesner, Librarian, Ohio Institute of Technology, 1350 Alum Creek Dr., Columbus Ohio 43209

Robert J. Elliott, Electronics Instructor, Miramonte High School, Acalanes Union High School District, 750 Moraga Hwy., Orinda CA 94563, is currently building a Mark-8 for classroom use. He's resurrecting a Kleinschmidt printer for output and plans to have a CRT display, paper tape system, & mag tape. And...a card reader system.

DeWalter Ekstrand, P.O. Box 1260 D, Southgate CA 90280

L. Dabrowski, 1815 N. Karlov Ave., Chicago ILL 60639

Mark Baker, 6113 Calle Tuberia, Scottsdale ARIZ 85251 is "in the process of building a microcomputer." Und vot kind of machine you building, Mark? Und vot you going do vid it?

Lonnie G. Clifton, Electronics Instructor, Indiana Vocational Technical College, 3501 First St., Evansville IND 47710, states that his school has a Scelbi System with an ASR-33. He would like very much to hear from other educators using minicomputers as an educational tool. (e.g., problems encountered, CAI, curriculum, special programs, etc.)

Steven Dompiere, 2136 Essex St., Berkeley CA 94705, is currently building the Altair 8800 with disc capabilities.

Maynard M. Dye, Net Worth Programming, 4986 San Joaquin Drive, San Diego CA 92109

Antonio Granit, Spevak Surgical Supply, Inc., 1345 Nostrand Ave., Brooklyn N.Y. 11226

Dennis Griessner, P.O. Box 1743, Cullowhee N.C. 28723, is a high school student who recently finished the TV Typewriter and is currently working on a tape reader. He plans to build a microcomputer in the future but right now "money is a problem." Welcome to the club, Dennis.

Douglas Hogg, 2516 Castillo (rear cottage), Santa Barbara CA 93105

Richard P. Inzina, 4415 White Acres Rd., Clarence N.Y. 14031, is currently building a Mark-8 and eventually plans to interface it with a TVT, cassette, and some sort of hard copy device.

Microcomputer Techniques, 11227 Handlebar Road, Reston VA 22091. (Ah din' git no name an that one!)

Oops! Almost forgot! One final note before I depart........ Mr. Wayne Davies in Mission Viejo California got his Mark-8 up and running at 2 A.M. Sunday morning, February 9th.
ARTHUR NOGUEROLA, 05 OLD FARM RD., VALHALLA, NY 10595, IS A RESEARCH ASSISTANT AND PROGRAMMER AT HUNTER COLLEGE (NYC). HE IS WORKING IN THE CHEMISTRY DEPT. WHERE THEY ARE USING THE 8008 TO COLLECT DIGITIZED SPECTRA WHICH THEN GO THRU A UART TO A NOVA COMPUTER FOR PROCESSING.

FRED MOORE, 2100 SANTA CRUZ AVE., MENLO PARK, CA 94025 IS PUBLISHING THE BAY AREA COMPUTER GROUP’S NEWSLETTER.


WALTER J. KLOS, 5193 S. ETNA ST., KLAMATH FALLS OR 97601

GARY ALEVY, EMORY UNIVERSITY, BOX 21393, ATLANTA GA 30322, IS INTERESTED IN BUILDING A MARK-8.

MARTIN NICHOLS, 100 GUY ST., DOVER, NJ 07801, HAS THE UNIQUE DISTINCTION OF BEING A PERSON WE INADVERTENTLY IGNORED. IT’S POSSIBLE WE SIMPLY LOST YOUR FIRST CORRESPONDENCE. MARTIN, (OR THE US POSTAL SERVICE DID) BUT IN ANY CASE WE APOLOGIZE. MARTIN HAS BEEN INVOLVED FOR THE PAST TEN YEARS IN SOFTWARE DEVELOPMENT FOR LARGE SCALE MACHINES AND IS CURRENTLY BUILDING A MARK-8.

TED SALLUME, 945 VIA FARGO, SANTA MARIA, CA 93456 IS THE PERSON RESPONSIBLE FOR GETTING THE LOMPC-SANTA MARIA-SANTA BARBARA LOCAL GROUP GOING.

HOWARD P. DODGE, THE CHOATE SCHOOL, WALLINGFORD, CT 06492 HEARD ABOUT US THRU THE "PEOPLE’S COMPUTER COMPANY."

JOHN CHRISTENSON, 439-16TH AVE. NO., SOUTH ST. PAUL, MN 55075 IS INTERESTED IN BUILDING THE MARK-8 AND THE TVT.

EDWIN L. MORGAN JR., 314 VINE ST., CHILlicothe, OH 45601, ALSO HEARD ABOUT US THRU FCC AND WOULD LIKE TO FIND OUT MORE ABOUT THE MARK-8. WELL, ED, IT ALL STARTED IN THE JULY 1974 ISSUE OF RADIO-ELECTRONICS MAGAZINE.

BRUCE HARRIS, 1532 N. LAFAYETTE, CLAREMONT, CA 91711.

TOM GRAHAM, 5107 ALAN AVE., SAN JOSE, CA 95124 HAS AN 8008 AND IS READY TO START A MARK-8.

CRAIG K. HARRIS, COORDINATOR, CLONLARA, 1289 JEWETT ST., ANN ARBOR, MI 48104 (313)769-4511 WORKS AT A SEVEN YEAR OLD FREE SCHOOL THAT WAS GIVEN A HAZELTINE TERMINAL AND PRINTER. THEIR GRANT FOR COMPUTER TIME RAN OUT AND THEY ARE LOOKING FOR ALTERNATIVES. THEY ARE LOOKING FOR LEADS ON ORGANIZATIONS THAT MIGHT BE INTERESTED IN FUNDING EXPERIMENTAL OR DEVELOPMENTAL PROJECTS FOR EARLY ELEMENTARY STUDENTS.

INFORMATION FROM SUPPLIERS

_______________________________________________________________________________________________

DR. MICHAEL HAYES, MNH APPLIED ELECTRONICS, WAS RECENTLY TRANSFERRED BY THE MILITARY SO THE NEW ADDRESS FOR HIS COMPANY IS PO BOX 367, JAMUL, CA 92035 AFTER APRIL 15. HE WARNS THAT THERE MAY BE SOME DELAY TO CUSTOMERS IN THE MOVE BUT THEY WILL TRY TO KEEP THINGS RUNNING SMOOTHLY. HIS MODEMS ARE SELLING WELL. CURRENT PRICES ARE $35 FOR MODEM ALONE, $5 FOR DOCUMENTATION, $5 FOR CABLES, AND $5 FOR POSTAGE AND HANDLING. JOE CIMMINS SENT A DRAWING ON WIRING THEM UP FOR USE IN A CASSETTE MODEM SYSTEM. (SEND A SASE AND A COUPLE OF STAMPS IF YOU NEED A COPY.) MIKE HAS FINISHED HIS MARK-8 AND IS INTERFACING IT TO A DIGITAL CASSETTE UNIT MADE BY MFE CORP., SALEM, NH. HE SAYS BILL ALLEN, SURPLUS ELECTRONIC, NTD INC., 9600 BALTIMORE BLVD., COLLEGE PARK, MD HAS NICE METAL CASES AND POWER SUPPLIES PERFECT FOR THE MARK-8.
MAURY GOLDBERG, MINI MICRO MART, 1618 JAMES STREET, SYRACUSE, NY 13203
(315) 422-4467 SAYS THE MIL BANKRUPTCY THING WAS A REAL BLOW. IT
WON'T AFFECT THE MOD-R, BUT IT WILL SLOW DOWN THE 8080 VERSION. HE
HOPES TO GET A FEW MONITOR-R ROM'S. SEND A SASE FOR INFO ON WHEN
AND WHAT THEY WILL COST. HE PROMISES US A NEWSLETTER ARTICLE ON THE MIL
DENISE AND ITS EFFECTS FOR THE NEXT NL. HE WILL HAVE A KIT FOR THE
SUING SCIENTIFIC CALCULATOR COMPLETE WITH PC BOARD AND ALL IC'S, SOFTWARE, ETC. FOR $69.95 UNTIL THE FIRST 25 KITS ARE GONE, $74.95 THEREAFTER. THE FIRST 25 WILL BE DELIVERED BY LATE APRIL. HE IS SELLING OFF 2000 2102'S @ $3.95 PLUS $2.00 HANDLING AND SHIPPING DURING APRIL ONLY. HE SHOULD BE ABLE TO SUPPLY MIL MOD-R CASSETTE INTERFACES SOON. HIS MAGAZINE AD HAS KEPT HIM ON THE PHONE ALMOST CONTINUALLY. DUE TO AN UNEXPECTED HANGUP, THEY CAN NOT ACCEPT BANK AMERICAN OR MASTERCARD CAMTS.

MARTY SPERGEL, M&P ENTERPRISES, PO BOX 1011, SUNNYVALE, CA 94088 HAS
THE FOLLOWING DEAL ON 2102-1'S. (YOU GUYS WITH THE 8080'S BETTER WATCH
WHAT YOU BUY OR YOU'LL END UP HAVING TO WAIT YOUR PROCESSOR ON THE MEMORIES. THESE ARE FAST ENOUGH. MOST OTHERS AREN'T.) PRICES ARE $4.50 EACH, 8 FOR $35, 16 FOR $60, 32 FOR $130, AND 64 FOR $250. HE HAS SOME ROM-1 (THE FAST ONE) FOR $50.00.

JAMES E. HEIL, OWNER, ELECTRONIC DISCOUNT SALES, 138 N. 81ST ST.,
MESA, AZ 85207 AGREES WITH COMMENTS REGARDING MITS AND POP ELECTRONICS IN NL #5. HE DOESN'T APPRECIATE THEM DISGUISSING COMMERCIAL ADVERTISEMENTS IN THE FORM OF HOBBY CONSTRUCTION ARTICLES. HE NOTES THAT THE BROCHURE ADVERTISING THE ALTAIR 8800 "USER GROUP" IS EVEN LESS HEAVILY DISGUISED, CRASS ADVERTISING. HE IS STILL SELLING MF8808'S FOR $50 AND 8080'S FOR $175. WRITE FOR CATALOG #6 WHICH IS 7 PAGES AND CONTAINS MANY EXCELLENT BUYS ON HARD TO GET COMPONENTS.

JOHN R. BURGOON JR., SOLID STATE MUSIC, 1222 CAROLYN DRIVE, SANTA CLARA,
CA 95050 296-7330 HAS THE FOLLOWING AVAILABLE:
4K MEMORY BOARD $163.80 PLATED THRU HOLES, BLUE, ALL 2102'S (32) RAR
SPEC SPEED, SOCKETS, CAS, EDGE CONNECTOR, 27442, 2 7404, 1 7400
BOARD IS SET UP FOR MARK-R BUS.
2102/2600'S - 8/$2 1101/2501'S - 8/$8.-- BOTH MARK-R TESTED.
1700 EROM'S - $18.-- (CHECK TO SEE IF THESE ARE A'S)
823 PROM'S - $3.50
7459/8225 RAMS - $1.85
B043 MUC - $4.00
8288 DIVIDE/12 - $1.00
RARE 4K 2102 BOARD - $17.00
1103 - $1.50
R 8080'S - MARK-R TESTED - $44.00

PARTICIPANTS CAN'T SEEM TO SAY ENOUGH KIND WORDS ABOUT JAMES ELECTRONICS.
DAVE DUSKIN IN LOMPLOC HAS PLACED MANY ORDERS WITH HIM AND THE LONGEST TIME IT HAS TAKEN TO RECEIVE PARTS IS 4 DAYS FROM TIME OF MAILING TO RECEIPT OF THE COMPONENTS. FAILURE RATE HAS BEEN LOW AND REPLACEMENT OF THOSE FEW COMPONENTS FOUND TO BE BAD IS FAST.
<table>
<thead>
<tr>
<th>TTL or Linear</th>
<th>MISC</th>
<th>TRANSISTORS</th>
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<tr>
<td>7400</td>
<td>8060</td>
<td>2N2222A</td>
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<td>2N2646</td>
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<td>555</td>
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<tr>
<th>CAPACITORS</th>
<th>RESISTORS</th>
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<tbody>
<tr>
<td>0.01/50V disc</td>
<td>1/4W 5% Carbon Film (Low noise)</td>
</tr>
<tr>
<td>1/100V disc</td>
<td>50/51.50</td>
</tr>
<tr>
<td>1/100V polyester</td>
<td>Minimum order 50 of same value. All standard values.</td>
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<tr>
<th>DIODES</th>
<th>SOCKETS</th>
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<tbody>
<tr>
<td>1N914</td>
<td>16 pin solder tail</td>
</tr>
<tr>
<td>1N4148</td>
<td>$0.35 ea</td>
</tr>
<tr>
<td>1N4001</td>
<td>16 pin solder tail</td>
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<tr>
<td></td>
<td>$0.40 ea</td>
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<table>
<thead>
<tr>
<th>CONNECTORS</th>
</tr>
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<tbody>
<tr>
<td>Molex connectors with pins for TVT $5.50 per set</td>
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<tr>
<th>KITS</th>
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<tr>
<td>Receiver-Transmitter addition to the TVT, less PCB and switch. Includes Molex connectors and IC sockets. $35.00</td>
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<tr>
<th>ORDERS UNDER $5.00 add $0.75 for handling and postage. Orders over $5.00 first class mail included in pricing.</th>
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| California residents add 6% |

| MARK-8 MINI KIT: Includes the 8060-1, all the resistors (5%), .1 disc capacitors, and each 7400. $62.50 |
| MARK-8 MAXI KIT: Same as above but includes Beach 2102-1 Rams. $92.50 |

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**MICRO-8 NEWSLETTER SUBSCRIPTION FORM**

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PLEASE SEND NEWSLETTERS NO 6 THRU 11 ENCLOSED IS A CHECK FOR $6.00 MADE OUT TO THE CABRILLO HIGH SCHOOL COMPUTER CENTER.

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PLEASE SEND NEWSLETTERS NO 1 THRU 5 OFFSET PRINTED ENCLOSED IS A CHECK FOR $3.50 MADE OUT TO THE CABRILLO HIGH SCHOOL COMPUTER CENTER. (IT MAY BE SEVERAL WEEKS BEFORE THEY ARE RECEIVED FROM THE PRINTER)

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**NAME**

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**ADDRESS**

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**TELEPHONE #**

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(IF YOU DON'T MIND BEING HELD IN OTHER PUBLICATIONS, GIVE A)
NEW ITEMS AND NEW PRICES

8008 - 8 bit Microcomputer chip with Creed $45
1702A - 256 x 8 Programmable and erasable ROM (Programmed with Creed Monitor free) with Creed $25
2102-2 1K x 1 RAM Static $4.50
74LS138 Decoders (1 out of 8) $2.25
25 pin connectors (male or female) $1.00
Plastic case for above $1.00
8 conductor cable, 2 are heavy power leads $.10 per foot
50 feet of above with 25 pin male connectors and plastic cases on each end (2 1/2 lb) $6.00
Teletype model 28 KSR, printer and keyboard, table model with table - heavy duty 5 bit machine, 10 years old $250.00
IBM 054 punched card verifier (can be used to read cards under control of 8008) $150.00
731 Selectric I/O typewriter - like new - $800.00
IBM 2740 terminal with I/O Selectric and control electronics $1800.00
Dura Mach 10 with I/O Selectric, 8 level punch and 8 level reader and electronics $1000.00
Flexowriter with tape reader and punch $250.00

Rixon Speed Conversion module with connector to plug into manual and instructions to use to convert TTY signal speed. This is a beautiful piece of commercial equipment. $9.50

Other Rixon circuit packs: clocks, modems, multiplexers, powersupplies - write for list.

Weights: Creed - 55 lb, Creed shipping crate - 9 lb, transformer - 4 1/2 lb, Interface kit and packing for Creed - 5 1/2 lb, box of 10 paper tape reels - 9 3/4 lb, power box - 4 3/4 lb, tape winder and reels 4 3/4 lb.

Shipping: For large items unless you specify otherwise. Greyhound is the best and cheapest. The Creed is too heavy for parcel post or UPS. REA is another alternative, but is more expensive. It is possible to pack a tape winder with the Creed in its crate or up to 14 reels of tape. Other items will be packaged separately.

The Creed manual grew to 26 pages and is finally ready to go. We are currently investigating a power supply for an entire 8008 system using the power transformer included with the Creed interface and an 8008 system built on one of the wire wrap boards we advertise at $10.

A lot of interest has been generated in the MIL monitor on one 2K word chip, however recent events have cast some doubt on when and if it will be available in this form. We are also investigating the possibility of offering the MIL monitor or an improved version of it on 1702's or possibly having our own 2K chip made up. In order to have our own 2K chip made we would have to have a good number of people willing to subscribe ahead of time and put down a deposit on it. In the meantime I would suggest that you use the Creed monitor on 1 or 2 1702's since they can be easily reprogrammed later and the Creed monitor will give you the basics to get you going.
We finally got another issue of the MICRO-8 Newsletter thru the printer and mailed out. Hope your impressed. Note: 72 pages! Subscriptions have made it economically possible to print and mail out this size newsletter. At the rate subscriptions are coming in, future NL's can be this big if we receive enough camera ready material.

A good many participants have running 8088 and 8080 computers and are concerned with trying to make them do something. An effort was made to try to make this issue "heavy" on software. The only way you can get good at programming is to read code so even if you aren't interested in all of these programs, figuring out the code will make it easier to write your own programs.

Printing Format

One wouldn't think that page arrangement would be a big problem in preparing a newsletter but it is. Printing is expensive and first class postage "eats you alive" and is necessary because 3rd class is unreasonably slow in most cases so some kind of reduced format is necessary if a lot of material is to be included. By printing sideways on 8½ x 11 pages, four sheets can be printed per page with only a 2/3 type reduction making it acceptable for reading (although it doesn't do anything for the printing quality when using marginally acceptable camera ready copy).

These sheets can be folded into a booklet as in NL# 5 which is nice except we keep getting complaints that they cannot be punched and placed in 3 hole notebooks. Along comes Eric Schott, 208 14th Ave., Juanita, Altoona, PA 16601 to the rescue. He sent in some sample booklets showing possible printing formats. His unreduced format wasn't acceptable because getting twice as much material printed at only a 2/3 type size reduction is too good a deal to turn down.

His reduced format seemed ideal. It's main feature was that the pages could be placed in a 3 ring notebook and when turned sideways, 4 full pages were arranged in front of you allowing easy page-to-page reference and two-page schematics where necessary. Computer hobbyists are obviously clever guys at getting electronic stuff working but they are sure slow at figuring this format out. All copies are being sent out prepunched to make it a little easier to figure out. Eric and I are sold on this format so you are going to get it whether you like it or not. Try it, you'll like it!

What Is A Newsletter?

There seems to be a little confusion as to what we are trying to do. This is a newsletter service, not a magazine. Our intention is to reprint and distribute material sent in by participants that you might be interested in and get it into your hands as fast as possible with the names and addresses of the contributors so you can contact them if you want more information. Also names, addresses and telephone numbers of participants are included to encourage communication and formation of local groups. Most of the material that comes in is a randomly organized letter containing a whole bunch of items. It is a non-trivial
task to extract and condense this material and include it with the participants name and address. So far, I think we have done pretty well, and we'll continue to try to do the same.

We receive occasional complaints about lack of subject titles and grouping. I think the important title is the submitter's name, address and telephone number. An excellent project for some participant would be a subject matter index. I'd rather spend my time extracting and condensing more material from participant's letters.

John Craig and I have vowed that we will not be the ones that let the newsletter die as long as there is a need to disseminate information. As long as you will send in material, we will continue to try to get it out to you in as readable form as possible. You can help tremendously by submitting material typed with a fairly new "black" typewriter ribbon, schematics drawn with a black flow tip pen, and sharp clear Xerox copies. As soon as material submitted drops off, there will no longer be a need for the NL service and we will cease publishing and return unused funds.

Regarding MITS and 8080 Systems

In NL's 5 and 6, some harsh comments from participants and the editors regarding MITS's sales policies have been interpreted by some as disinterest in 8080 systems (ALTAIR 8800). Nothing could be farther from the truth. At this time, one should seriously consider whether starting an 800 system that is not easily expandable to an 8080 is a wise move. Most of us started with 8008's and the information is heavily directed that way. Remember though, all programs and interfaces for an 8008 can easily be modified for 8080's but it doesn't work quite so well the other way around. Letters coming in in response to the PE mention confirm that there are an enormous number of ALTAIR 8800 owners desperate for memory expansion and peripheral interface information as well as software. Please contribute any technical information or programs you have for 8080 systems.

Popular Electronics Mention in Computer Notes Column

You probably noticed that Jerry Ogden printed an excerpt from a 5 month old letter in his Computer Notes column in the June PE. When that letter was written, we were still doing spirit master duplication and offered to supply NL's 1-4 to prospective ALTAIR 8800 builders for a 50¢ SASE. Since PE did publish the 5 month old offer, we feel we must honor our agreement so NL's 1-4 are being sent out. The June issue has only been out for two weeks and over 250 requests have been received.

To remain fair to the participants that ordered the printed back issues at $3.50, the fee schedule for these new participants is: NL's 1-4 50¢ SASE, NL's 5 & 6 $3.00, NL's 7-12 $6.00. All participants that renewed for $6.00 will receive issues 7-12.

**Flash Announcements**

The 1st meeting of the Amateur Computer Society of New Jersey will be held Friday, June 13, 1975 from 7:00 to 10:00 pm at the Union County Technical Institute, 1776 Raritan Road, Scotch Plains, NJ. Contact Sol Libes at 889-2000 Ext. 282 or 291 days or 277-2063 evenings.

See the announcement inside on the IA Area meeting June 15.

8080 boards are now available for the Mod-8 system from Space Circuits. Thanks to Cabell A. Pearse, 3523 Tilden St. NW, Wash. DC 20008 for this information.
A System For The Novice Computer Hobbyist

I'm reluctant to recommend anything because the smallest hint of endorsement is interpreted by some as unconditional recommendation. However we do have some very novice participants that want to get into hobby computer construction without getting in over their head. Everything that I have been able to find out indicates that the Martin Research MIKE-2 system (see the 6 page ad later in the newsletter) is the one for them. It's reasonably priced, very well designed, and supported by a reliable company. Contact Mark Condic, 410 Woods Lane, Apt. 6A, Downer's Grove, IL 60515 or Martin Research for additional information. Mark's college class built up 14 of these systems and they were very favorably impressed. Be cautious on ordering boards only because the IC's to stuff them are the very latest releases and a little difficult to find.

Miscellaneous Comments On 8008's and 8080's

IC Electronic Supply, 16723 Roscoe Blvd., Van Nuys, CA 91406 (213)894-3771 or 619 W. Kettella Ave., Orange, CA 92667 has 8008's for $24.95, 8030's are being sold in the L.A. area for $110 but I'm not sure where yet. Rumor has it that the TI 8030 will sell off the shelf at $100.

Intel has announced their 8080-A and all future deliveries will be that part. It differs from the regular d080 by having full TTL drive capability, improved synch handling, and ability to jam in multi-byte instructions. It was probably introduced to complicate the lives of the second source suppliers. It will work in the same socket as the regular 8080.

Mr. PJ Roberts of MITC clarified the question of what kind of 8080's they are using in MTAIR 8080's. It seems that Intel was a little upset when MITC was selling a board set including the 8080 for $294 at the same time they were trying to sell 8080's at $350 in single quantity. Those shipped to MITC were given a 8080-8 marking but were otherwise identical. When the fallout rumor started, MITC started accepting and shipping only those with the regular marking.

Intel will produce the 8008 companion chip that contains all the multi-plex logic in the 8080 and said that pricing of the pair will make it very cost effective compared to the 8080 so maybe the 8008 is not dead yet.

Programming Manuals For The Beginner

Nat Wadsworth of Scelbi Computer Consulting, 1322 Rear, Boston Post Road, Milford, CN 06460 has done it again. His first programming manual was highly recommended. Now he has written "Machine Language Programming For The 8008 (And other similar microcomputers)". You just can't believe the rave revues that keep coming in. It is an absolute must for your bookshelf. Coverage includes: 8008 instructions, flow charting, mapping, editing and assembling, debugging tips, fund. progs. techniques, loops, counters, pointers, masks, organizing tables, search and sort routines, math operations, multiple prec. arith., a floating point package, i/o programming, real time programming, programming for proms, etc. Its available for $19.95 book rate or $22.95 first class. The floating point package is worth that.
MIL Mod-8 Documentation Package

Anyone interested in or actually building the MIL Mod-8 computer system will want to order the $10.00 documentation package being offered by Robert Swartz, 195 Ivy Lane, Highland Park, IL 60035 - 472-6660 during the last few months. He has debugged another unit and is thoroughly familiar with the system, errors in the PC boards, and the available documentation. The package will include:

1) The MF8008 Data Book containing Mod-8 circuits, foil diagrams and Monitor-8 listings (these are scarce as hen's teeth because MIL ordered them all destroyed) as long as the supply lasts.
2) Mod 8-8 Prom Programmer documentation including circuitry, parts list, and component placement.
3) Audio cassette/Mod-8 interface documentation.
4) Notes on the MOD-8 system including manual errors and parts lists.
5) Mod-8 self-test programs (getting this system running isn't trivial since front panel is available)
6) Notes on I/O Port expansion
7) Hints on getting the system running.

I've seen Robert's package and no way are you going to get a Mod-8 up and running without it. (At the present time the only known source of the MF8008 book is duplicating it and selling it for $5.00)

Scope Graphics Terminal

Carl Hellmers of MP Publishing Co., Box 378, Belmont, MA 02178 has a Digital Graphics Oscilloscope Display interface by James Hogenson in Vol 1, #5, that will really turn you on. It drives any cheapie Heathkit or Eico oscilloscope, uses 4 2102's to store a raster of 64 x 64 dots that can be either on or off. Graphics game programs using 8008's or 8080's should be a cinch with this interface. Double sided plated thru PC boards are available at $25 from MP Publishing. We have a copy of the article in our literature loan file to send out on short term loan if you are not an MP Publishing subscriber. You may become one after you get a close look at this interface.

Information Regarding Suppliers

Let us repeat: when you send off a check to a supplier, kiss it goodbye, because you may never see that money again. What's almost as bad is if the check gets cashed and you wait months for delivery on items you need now. If a guy's advertising looks too good to be true, it probably is. If it looks like he is offering too many hard to get items, beware. If he can supply them, other people could also, and they wouldn't be hard to get. If the prices are much lower than other outfits, he's probably selling junk and its hard enough to get these complicated computer systems running without having to find defective parts as well. What do you do when a guy offers something you have to have and he is the only one that offers it? I don't know. But you'd better clarify everything by telephone and or letter before you send your money.

If they accept Mastercharge or BankAmericards, you've got several things in your favor. At least some bank recognizes them and part of the agreement they sign is that they will submit information on when and how items were shipped. If you don't get them, you just stop payment on the bill at your bank.
William E. Shawcross, 1105 Massachusetts Avenue, Cambridge, MA 02138 (617) 547-7652 is managing editor of "Sky And Telescope" Magazine with a background in physics and astronomy. He took the Control Data Institute course in computer programming and done work with a CDC 3150 and a tape-oriented Honeywell-200 (tape oriented). He purchased a 256 word ALTAIR 8800 that ran the first time he turned it on after a week of spare time construction. He has a SWTP TVT-II with all the bells and whistles on order is looking forward to putting it together. He'll add more memory and a Suiding cassette and should have a system that will keep him amused and occupied as well as helping him with commercial programming--mailing lists and files. He supplied the following program that is a 14 byte program to zero memory, starting just below the program and progressing down to zero and then repeating the whole business until stopped. It is listed here with octal 377 as the high address.

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<thead>
<tr>
<th>Address (octal)</th>
<th>Instruction</th>
<th>Purpose</th>
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<tbody>
<tr>
<td>362</td>
<td>LXI</td>
<td>Load B&amp;C registers with starting address plus 1</td>
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<tr>
<td>363</td>
<td>001</td>
<td></td>
</tr>
<tr>
<td>364</td>
<td>000</td>
<td></td>
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<tr>
<td>365</td>
<td>XiA</td>
<td>Zero accumulator</td>
</tr>
<tr>
<td>366</td>
<td>DCX</td>
<td>Decrement B&amp;C registers</td>
</tr>
<tr>
<td>367</td>
<td>STAX</td>
<td>Store acc. in address in B&amp;C</td>
</tr>
<tr>
<td>370</td>
<td>ADD</td>
<td>Effectively put B in accum.</td>
</tr>
<tr>
<td>371</td>
<td>ORA</td>
<td>Logical OR accum. with C</td>
</tr>
<tr>
<td>372</td>
<td>JZ</td>
<td>Jump to beginning if zero (preceding 2 steps check to see if address has reached 0)</td>
</tr>
<tr>
<td>374</td>
<td>000</td>
<td>If not zero, return to XiA instruction</td>
</tr>
<tr>
<td>375</td>
<td>003</td>
<td></td>
</tr>
<tr>
<td>376</td>
<td>JMP</td>
<td></td>
</tr>
<tr>
<td>377</td>
<td>000</td>
<td></td>
</tr>
</tbody>
</table>

Sincerely yours,

William Shawcross

R. E. SMALLWOOD, 20-12 ST. N.W., CALGARY ALBERTA, CANADA T2N 1Y3 SENT IN A BROCHURE ON THE PHI-DECK CASSETTE UNIT, SOME VERY INTERESTING CLIPPINGS ON THE MIL THING (SEEMS THE CANADIAN GOVERNMENT GOT TAKEN PRETTY BADLY), AND INFORMATION ON A MOTOROLA 6800 MICROPROCESSOR EVALUATION KIT CONSISTING OF 1 MC6800L (MPU), 2 MC6801L1 (ROM), 1 MC6850L (ACIA) AND EXTENSIVE DOCUMENTATION FOR $300.00. THIS SHOULD BE AVAILABLE THRU ANY MOTOROLA DISTRIBUTOR HERE. HE SAYS THAT HE HAS HAD HIS DOUBTS ABOUT THE ALTAIR 8800 SINCE RECEIVING THE DATA PACKAGE WITH POOR QUALITY LAYOUTS, NO INFORMATION AND LOTS OF ADVERTISING LITERATURE. HE THINKS THE MAGAZINES HAVE BECOME COME-ONS FOR KIT MANUFACTURERS IN AN EFFORT TO PRESENT COMPLEX PROJECTS AND THE ALTAIR 8800 IS THE MOST BLATANT EXAMPLE.

Angel Bravo, 10333 Felson Street, Bellflower, CA 90706 announces that his computer, nicknamed the FRUSTRATION-8 is now running perfectly. He has had some very frustrating experiences. First he gambled and lost with the Electronic Component Sales swindle. He had something wrong with his original MF8008 which Marty Spergel of M and R replaced. He had to dig out some bad IC's with the help of Paul Farr. He can now see that a standardization scheme will have rough going, but hopes we can arrive at some standard, however limited it may be. At present he is learning toward Dr. Suiding's approach, that is the TVT, cassette, calculator, and maybe Bob Cook's Baudot TTY. He says each one of us is going to have to set his own goals and not try to shoot for the moon, especially with the cross fire we find ourselves in with announcement of the LSI-11, PACE, M6800, MITS, etc.
Peter Wolfe, 4209 Highland Drive, Yarrow, BC Canada VOX 2A0 decided there was no difference in cost between the $397 ALT. IR 8800 and the MK-8 after he got thru paying duty. He has ordered the 8800 and a SWTP keyboard. He appreciates Jim Fry's 2102 group buying effort. He hopes that we will soon agree on a cassette standard so he can decide which one to buy. (Maybe you'll have to settle for one of each, there cheap.) He is also trying to decide what kind of output device to use and is presently impressed with TVT-II.

Kendall Stambaugh, 5009 Guide Meridian, Bellingham, WA 98225 734-9424 has offered to redraw schematic diagrams for us. Thanks Ken, we'll get some to you soon.

Richard A. Peterson, 9004 184th Avenue E, Sumner, WA 98390 appreciates the information in the NL and says we do need a central clearing house for the start of this giant new hobby effort. It takes time and money to have a good organization and there is no way this thing can be sustained by depending solely on donated time. Popular Electronics is a joke (seems like a front for MITS), so all we have is Radio-Electronics (I'm not so sure they aren't a joke also) and the efforts of the various newsletter and publishing groups.

Joe D. Ringland, po Box 4784, Rolling Bay, Wa 98061 has constructed an ALTAIR 8800 and is awaiting a keyboard from Mini Micro Mart and a TVT-2 from SWTP. He has had great success translating 8008 programs to 8080 format. The only adjustment that need to be made are in timing loops and it would help if people would specify the time for their loops. Both 8080 and 8008 people would be helped since people use different clock frequencies and memory cycle times.

Gary L. Dickman, 707 Elm Street, Hays, KS 67601 is building a Mark-8 and will use a 4k 2102 board for memory. He is extending the input and output ports and is redesigning the LED Output register board to accept 7-segment readouts. He will soon have a PC layout ready for a double sided board but can't find anyone to etch a double sided board. Any suggestions? These layouts and/or boards are available to any user group participant. He will add the Suding cassette interface, Suding TVT, and Suding calculator and is contemplating a computer controlled cassette deck or a floppy disk for the future and would appreciate any information in this direction that participants can supply. He will use his Mark-8 as a sophisticated CCTV Video Titler and Animator (graphics terminal?) and for a music machine courtesy of Phil Mork's music program.

Mr. G. Penner, Bio Medical Electronics, Boca Raton Community Hospital, 800 Meadows Road, Boca Raton, FL 33432 (305) 395-7100

Albert Sardo, PO Box 6678, San Jose, CA 95150 sent a flyer to some participants advertising ICs. I never received one but I heard that he had slow 1702As at $13.

Robert L. Hatfield, 228 - 22nd Street, Ashland, KY 41101 should have a Mark-8 running by now. He is using a Precision Systems power supply. He has received a copy of Sceibi's "Machine Language Programming For The 8008" and says that this is the best programming book he has ever seen.

LTC Donald R. Kelley, Facility Engineer, Fort Lesley J. McNair, Washington, DC 20319 is working on a Mark-8 but also ordered, received, and assembled the ALTAIR 8800. It is up and running but he is still having trouble with the MARK-8 memory board and shorts.
Geoffrey D. Lowe, 3615 North Pine Grove, Chicago, IL 60613 was not happy with the way NL#6 pages were arranged. He is a programmer (languages: PL/1, FORTRAN, Assembler) on fourth generation IEM equipment (S/370-145, DOS-VS). He ordered parts for the TVT-1 and then found out the PCB boards were not obtainable (try Semtronics). When he finally gets a computer built, he plans to use it for financial files, book and record file lists and data retrieval and eventually, graphics. Peripherals will include two cassette drives, TVT type terminal for program entry and monitoring and an off-line printing unit for hard copy and perhaps a floppy disk. He has had excellent luck with Godbout and James as suppliers and received the typical rude response from SWTP when questioning them about TVT-1 boards and parts. He recommends the SCelbi manual and has ordered the new programming manual from them. He would like denser memory boards and wishes someone would put together a glossary of terms especially relating to microprocessors that would help the newcomers to the field understand such terms as scrolling, burned-in IC's, crowbar power regulators, PROM programming, clock rates, etc.

Beardsley Ruml, II, 3306 Cathedral Avenue NW, Washington, DC (202)333-0173 says that now that the computer is properly seen as simply another tool, folks like him who have no training in electronics, will want to learn the necessary background info. We would do him and others a great favor if a small section was devoted to the "beginners" by citing some of the best materials for "starting at the ground floor". (It seems we keep mentioning this over and over but its true. Start with the SCelbi manual, work up to the new SCelbi manual and go from there. We will try to encourage some readers to write some articles for the beginner that will get him started.)

R. D. "Slim" Cummings, 510 West Fifth St., Pittsburg, KS 66762 is WAOEDA and just came aboard.

Jim Farschon, 3949 Mt. Everest Blvd., San Diego, CA 92111 (714) 459-0211 (day) (714) 292-9180 (night) has ordered a MIKE 201 kit with an 8008 and 1k of RAM from Martin Research. He will soon build a scientific calculator interface and is working closely with Mr. George Enos who assembled and checked out his ALTAIR 8800 in two days. George is now impatiently awaiting delivery of a keyboard so he can use it. Meanwhile he is designing a paper tape reader which they hope to build for under five dollars. He is interested in hearing from others in the San Diego area and is willing to serve as the focal point to see if there is sufficient interest to start a local user's group.

Terry G. Harris, 417 Northwestern Drive, Grand Forks, ND 58201 (701) 772-8453 has built the SCelbi 8-H minicomputer -- a very simple construction project from bare bones and an excellent set of instruction manuals, both software and hardware, RE TVT-1 -- just finished, what a mind-bender, wishes he had been a few months slower to take advantage of Dr. Suding's TVT, SCelbi Mag Tape Interface -- works great but he feels awful about spending so much when the Suding unit works so well, SWTP keyboard -- it works. He has ordered SCelbi's new 8008 programming manual and has been toying with the idea of writing a mini ALGOL compiler. The subset would be about 4 to 6 K. He would like info on a good line printer and a floppy disk.
John Bottoms, Box 158 CTS, 1000 West 42nd, Indianapolis, IN 46208 says he has TVT-II boards available for $18.00.

Ron Durnin, 2310 Munroe Avenue, Saskatoon, Sask. S7J 1S5

Per Bjorn, PO Box 309, Quakertown, NJ 08868 works for Bell Labs, 2B-310, Murray Hill, NJ 07974 and is presently building a Mark-8.

Lawrence Miller, 826 Halstead Blvd., Jackson, MI 49203 is a graduating senior at Jackson High School and will be going to Michigan Technical University in the Fall. He is building a Mark-8 and a TVT-1 and wants to know if there is a compiler or interpreter for FASIC or FORTRAN for the Mark-8.

Peter Middleton, Box 714, De Kalb, IL 60115 is connected to the Dept. of Music, Northern Illinois University, DeKalb, IL 60115.

Jim Squires, PO Box 1124, Santa Maria, CA 93454 (805) 925-1402 is employed by Alan Hancock College as a programmer and is working on his Masters Degree at Cal Poly, San Luis Obispo. He is looking for a Masters Degree thesis project and favors an 8080 operating system. I'm trying to get him to write an 8008/8080 operating system built around a pair of Phi-decks. Let's flood him with encouragement and maybe he will.

M. P. Squires, Rt. 2, Box 326, Nokesville, VA 22123 is Jim's brother and an IBM logic designer in Manassas, VA.

S. Joseph Toy, Route 3, Box 73, Chico, CA 95926 has a Scelbi 8-H, the Scelbi cassette tape interface, and their TTY interface. Input is via a Model 15 TTY keyboard and output is on the TTY printer. The system is being used to handle data in a plant breeding program. He is a ham, WB6KAI, and currently operates on 160 meters.

J. W. Ward, 7236 Cirrus Way, Canoga Park, CA 91304 also noticed the same output instruction bug described by G. Hart in Vol. 1, NL #5. He has had his Mark-8 working (?) since late December but is still trying to track down an intermittent bug and wants to know if there are any timing diagrams available for the CPU board. He also has trouble with the clock sometimes oscillating at 2 times the correct frequency and will try the fix suggested in NL#5.

Tom Newman, 2230 Sweetwater Drive, San Leandro, CA 94578 (415)352-2315 says that if we need any info on Diablo disks or HYTYPE I to let him know because he works for Diablo-Hayward.

C. Richard Corner, PO Box 2017, Fargo, ND 58102 must have a Precision Systems PS since he wants Dave Chapman's redrawn schematic.

Raymond L. Heinrich, 1726 N. 16th Street Apt. 1, Arlington, VA 22209 (If all the guys in the Washington, D.C. area ever get together, they'll take over the whole hobby computer movement.)

Robert Pearce, 28 Hakin Street, Danbury, CT 06810 has the Mark-8 FC boards and plans to use plug-in boards. The back plane will be Radio Shack copper clad 6" x 9" sheet etched for 9 board connectors. He intends to have 8K of 2102 memory.
Mark Spohr, 527 Lafayette Avenue, Cincinnati, OH 45220 says that a National Semiconductor engineer told him that the UV erasable PROMs cannot be indefinitely erased and reprogrammed. After a certain number of cycles (he said 52) the device will not work properly unless it is reconditioned by baking in an oven at 400° for 45 minutes. After this reconditioning, the device can again be erased and reprogrammed 52 times (NS recommends only 35 cycles before reconditioning).

Joseph Weintraub, Lightworks Productions, Inc., 46-16 65th Place, Woodside, NY 11377 is interested in a computer interface with a light pen for video graphics. He says he has done some work with a color set. Where can he buy a light pen? Joe is very interested in joining a local group in the New York Area and if there isn't one, he like to start one. Write him if your interested.

Stephen B. Gray, Amateur Computer Society, 260 Noroton Avenue, Darien, CN 06820 has been swamped by inquiries about the ACS. He says that back issues are available of his newsletters as follows; Volume I consisting of the first 11 issues (1966-1968) at $3.00; Volume II, 12 issues (1969-1972), also $3.00; Volume III, 11 issues so far and there will be several more, $5.00. He's making noises about not continuing his newsletter beyond the few issues left in Volume III. The hobbyist needs all the help he can get. Write him and encourage him to keep publishing.

Mike Anastasion, 6211 Quincewood Circle, Citrus Heights, CA 95610 is a systems analyst programmer III with about seven years DP experience. He has written I/O subroutines, interrupt subroutines, and load business application programs. He has dreamed of having his own home computer for fun and profit since he started in DP and is now waiting for the "dust to settle" before determining the best way to go. So far the 8080 looks promising, especially the ALTAIR 8800, but MITS' I/O device price list has him scared. (Don't panic Mike, anything that works with an 8080 system can be easily modified to interface with an 8080 system and several companies are already cranking out compatible peripherals and ALTAIR owners should have no trouble trading information that they acquire.) He would like to see an article in the NL that would evaluate all available systems so that the beginner could more easily decide which system to build. He has a set of SWTP TVT-I printed circuit boards he is willing to sell and he will trade programming time for electronic goodies.

Richard C. Creighton Jr., 1053 Princewood Drive, Orlando, FL 32810 is starting assembly of an 8080 CPU based computer system. He is currently working in the Medical Electronics (x-ray) service field and formerly was an instructor in the USAF teaching radar repair. He is currently teaching programming to a friend and is trying to complete the computer to make the learning situation more meaningful. He would like to organize a local group in the Orlando or central Florida area. Contact him if you are interested. He is interested in any information on an 8080 operating system and a B-SIC compiler. (See what MITS has done.) He also hopes to develop a short form assembler and eventually programs for games and data handling.
Harold L. Novick, Attorney, 2810 Henderson Court, Wheaton, MD 20902 (301) 933-7453 has had his Mark-8 up and running since mid-January. He has two non-electronic problems: 1) Failing one's spouse 2) Getting one's wife at least half interested so it is easier to explain why $50 for more memory is necessary when the $2K installed is not being used because of lack of peripherals. Even his friends are offering to testify against him at sanity hearings. He and Steve Winick may have found a tremendous buy. They are tracking down and hoping to bid on some surplus terminals. With luck, they may be able to offer Dura Mach 10's at $200-$250, Itel 1041 at $300-$350, Dura 1041 at $300-$350, Friden Flexowriter's at $50 to $100, Itel 941's at $200-$250. The catch is that they are government surplus and cannot be assumed to be in operating condition, but at those prices, one could afford to spend another $100 to put them in working shape. Anyone interested should send a SASE. Firm details will be printed in the NL as soon as the details get worked out. He made the following mods to Phil Mork's front panel switch mods (NL #4). He offers the following program to zero all of the 8008 registers in approximately 4 of the usual instructions. In the process of working on our hobby it is possible that a patentable development may come up. Hal provided this information:

Patents: A patent is good for 17 years from the date of issue and prevents others from making, using, or selling the patented invention without permission. A patent does NOT give the owner the right to make his own invention since someone else may also have a similar patent which would prevent this. If anyone publishes a description of the invention or if anyone publicly uses or sells an embodiment of the invention (including the inventor) more than one year before a patent application is filed, the invention becomes public property and a patent of it is forever barred. I asked if he would be willing to answer preliminary questions participants might have regarding patent problems and he graciously agreed.

250 - Exclusive OR A register with its self
310 - Xfer A register to the B register
320 - " L"
330 - " D"
340 - " E"
350 - " H"
360 - " L"

Program To Zero 8008 Registers.

Switches shown In The RUN Mode

Hal Novick's Mods To Phil Mork's Front Panel Mods.
Bill Fuller, 2377 Dalworth 157, Grand Prairie, TX 75050 has this to say:

I'm one of those Altair owners, so maybe my comments should be heard. I get a little perturbed about some of the bad-mouthing, especially when it is related to emotional reaction. My reasons for going Altair and 8080 was because:

1) At the time I became committed to a home computer (Nov./Dec. 74) differences in price between Altair and others available was not great.
2) ordering from multiple sources and hoping I got everything and it was good left me uneasy.
3) the 8080 IC was priced at $360.
4) I had no source that said I would be able to convert from the 8008 to 8080 within a reasonable price range.
5) I did not know that the Micro-8 ML had already covered so much territory. My only knowledge of "you-all" was a letter to the editor in R-E, until you cropped up in MicroMini Mart ML.
6) I sent my $5 and $10 everywhere info was advertised. Some top-notch, some garbage.
7) I figured I would do all my own design around the basic Altair if I had to, since I was "all alone".
8) Uncle Sam owed me money.
9) I was interested in limited use--teaching machine and game machine.
10) I was frustrated by reading 1000 pages of claims and counterclaims by CPU manufacturers and writers.
11) The Intel was best supported and Altair was using it.
12) I'm not an expert in programming or hardware.
13) No one knew that parts I couldn't afford one week would be cheap the next week.
14) Ad infinitum.

How do I feel about the Altair? I partially knew what I was getting into, only 250 words when I knew I would need a basic 1000 for what I wanted to do at the time. Since my uses have grown, I see that I got my work cut out for me if some of the attitudes in the ML become prevalent. That attitude being the hell with the Altair and in some cases the 8080. I think there is a place for all models and configurations whether it be 8008, 8080, Altair, PDP, EBC, MC6800, 4040 or whatever.

If we sit around criticizing what each other has, instead of trying to work out the mutual problems, then we'll all end up like a guy I met in Dallas. He just got his computer working after 5 years of effort. Think of what went through his mind when he realized his 100+ IC CPU had just been replaced by a cheap multipin IC. I think the desire to standardize is in the right direction. I agree with Larry Pleskac comments--most of us are not far enough along to provide comments. I'm still trying to dig through the M & P ECS Series. Somewhere between ECS 5 and 7 I became lost. Mainly because I need the "hands-on" along with the theory.

Sure I'd like a PDP-11 or something built around the 6800, but I just came out of the DO Loop of frustration trying to determine who was talking and who was acting. So maybe some year Uncle Sam will come across again, then my kids will have the first generation micro.
Robert A. Van Winkle, 12717 Folsom Blvd., #32, Rancho Cordova, CA 95670 has collected the parts for his Mark-8 and plans to etch his own boards and include edge connectors on all boards. He is currently attending classes at Sacramento State and will really get moving after finals. He will make his PC board layouts available to any participant interested. He'd like to acquire an MF8008 manual.

Roger Smith, Smith Enterprises, 4502 E. Nancy Lane, Phoenix, AZ 85040 gives a red-faced thanks to R. D. Hogg who caught his "boo-boo" on the UART I/O board. When he built his TVT, he didn't install diodes D10 thru D14 since he held these bits low on the keyboard where his CLEAR key was. In the intervening months, he forgot his TVT was different in that area. He received an ALTAIR 8800 last week and had it running in two days but his Mark-8 is still not up. He doesn't think he will be buying any other "inexpensive add-ons" from MITS but couldn't resist the "loss leader" initial price. He enclosed a copy of a cross-listing of the 8008 and 8080 instruction sets included elsewhere in the NL.

Jim Lefwich, MD, Geophysical Communications Systems, 410 South Glendora Avenue, Suite 140, Glendora, CA 91740 (213) 335-1241 says he can't remember ever reading a piece six times and enjoying it more (NL #5). Having fought his way thru a full blown processor in 1965-1967 with discrete transistors, not IC's) and no one around with similar interests, he can assure us that he will be a staunch supporter of our hobby effort. He wears two hats - a general practice of medicine with an adjoining electronics lab for the remaining. It looks like its time to build again so he is trying to decide which way to go. A suggestion for Jay Bowden's power supply circuit in NL #5, if you move one of the diodes so that it is in series with the 150 ohm charging resistor and supply, if the supply zaps shorted, it will isolate the short from the battery and the gear will not load the battery.

Peter Vickers, 162 Nehoiden Street, Needham, MA 02192 (617) 444-1410 has had his Mark-8 running for about three months. Construction on the Mark-8 and TVT began in mid-October. By the end of November troubleshooting most of the boards was under way. By the end of January, his room was a junk pile, savings gone, bills unpaid, study habits destroyed. As soon as the units were working exactly right with no more bugs, they were shoved into the corner and not touched again until normalcy finally returns.

Tom Boyko, Varian Data Machines, 12062 Valley View, Suite 208, Garden Grove, California 92645, (remember him from NL #5?). Tom did it the hard way, but probably faster than all of us put together. His wire-wrapped version of the Mark-8 is up and running with his music program playing "A Bicycle Built for Two." (Tom has a subscription to Radio-Electronics but somehow missed last July's issue which described the Mark-8. It's hard to imagine where he would be now if he had not started then.)

Several people have mentioned that the information in the NL is rather hard to digest because it is all so scattered around without any organization. We agree, but this is the nature of the beast. If anyone would care to put together an Index/Cross-reference of any kind we'll be happy to publish it.

Phil Glazer, Ace Electric Service, 40 Broadway Ave., Trenton, New Jersey 08618, says that he can't work, take care of his family, cut the grass, paint, etc. Between our group, the Digital Group & Dr. Suding, the Computer Hobbyist, and the People's Computer Company he is going bananas and beseok! But, he says he is certainly learning plenty & that is what it's all about. He recently finished his TVT I.
NEW ADDITIONS TO THE ROSTER

Gary Alevy, Emory University, Box 21393, Atlanta GA 30322, (ph: 377-4907), is interested in building a Mark-8 and would appreciate any tips on purchasing the various components.

Alan S. Bailey, McKee Vocational & Technical High School, 290 St. Marks Place, Staten Island, N.Y. 10301

Meir Baran, Department of the Army - Picatinny Arsenal, Dover, N.J. 07901 (SARPA-AD-F-D)

Robert A. Barber, 7 Johnson Place, Ardsley N.Y. 10502, is currently building a Mark-8.


Neil A. Benson, 10040 Nicollet, Bloomington Minn 55420, has about 3/4 of the parts for a Mark-8. Hal Chamberlain of the "Computer Hobbyist" suggested he get in touch with us before starting construction.

E.L. Bethel, 418 E. School St., Kent OH 44240

Gary K. Berkheiser, 601 Bath St., Bristol PA 19007, is a technician and hobbyist with an interest in micro-computers for both hobby and commercial purposes.

John Bird, Associate Prof, Community College of Baltimore, 2901 Liberty Heights Ave., Baltimore MD 21215

W.A. Bobisud, Route 1 Box 559-D, Grass Valley CA 95945, is a retired Electronics Engineer who has been recently afflicted with 'computeritis'. He has just completed assembly of an Altair 8800 and is presently trying to develop a less expensive I/O card than that provided by Altair. He heard about us thru the Digital Group Clearinghouse.

Robert K. Burant, HMX-1 Exec Flt MCAS, Quantico VA 22134, hasn't made up his mind which way he'll be going (choice of system) but he's getting ready to make the plunge.

John Burger, 1440 Leopold St., Jasper INDIANA 47546, has a Mark-8 up and running with a TVT attached. He's building a cassette interface and is planning to buy the Monitor 8 16K Rom thru Mini Micro Mart.

T.F. Caldwell, P.O. Box 116, Burgess VA 22432, is just completing a TVT and is in the process of accumulating parts for the Mark-8.

H.N. Campbell, R.D. 3 - Brockway Road, Moravia N.Y. 13118, has a completed Mark-8 micro-computer which does not compute. As a matter of fact, it doesn't do anything! Upon re-reading some back issues of RE he ran across Hal's letter in the Oct issue. He is now one of us and the happy recipient of all those de-bugging tips in NL's 1 thru 5.

Douglas Faunt Jr., 310 Holly St., Columbia SC 29205, is going in the direction of the DEC LSI-11 (see NL #6), and is building a terminal with Mini-Micro Mart's Univac printer mechanism.
Michael Christoffer, 4139 12th N.E., Suite 400, Seattle WA 98105, is a graduate engineering student at the University of Washington. He just completed construction of an 8008 based microcomputer and is looking forward to some heavy software development.

Lynn E. Cochran, 377 Laurie Meadows Dr., Apt #327, San Mateo CA 94403, is waiting for his Altair 8800 to arrive and is planning to go the Solid State Music memory board route. He, and some of his friends (who have also ordered 8800's) will probably work together on developing I/O boards and a priority interrupt system.

And, Lynn, don't worry about providing "camera ready" copy for the newsletter. We're very happy to hear what you newcomers are interested in and planning to do. Those of you that have only sent us your name and address....we, and everyone else, would like to hear of your plans and/or thoughts. --

C. R. Corner, 514 South 9th St., Moorhead MN 56560

Robert G. Confrey, PSC Box 4636, Beale AFB CA 95903

Richard C. Creighton, 1053 Princewood Dr., Orlando FL 32810

Mark G. Crook, 3 Bel Air Rd., Delmont PA 15626, would like to get the plans for the Mark-8. (They can be ordered from Radio-Electronics, Micro-computer, P.O. Box 1307, Radio City Station, New York N.Y. 10019, for $5.00)

L. Dabrowski, 1815 N. Karlov Ave., Chicago ILL 60639

Gary L. Dickman, 707 Elm St., Hays KA 67601, Ph: (913) 625-9693 or 462-3439

Steven Dompier, 2136 Essex St., Berkeley CA 94705, is currently building an Altair 8800 with disc drives.

James Dunion, 421 Ridgecrest Rd., Atlanta GA 30307, is a graduate student in Information and Computer Science at Georgia Tech. He has built a Mark-8 and the Altair 8800 and is looking for suggestions as to how he could make contributions to the User's Group. If you've got them things built, Jim, then it's software development time...and we'd love to share your efforts with the others.

Robert H. Frbe Jr., #263, 614 W. 36th Pl., Los Angeles CA 90007

David J. Evans, 754 S.E. Daytona Drive, Palm Bay FL 32905, Ph: (305) 724-2613, is an instructor in Computer Science and is currently working toward a Ph.D. in Electrical Engineering. He has built a microcomputer around the 8008 and is very interested in software and hardware developments.

Edward M. Evans, 46 Knoll Crest Ct., West LaFayette IND 47906, is an Instrument Specialist at Purdue University. His recently completed Mark-8 is currently in the de-bugging stage, and he has also built a TVT which works great.

Charles R. Goetowski M.D., 2506 Victor Ave., Glenview ILL 60025, Ph: 729-8886

John Ford, 5561 Esplanada Ave., Santa Maria CA 93454, has a noble project in mind. He is going to develop a modular CHESS program which hopefully can be reduced to 4K, using an overlay technique to roll program segments in and out of memory. (There, John, now you're committed.)
W.C. Fuller, 2377 Dalworth 157, Grand Prairie Texas 75050

Jeff Goldberg, 826 Cambria Ave., Santa Maria California 93454, Ph: (805) 937-5558

Jack Gray, 264 East 21st Street, Paterson NJ 07513

John Hardesty, 909 E. Grovemont, Santa Ana California 92706, is a "four-bit people". He is building a microcomputer using the Intel MCS-4040 and is, of course, interested in the same type of peripherals being built and acquired by us "8-bit people".

Robert L. Hatfield, 228 - 22nd St., Ashland Kentucky 41101

Gray Hoffman, 1502 Spillers Lane, Houston Texas 77043

Donald E. Houghton, 1864 Ortonville Road, Ortonville Missouri 48462

J.P. Hunter, 1207 Malden Ave., San Pedro, California 90732

Doug Inglis, 2711 So. Eby St., Terrace, B.C. Canada V8G 2X4, is a Computer Science teacher with an interest in micro & mini computer development.

H.J. Kearns M.D., 14421 Wilson Road, Edmond, Oklahoma 73034

Carl R. Kelb, 3775 Nathan Way, Palo Alto, California 94306, has built an 8008 based microcomputer along with Don Lancaster's TVT modified to 80 characters per line.

Speaking of Mr. Don Lancaster... he sent in a check for membership in the User's Group and Hal Singer promptly returned it with a letter expressing his (and our) gratitude for the contributions he has made to the microcomputer hobbyist field. Thanks again, Don, and welcome aboard.

Robert A. Kern, Chief - Computer Services Unit, A-306 East Fee Hall, Michigan State University, East Lansing, Michigan 48824, indicates that his department is seriously considering construction of a microcomputer system.

Jack W. Klincher, 15448 Meyers Road, Detroit, Michigan 48227, Ph: (313) 345-4974, is "investigating the field" and trying to decide which microcomputer system he is going to build.

Dick Kopitzke, 200 W. Midway Drive #177, Anaheim, California 92805, is quite enthused about getting started on the Mark-8 and plans to use it as a "brush-up" learning tool (he has previously worked on some of Autometric's 2nd & 3rd generation nav system computers). He is also looking for employment in "electronics test, computer/digital test, engineering assistant or a Quality assurance function related to those positions." Phone: (714) 535-7001.

Richard Kulka, 283 Poplar St., Mansfield, Ohio 44903, is in the process of making the PC boards for the Mark-8 and the TVT. He's been playing with electronics for the past 10 years and is looking forward to getting into this latest thing.

Charles (Chuck) W. Leroy, 116 Somerset Pl., Lompoc, California 93436, Ph: (805) RE 6-5475, is currently checking out an Altair 8800 and will be interfacing it with a surplus keyboard, TVT II (modified for direct mem access, Read/Write, & without keyboard), cassette, and graphic CRT display. He's very happy about the fact that PCC is developing a mini-BASIC. (I think we'll all be happy to see a BASIC which we can all use.)
Charles A. Lewis, 3435 Woodmar Courts, West Lafayette, Indiana 47906, has completed the Mark-8 but is having trouble getting it running (perhaps the past NL's will help solve the problem, Charles. If not, let us know.) He says it will address, load, & examine...but not run. He has plans for interfacing a mag tape when it becomes operational.

Ric Martin, WATMVL, 13709 Preston Rd. #232, Dallas, Texas 75240, is building the Mark-8 and TVI I. A Klienschmidt 311 RO will be used for hard-copy (at 300 baud).

Harrison R. McCray Jr., 6716 Rugby Lane, Charlotte, North Carolina 28211

W.H. McCarter, PO Box 864, Slidell, Louisiana 70458

Thomas E. Morgan, 3904 King Arthur Road, Annandale, Virginia 22003

Christopher S. Ott, 47 Mueller Dr., Charleston, South Carolina 29407, is looking for a de-bugged & running Mark-8 for purchase.

Richard A. Peterson, 9004 184th Ave. E., Summer, Washington 98390, is in the final stages of assembling his Mark-8 & TVT. He heard about us thru Maury Goldberg's "Mini-Micro Mart" and would like to know if anyone has tried driving the UNIVAC 0769 printer that is advertised? He's going to order the NL Monitor 8 ROM (correction...has ordered). (Most of the questions in your letter, Richard, will be answered in the previous NL's.)

Richard W. Rauer, 2842 N. Richmond St., Chicago, Illinois 60618

David P. Rennie, P.O. Box 33388, Houston, Texas 77033, heard about us thru the Digital Group Clearinghouse.

Richard Rhinevault, 79 Sprucewood Circle, Geneva, New York 14456

Joe D. Ringland, P.O. Box 4781, Rolling Bay, Washington 98061

William (Bill) J. Risch, 471 Geneva Apt 212, Aurora, Colorado 80010

J.B. Ross, Asst. Prof. of Physics, Dept. of Physics, Park College, Kansas City, Missouri 64152

Jeffrey P. Royer, 1568 Mariposa Ave., Palo Alto, California 94306, states that "we are in the process of building a Mark-8", and they're planning to use it as an educational exercise and later for computer-controlled games & musical applications. (Who are "we", Jeff?)

Frederick L. Kahl, T&F Electronics, 704 Courtland Circle, Western Springs, Illinois 60558

John D. Turner, MAVSEEACT Japan, Box Five, FPO Seattle, Washington 98762, is awaiting an Altair 8800. He is working near Tokyo at the present and expects to return to the states next year.

Duane L. Gustavus, 818 W. Hickory, Denton, Texas 76201, is completing construction of an Altair 8800 w/1K of static memory. He expressed slight reservations for not going the 8008 route because of the support from groups such as ours. (Don't worry, Duane, it looks like this group is going to be just as active in 8080 software & hardware development as the 8008.)

William H. Freeman, 816 Meadowlark Lane, Glenview, Illinois 60025, is a registered Professional Engineer who recently attended a course on microprocessors at Northwestern University. One of the instructors (Prof. W.J. Lennon) suggested the NL would be of interest. (We hope so.)
Ernst J. Schubert Ph.D., Computer Institute for Continuing Education, POB 851, Los Alamitos, California 90720, is one of the founders of the Institute, and has started a project to build a microcomputer and interface it with an ASR 33 and cassette. He plans to develop an Operating System using BASIC and will be happy to share the results with the User's Group.

William E. Shawcross, 1105 Massachusetts Ave., Cambridge, Massachusetts 02138 Ph: (617) 547-7652

Neal Sheffield Jr., D.D.S., N42PZ, 2601 Oakcrest Avenue - Suite E, Greensboro, North Carolina 27408

Robert Sherman, 1010 North Palm Ave. #201, Los Angeles, California 90069

Randy Soderstrom, 4601 Goldfinch Dr., Madison, Wisconsin 53714

Charles D. Soucek M.D., 2807 Ohio, Kansas City, Kansas 66102

Capt. John R. Stanton, 2930 Currie St., Biloxi, Mississippi 39531

Donald E. Tarbell, 144 Miraleste Dr. #106, Miraleste, California 90732, is a busy man indeed. He designed and built his own computer system and has been operating it for the last four years. The CPU is an 8-bit, byte-oriented machine with 16-bit Accumulator, Prog Cntr, & Index Registers (5). It has 50 instructions w/8 addressing modes (both to be expanded). The peripherals include a Model 32 TTY, CRT & keyboard, 500 Kbyte disc, modem, X-Y Plotter & audio cassette. He intends to install 2 more CPU's -- an 8080 and a micro-programmable processor with Writable Control Store. The three processors will share memory (36 Kbytes) and peripherals. He has also developed extensive software which includes a BASIC interpreter and a Sentence Processing Language. (Ya gotta lotta guys boilin' over with envy, Don. I hope yur happy!)

Gary D. Thurmond, 1040 Meadows End Dr., Calabasas, California 91302, W6STR, Ph: (213) 340-1664, just completed the TWT and is waiting for a MOD-8 from Mini-Micro Mart (and the MIL Monitor-8 Rom). He's quite enthused about this new hobby & has really been bitten by the bug.

S. Joseph Toy, Route 3 Box 73, Chico, California 95926

Laurence E. Turner, #102 3023 Blakiston Dr. N.W., Calgary, Alberta, Canada, is interested in the MOD-8 and is wondering if layouts (or negatives) are available for making his own boards? He is presently building some terminals and cautions that the General Instruments keyboard encoder sold by B&F Enterprises is likely not the standard 2376 ASCII encoder as claimed. (Out of two completely separate orders both encoders he recvd' were custom encoders - & B&F would not accept them for return.)

Robert A. Van Winkle, 288 Woodbridge St., Yuba City, California 95991, has two Micro-8's (Mark-8's ?) under construction and "is anxious to meet and/or correspond with anyone working with these items." (We might be able to help you out there, Bob.)

Andrew Vics, Media Co-ordinator, Pequannock Township High School, Sunset Road, Pompton Plains, New Jersey 07444, indicates his school is currently involved in microcomputer experimenting and is interested in the TWT.

L.G. Walker, Rt 1 Box 272, Aledo, Texas 76008, is an analyst and scientific programmer with 16 years of experience in the field. He is currently working as a member of a software team designing and building mobile computerized systems. (And, we sent him a requested copy of the NL so that he can get bit by da bug, too.)

Page 17
Tate Yoshida, 2951 S. Martin Luther King Jr. Dr., Chicago, Illinois 60616, heard about us thru the Digital Group.

Bruce Robinson, 15 Cranegrove, Ontario, Canada, is an instrumentation design engineer doing analog-to-digital conversion using an 8008 based PRO-LOG microcomputer (for a living). He's very interested in microcomputer applications for model railroading and has some things working in that area. He has also come up with some inventions in the Ham radio field.

Robert Zaborcak, 40 Maple Lane, Lake Hiawatha, New Jersey 07034

Pearce Young, 9478 Cherokee Lane, Beverly Hills, California 90210, is a Los Angeles County Superior Court judge with an interest in electronics which was previously concerned with ham radio and is now actively involved in the computer hobbyist field (by way of a MITS Altair 8800). He, together with Don Tarbell (see page ) and a few others, are organizing a meeting of enthusiasts in the Los Angeles area for June 15th. The meeting will be at 2:00 P.M. in the recreation room at Don Tarbell's apartment building (Laurel Tree Apts.). Please drop a note to Don and let him know if you will be attending and how many in your party (Donald E. Tarbell, 144 Miraleste Drive, Apt. 106, Miraleste, Calif. 90732). If you have any items to sell or trade, bring them along. Also, if it is not too large, feel free to bring your own computer. Following is a map showing how to get to Don's apartment:

**MAP TO MEETING PLACE**

To locate Don's apartment, follow these directions:
- Head north on Western Ave.
- Turn right on First St.
- Turn left on Gaffey St.
- Continue south until you reach the Harbor Freeway.
- The recreation room and theater in the main office building is located on this side of the harbor

**NOTE:**

It would be best to park along Miraleste Drive, since most of the apartment spaces are numbered, and subject to towaway. There may be a few "guest" parking spaces available if you arrive early.
Introduction to the MIKE 2

Martin Research has received hundreds of inquiries about our microcomputer modules—both from readers of our book, MICROCOMPUTER DESIGN, and from computer hobbyists. Demand for the MIKE 201 exceeded our initial supply of printed circuit boards. Volume production of PC boards is now underway, and we expect to begin shipping again on June 16, 1975.

Before you decide you can’t wait, let us describe what we believe is the best microcomputer yet available.

FIRST: All of our parts are new and of top quality. No factory seconds or temperature rejects.

SECOND: All printed circuit boards are commercial quality, made by professional PC houses to our specifications. Component holes are plated through for easy solderability. Each board comes with its own connector for rapid insertion and removal.

THIRD: The system architecture has been designed for optimum flexibility. It uses a carefully-designed bus structure which permits any board to be inserted in any position on the bus. To expand the system, you simply plug more boards onto the bus.

FOURTH: All critical control signals needed throughout the system are decoded right on the CPU board and piped around the system on the bus. Hardware interfaces to the microprocessor generally need only two chips—one strobe decoder, and one latching device (for output ports) or three-state driving device (for inputs).

FIFTH: There are no critical adjustments during assembly. The main timing is controlled by a reliable crystal on the CPU board.

The Boards

The MIKE 203 system contains four circuit boards, described below.

MIKE 2-1

CPU BOARD

An 8008, crystal-controlled oscillator, and all the timing for the system. The bidirectional bus drivers on the CPU board allow many accessory boards to be added to the microcomputer.

MIKE 2-20

CONSOLE BOARD

The MIKE 2-20 has six large, 0.3-inch seven-segment display digits and a twenty-key calculator-type keyboard. Unlike systems with banks of toggle switches and lights, this micro is easy to program, since codes are easily visualized. The six digits are driven by decoding latches, and can be read in octal, decimal, or hex; they are user-accessible, constituting three output ports.

MIKE 2-3

PROM/RAM BOARD

This board has room for up to 1K of RAM (1024 eight-bit bytes, or 8192 bits) and 2K of PROM (2048 bytes). Handles up to eight 2112s and up to 8 1702As. The basic system, the MIKE 203, uses 256 words of RAM (two 2112s) and 256 words of PROM (one 1702A). The PROM is preprogrammed with our monitor program, described below.
MIKE 2-15
BREADBOARD
A standard-sized MIKE 2 board, with a connector for interfacing to
the system bus. All power and bus signals are accessible. Pre-
drilled with over 700 holes, with half the board configured for
standard 14- and 16-pin DIPs (+5 and ground at the corners), and
the other half with universal spacing, for any size sockets.

MIKE 2 Monitor

Just as important as the hardware is the MIKE 2 MONITOR that comes
with the MIKE 203. Consisting of 256 words in a single 1702A PROM,
MIKE 2M allows you to write instructions into memory at any location,
and read instructions, simply by punching the keys on the keyboard.

DATA ENTRY
Instructions and data are entered into the MIKE 2 simply by punching
the keyboard. With a little practice, it's just as fast as your
pocket calculator. As a key is pressed, the digit appears on the
LED display. When a second digit is entered, the first automatically
moves left and the second takes its place. For example, say you
are entering the number 135, which is the octal number for an 8008
OUTPUT 16 instruction. You type in the 1, and the display reads
000001. Then you press the 3, and the digits say 000013. Finally,
you press the 5, and the display reads 000135. (Incidentally, you
do not have to punch in leading zeros.) As the data appears on
the displays, it is also loaded into the 8008's E register, where it is
available for further use.

A number of special-purpose keys on the keyboard are used to
program the microcomputer.

LOAD H KEY
This key is used to address memory. It transfers the contents of
the 8008's E register to its H register, then clears the E register
(to 000). For example, you have just entered 010 onto the display;
now you press this key. The 8008 H register address is now 010,
and this is the new high-order memory address for writing into
and reading from memory.

LOAD L KEY
This key also references memory, at its low-order address.
Together, the LOAD H and LOAD L keys can address any location in
the 8008's full complement of 16K of memory. After the LOAD L
key loads the L register from the E (clearing the E), the display
blinks back and forth between the address of memory, and the
contents at that address.

WRITE KEY
This key writes into RAM memory. It takes the value previously
entered into the E register, writes into RAM at the H/L memory
address, and clears the E register. Then it increments the L
register (and the H if the L overflows), preparing the user for
the next instruction. Now the display begins to alternate between
the new address in memory and its contents.

READ KEY
This key reads the contents of RAM or PROM at any address, as
selected by the LOAD H and LOAD L keys. The display alternates
between memory address and contents. Each time the REAL key is pressed, the program automatically steps to the next-higher location in memory, so that you can check the contents of a whole program quite rapidly.

**EXECUTE KEY**

This key jumps to location 010 000 in RAM memory and executes whatever program you have stored there.

**INTERRUPT KEYS**

One key sets the interrupt flip-flop on the CPU board low. (Now no peripheral device on the MIKE 2 bus can cause an interrupt.) The second key resets the flop, causing an interrupt to the 8008. The M2M program takes over, saving the status of the 8008's internal registers automatically. (The A register contents are at 013 370 in RAM; B, at 013 371; C, 013 372; D, 013 372; E, 013 374; flags, i.e., carry, parity, sign, zero, 013 375; H, 013 376; and L 013 377.) The digital display automatically flashes back and forth between location 013 370 and the contents of the A register. The other saved registers and flags can be read out in succession by pressing the READ key. This feature allows the user to use the 8008's interrupt capabilities without including status-saving software in each program.

**CONTINUE KEY**

This key continues execution of the main program at the point where the CPU left off when it was interrupted.

## Programming

Here is an example of a program for testing operation of the MIKE 203. First, the program; then, how you load it in and execute it.

### THE PROGRAM

<table>
<thead>
<tr>
<th>Address</th>
<th>Value</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>010000</td>
<td>304</td>
<td>LAE</td>
</tr>
<tr>
<td>010001</td>
<td>004 021</td>
<td>ADI 021</td>
</tr>
<tr>
<td>010003</td>
<td>100 007 010</td>
<td>JFC 010007</td>
</tr>
<tr>
<td>010006</td>
<td>250</td>
<td>XRA</td>
</tr>
<tr>
<td>010007</td>
<td>340</td>
<td>LEA</td>
</tr>
<tr>
<td>010010</td>
<td>133</td>
<td>OUT 15</td>
</tr>
<tr>
<td>010011</td>
<td>135</td>
<td>OUT 16</td>
</tr>
<tr>
<td>010012</td>
<td>137</td>
<td>OUT 17</td>
</tr>
<tr>
<td>010013</td>
<td>045</td>
<td>RST 040</td>
</tr>
<tr>
<td>010014</td>
<td>104 000 010</td>
<td>JMP 010000</td>
</tr>
</tbody>
</table>

**ENTERING THE PROGRAM**

1. _1, _0_. (Display reads 010.)
2. **LOAD H**.
3. **LOAD L**. (This loads L register with _000_. Now memory location is 010000. Digits flash this address and its current contents.)
4. _3, _0, _4_. (304 on display.)
5. **WRITE**. (Display moves to next location.)
6. _4, **WRITE**.
7. _21, **WRITE**.
8. _100, **WRITE**.
9. _7, **WRITE**.
The display will now count as follows, changing once every 1.2 sec.:

```
111111 222222 333333 444444 555555 666666 777777 888888
999999  AAAAAA  bbbbbbb  CCCCCCC  ddddddd  EEEEEEE  FFFFFFF  000000
```

### The System

**MECHANICAL**

The MIKE 203 is complete except for a cabinet of your own design, and a power supply. The four boards provided each measure 5.5 by 7.0 inches (140 by 178 mm), and include a fifty-pin connector at the rear which connects to a fifty-wire flexible cable. The boards stack up, one on top of the other, and are separated by rigid metal spacers (provided). Eighteen inches (457 mm) of cable are supplied with the MIKE 203, more than enough for foreseeable expansion.

**POWER**

Power requirements for the basic MIKE 203, including only those basic memory chips detailed above: +5 V, 1.4 A; -9 V, 70 mA.

A power supply providing these voltages and ±12 volts as well is under development and will be announced shortly.

### Extras

A number of circuit boards are under development:

- **MIKE 2-5**
  - 4K RAM BOARD
  - Available as this sheet goes to press, our 4 K RAM board has room for up to thirty-two 2102 static RAM chips. It includes decoders and bus drivers for complete interfacing with the MIKE 2 system. Adds up to 4,096 bytes (32,768 bits) of memory. Requires a single +5-volt supply.

- **MIKE 2-6**
  - CRT DISPLAY INTERFACE.

- **MIKE 2-9**
  - CASSETTE RECORDER INTERFACE, for use with audio machines.

- **MIKE 2-10**
  - TELETYPETE INTERFACE, for hard copy. Includes control ROM.

- **MIKE 2-14**
  - PROM PROGRAMMER, for 1702A PROM memories.

- **MIKE 2-?**
  - YOUR SUGGESTIONS APPRECIATED.

For further details, stay in contact with Martin Research. To be added to our mailing list, just drop us a postcard or call us up; we’ll send you bulletins as new developments occur.
<table>
<thead>
<tr>
<th>PART</th>
<th>DESCRIPTION</th>
<th>BOARD &amp; CONNECTOR ONLY</th>
<th>KIT</th>
<th>ASSEMBLED &amp; TESTED</th>
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</thead>
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<tr>
<td>MIKE 2-1</td>
<td>CPU board, without 8008</td>
<td>19.95</td>
<td>54.95</td>
<td>74.95</td>
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<tr>
<td>MIKE 2-1A</td>
<td>CPU board with 8008</td>
<td></td>
<td>94.95</td>
<td>114.95</td>
</tr>
<tr>
<td>MIKE 2-1B</td>
<td>CPU board with 8008-1, fast crystal (60% faster than standard 8008)</td>
<td></td>
<td>99.95</td>
<td>119.95</td>
</tr>
<tr>
<td>MIKE 2-20</td>
<td>Console board</td>
<td>19.95</td>
<td>68.95</td>
<td>83.95</td>
</tr>
<tr>
<td>MIKE 2-28</td>
<td>PROM/RAM board with 1-1702A (M2N program), 2-2112s</td>
<td>19.95</td>
<td>78.95</td>
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</tr>
<tr>
<td>MIKE 2-15</td>
<td>Breadboard</td>
<td>19.95</td>
<td>19.95</td>
<td></td>
</tr>
<tr>
<td>MIKE 2-030</td>
<td>18&quot; cable and spacers</td>
<td></td>
<td>4.50</td>
<td>6.00</td>
</tr>
<tr>
<td>MIKE 2-100</td>
<td>MIKE 2 MANUAL</td>
<td></td>
<td>10.00</td>
<td>10.00</td>
</tr>
<tr>
<td>MIKE 203</td>
<td>MIKE 2 microcomputer system. One each: 2-1, 2-20, 2-3, 2-15, 2-030, 2-100. Without 8008.</td>
<td></td>
<td>229.95</td>
<td>279.95</td>
</tr>
<tr>
<td>MIKE 203A</td>
<td>MIKE 203, with 8008 microprocessor</td>
<td></td>
<td>269.95</td>
<td>319.95</td>
</tr>
<tr>
<td>MIKE 203B</td>
<td>MIKE 203, with 8008-1, fast XTAL</td>
<td></td>
<td>275.95</td>
<td>325.95</td>
</tr>
<tr>
<td>MIKE 2-5</td>
<td>4K RAM board. No 2102s, decoders</td>
<td>28.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MIKE 2-5A</td>
<td>With decoders, 1K of RAM, 450 ns speed</td>
<td></td>
<td>77.95</td>
<td>99.95</td>
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<tr>
<td>MIKE 2-6B</td>
<td>With 2K of RAM, 450 ns</td>
<td></td>
<td>107.95</td>
<td>130.95</td>
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<tr>
<td>MIKE 2-6C</td>
<td>With 3K of RAM, 450 ns</td>
<td></td>
<td>136.95</td>
<td>160.95</td>
</tr>
<tr>
<td>MIKE 2-6D</td>
<td>With 4K of RAM, 450 ns</td>
<td></td>
<td>164.95</td>
<td>189.95</td>
</tr>
</tbody>
</table>

**3112**
Extra 2112 256 x 4 RAM ICs for MIKE 2-3

**1702A**
Extra 1702A PROMs for MIKE 2-3

**MOD-8**
7-1702A PROMs, programmed and tested with Microsystems' MOD-8 monitor program

**MOD-8/CREED**
8-1702A PROMs, programmed and tested with modified MOD-8 for use with 5-bit CREED teletypewriters

**MIKE 2-151**

**MIKE 2-16**
CREED interface board. Connects 5-bit CREED machine with MIKE 2. Available as kit only (MIKE 2-15 plus kit of parts).

**MICRO-COMPUTER**
A 300+ page book on hardware design around the 8008. Write for details, pricing. Price with MIKE 2 purchase of $200 or more:

----- 50.00
HANDLING CHARGE

Our minimum order is $25.00. Orders for less than this will be charged an additional $1.00 for handling.

TAX

Illinois residents, please add 5% state sales tax.

SHIPPING

Within the United States: shipping is free on prepaid orders. Orders requiring billing will be charged for shipping costs. We ship via United Parcel Service (by mail in non-UPS areas); be sure to give a street address suitable for UPS delivery. Air shipment (air mail or UPS blue label) is available at cost.

TERMS

Recognized corporate and institutional purchasers, net 30 days. Individuals: for fastest service, use a cashier's check, money order, or MASTER CHARGE. We reserve the right to delay shipments while personal checks clear through our bank. When using MASTER CHARGE, please supply your account number and its expiration date.

QUANTITY PRICES

Please contact Martin Research for quotations on quantity prices on MIKE 2 parts and systems. Educational rates have been established for the book MICROCOMPUTER DESIGN; educators, please write on your letterhead for price lists.

OUTSIDE UNITED STATES

Our export agent reserves the right to request prepayment in advance of shipment. Shipping is charged at cost; please specify surface mail or air shipment.

WARRANTY POLICY

Parts and circuitry guaranteed to operate as advertised. Parts on warranty for thirty days. However, we cannot be held responsible for damage to parts determined to result from carelessness or misuse. In case of problems, please write Martin Research with an explanation. In order to ensure credit, please do not return goods until you have received written permission.

SHORT FORM ORDER BLANK

Name __________________________ Phone __________________________

Company/Institution __________________________

Address __________________________ Zip __________________________

<table>
<thead>
<tr>
<th>ITEM</th>
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<th>ITEM</th>
<th>PRICE</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td>Subtotal (for goods)</td>
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<td></td>
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<td>ILL. residents: 5% tax</td>
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<td>Handling charge; omit for order of $25.00+</td>
<td>$1.00</td>
</tr>
</tbody>
</table>

Subtotal __________________________ TOTAL ENCLOSED __________________________
Any number of players can play Chomp. It is played (in this version) on an 8 by 8 board of +’s with a * in the upper right hand corner. Players take turns chomping until one player is forced to take the poison *. To take a chomp, you type in the letter and number of one of the +’s, That +, and all of the +’s to the left and below disappear. No fair chomping empty space.

This version of Chomp uses the Mark-8 with the TV Typewriter I and an ASCII keyboard. The TVT is on output port 1, and the keyboard is on input port 0. Strobe lines are appropriately connected (see below).

First load the "Load Comments" program then interrupt with a Restart 005. Now set the switch register to 300 (NOP) and type in the comments using returns and line feeds as shown. The output 0 LED’s will count characters as they are loaded. LED’s should read 365 when done.

Now load the program from 0 000 to 0 164. Interrupt with 005, then set switch register to 300, home TVT and press any key. When the game is over, clear the screen and hit any key to play again. Have fun!

* Remove jumper!
** Remove cursor C16.
<table>
<thead>
<tr>
<th>Line</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>TYPE A LETTER AND A NUMBER(ret)</td>
</tr>
<tr>
<td>001</td>
<td>TO TAKE A BITE, NO FAIR BITING(ret)</td>
</tr>
<tr>
<td>002</td>
<td>AIR, BITE THE &amp; AND YOU LOSE(3 ret)</td>
</tr>
<tr>
<td>003</td>
<td>ABCDEFGH(ret)</td>
</tr>
<tr>
<td>004</td>
<td>306 LAL ++1(ret)</td>
</tr>
<tr>
<td>005</td>
<td>121 OUT 010 ++2(ret)</td>
</tr>
<tr>
<td>006</td>
<td>000 HLT ++3(ret)</td>
</tr>
<tr>
<td>007</td>
<td>101 INP 000 ++4(ret)</td>
</tr>
<tr>
<td>010</td>
<td>123 OUT 011 ++5(ret)</td>
</tr>
<tr>
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<td>370 LMA ++6(ret)</td>
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<tr>
<td>012</td>
<td>060 INL ++7(ret)</td>
</tr>
<tr>
<td>013</td>
<td>104 JMP ++8(7 ret)</td>
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<tr>
<td>014</td>
<td>004 G0!(2 space) (LF) (space)</td>
</tr>
<tr>
<td>015</td>
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1 300 (6 ret) NEXT?(LF)

1 314 (ret) CHOMP! YOU LOSE, PLAY AGAIN?(11 ret) (LF)

---Program---

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<tr>
<td>006</td>
<td>110 JFZ 106 CAL 106 CAL</td>
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<td>000 106 CAL 150 JTZ</td>
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<td>015 015</td>
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<td>015 000 HLT</td>
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<td>121 123 OUT 011 160 000</td>
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<tr>
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<td>000 121</td>
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<tr>
<td>300</td>
<td>LCA 000</td>
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<td>106 CAL 106 CAL 104 JMP</td>
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<td>CAL 015 000 000</td>
</tr>
<tr>
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<td>000 000</td>
</tr>
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</table>

Page 26
Phil Mork's Music Program Modified For 8080's

MUSIC PROGRAM FOR ALTAIR 8800

By Chuck Leroy, 116 Somerset Pl
Lompoc, CA, 93436

Uses Sense Switches for Tempo

START LXI H MUSIC SET ADDR.
TEMPO IN 377 GET TEMPO FROM
THere MOV D,A SENSE SW.
- MOV A,M PUT IN D
  CPI 377 GET NOTE
  JZ START 377 ?
LOOP DCR A YES, REPEAT
      JZ CLICK NO, DEC. FREQ.
      DCR D 0 ?
      JNZ LOOP NO, DEC. TEMPO
      MOV B,A 0 ?
      IN 377 YES, SAVE NOTE
      MOV D,A GET TEMPO
      MOV A,B PUT IN D
      DCR E RESTORE NOTE
      JNZ LOOP TIME TO GET NEW
      INX H NOTE ?
         THERE NO, GO BACK
         JMP YES, BUMP ADDR.
CLIcK THERE GO BACK
         OUT PORT
         JMP THERE GO BACK

NOTE VALUE
A 343
A# 326
B 312
C 264
D 252
E 230
F 217
G 200
G# 174
A 153
A# 145
B 140
C# 114
D 110
D# 105
E 90
F 80
G# 77

MUSIC 200 162 140 174
230 162 174 174
217 200 162 140 174
207 200 153 140 174
200 207 145 140 140
114 200 145 140 140
140 230 153 140 140
200 217 145 140 140
200 200 217 140 140
217 162 217 140 140
217 162 217 140 140
230 174 140 140 140
217 162 140 140 140
125 140 125 140 140
145 140 145 140 145

Try Sense Switch 11,12 for Tempo.
Handy Special Register Subroutines

By Dr. Robert Suding, C/O Digital Group, PO Box 6528, Denver, CO 80206

Register operations are a general nuisance on the 8008, especially when using the H&L registers. The following subroutines are part of a new 2K operating system to be available through the Digital Group.

The first thing to do is to make up two jumper plugs to connect the eight Port 5 inputs to the eight Port 5 outputs, and the eight Port 4 inputs to the eight Port 4 outputs.

The next item is to reserve storage addresses 000006, 000007, and 000050 - 000056 as temporary storage locations for registers A through L.

Now the subroutines (addresses may be moved as desired):

Notes

"H&L Register Save" places the current H&L into storage positions 000055 and 000056. The A register is temporarily saved and later restored to permit its utilization without loss of its original contents.

"H&L Register Restore" retrieves the values of H&L registers previously stored in storage positions 000055 and 000056.

"H&L Swap with D&E" exchanges these register sets to double the memory accessing capabilities of the 8008.

"Register A - L Save" places the current A - L registers into storage positions 000050 - 000056. No registers are lost in the operation. By placing this subroutine at the front of your storage dump routine, you can list off all 6 registers by simply sampling storage positions 000050 - 000056.

"Restore A - L Registers" loads registers A - L with the contents of storage positions 000050 - 000056. The former data in registers A - L is lost.

"Swap Current A - L Registers with Stored Ones" exchanges the current A - L Registers with those stored in storage positions 000050 - 000056. No data is lost in the exchange. The result of this operation is a 12 register microprocessor instead of a 6 register microprocessor.

Sincerely,

Dr. Robert Suding WØLMD
<table>
<thead>
<tr>
<th>OCTAL ADDRESS</th>
<th>OCTAL CODE</th>
<th>OPERATION</th>
<th>OCTAL ADDRESS</th>
<th>OCTAL CODE</th>
<th>OPERATION</th>
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<tr>
<td>001 000</td>
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<td>*** H&amp;L Register Save</td>
<td>001 060</td>
<td>306</td>
<td>Load A with L</td>
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<tr>
<td>001 001</td>
<td>133</td>
<td>Out 5 (Save A)</td>
<td>001 061</td>
<td>056</td>
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<td>001 002</td>
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<td>001 062</td>
<td>000</td>
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<td>001 003</td>
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<td>001 004</td>
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<td>055</td>
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<td>Load A with Mem</td>
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<td>Restore A-L Registers</td>
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<td>050</td>
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Continued
### Pilot Light & Blown Fuse Indicator Circuit

**5/4/75**

If fuse is good and power is one, neon lights all the time. If fuse blows, lamp flashes.

By Ted Lincoln WA6HWJ

410 Bell Avenue, Santa Ana, CA 92707
MEMORY Diagnostic

James R. Boddie
APT 216
920 N. Dean Rd.
Auburn, AL 36830

0 056 LNS
1 PPP PPP PAGE UNDER TEST (NOT SAME PAGE THAT
2 066 LCE PROG IS LOADED)
3 000 000
4 016 LBE
5 TTT TTT TEST PATTERN
6 376 LML WRITE IN MEM.
7 060 INL
10 110 JBF CONTINUE IF PAGE
11 006 006 NOT FILLED
12 000 000
13 307 LAM READ FROM MEMORY
14 276 CML COMPARE WITH PATTERN
15 110 WFF JUMP IF DIFFERENT
16 027 027
17 000 000
18 060 INL
21 110 JPF CONTINUE IF PAGE
22 013 013 NOT COMPLETELY
23 000 000 CHECKED
24 107 JMP DO IT AGAIN
25 000 000
26 000 000
27 121 OUTF OUTPUT WRONG PATTERN
30 000 HFT READ READ FROM MEM.
31 306 LAC
32 121 OUTF OUTPUT ADDRESS OF ERROR
33 000 HFT
34 107 JMP CONTINUE
35 020 020
36 000 000

* PROG LOADS MEMORY ADD. INTO MEM. LOCATION THEN
  BROWS FOR ERROR.
* FOR AN ARBITRARY TEST
  PATTERN
  1. PUT PATTERN IN (5)
  2. CHANGE (6) TO 371
  3. CHANGE (19) TO 271

The idea of checking the memory if address catches
before plugging the 8008 SVC is good, but I found
it necessary to clear the R/W FE (F 1C 1F) by
momentarily grounding pin 14 on the empty
8008 socket. Sincerely, Dan R. Boddie
<table>
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<th>Code</th>
<th>Key</th>
<th>Key</th>
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<td>LHI, Load H Immediate</td>
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<td>1</td>
<td>001</td>
<td>DATA</td>
<td>DATA</td>
</tr>
<tr>
<td>2</td>
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<td>LLI, Load L Immediate</td>
<td>LLI, Load L Immediate</td>
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<td>3</td>
<td>000</td>
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<td>DATA</td>
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<td>DATA</td>
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<td>DATA</td>
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<td>LDI, Load D Immediate</td>
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<td>DATA</td>
<td>DATA</td>
</tr>
<tr>
<td>12</td>
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<td>JMP, Uncond. Jump to</td>
<td>JMP, Uncond. Jump to</td>
</tr>
<tr>
<td>13</td>
<td>016</td>
<td>ADDRESS</td>
<td>ADDRESS</td>
</tr>
<tr>
<td>14</td>
<td>000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>060</td>
<td>Loop, INL, Increment L or L+1</td>
<td>Loop, INL, Increment L or L+1</td>
</tr>
<tr>
<td>16</td>
<td>302</td>
<td>Start AC, Load A &amp; C</td>
<td>Start AC, Load A &amp; C</td>
</tr>
<tr>
<td>17</td>
<td>270</td>
<td>LMA, Load M &amp; A</td>
<td>LMA, Load M &amp; A</td>
</tr>
<tr>
<td>020</td>
<td>301</td>
<td>LAB, Load A &amp; B</td>
<td>LAB, Load A &amp; B</td>
</tr>
<tr>
<td>21</td>
<td>276</td>
<td>CPL, Compare A &amp; L</td>
<td>CPL, Compare A &amp; L</td>
</tr>
<tr>
<td>22</td>
<td>110</td>
<td>JFZ, Jump Face Zero to</td>
<td>JFZ, Jump Face Zero to</td>
</tr>
<tr>
<td>23</td>
<td>015</td>
<td>ADDRESS</td>
<td>ADDRESS</td>
</tr>
<tr>
<td>24</td>
<td>000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>056</td>
<td>LHI, Load H Immediate</td>
<td>LHI, Load H Immediate</td>
</tr>
<tr>
<td>26</td>
<td>066</td>
<td>LLI, Load L Immediate</td>
<td>LLI, Load L Immediate</td>
</tr>
<tr>
<td>030</td>
<td>000</td>
<td>DATA</td>
<td>DATA</td>
</tr>
<tr>
<td>31</td>
<td>104</td>
<td>JMP, Uncond. Jump to</td>
<td>JMP, Uncond. Jump to</td>
</tr>
<tr>
<td>32</td>
<td>035</td>
<td>ADDRESS</td>
<td>ADDRESS</td>
</tr>
<tr>
<td>33</td>
<td>000</td>
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<tr>
<td>34</td>
<td>060</td>
<td>Loop, INL, Increment L or L+1</td>
<td>Loop, INL, Increment L or L+1</td>
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<td>35</td>
<td>306</td>
<td>Read AC, LAL, Load A &amp; L</td>
<td>Read AC, LAL, Load A &amp; L</td>
</tr>
<tr>
<td>36</td>
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**Remarks:**

START with a RST-0 (005/INT).
END OF O's CHECK indicated by all O's Displayed at PORT 0.
CONTINUE with a CONT (300/INT).
END OF 1's WALK through indicated by all 1's at PORT 0 - INT to CONTINUE.
END OF 1's WALK through indicated by all C's at PORT 0 - INT to CONT.
END OF 0's WALK through indicated by all 1's at PORT 0.

(Use reverse side for formulas, flow charts, notes, etc.)

MICRO Laboratories, Inc., 1973
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**Remarks:** If at any point in the test a error is found in the contents of a memory location, the program will exit to "BAD" indicated by the low address display of 112 (0100 111). The address of the "Defective Bit" will be displayed at output port 6 on control panel.

(Use reverse side for formulas, flow charts, notes, etc.)

MICRO Laboratories, Inc., 1973
A SHORT PROGRAM TO ENTER, DISPLAY, AND STORE ASCII TEXT

By M. Paul Farr, 3723 Jackstadt, San Pedro, CA 90731

Note: See TV Typewriter interface in NL #5.

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Output Subroutine
(25 Char./Sec. Delay Loop)

040 123 OUT-A
026 LCI
003 003
031 DCD
220 JFZ
043 Loop 1
000 }
031 DCC
100 JFZ
043 Loop 2
000 }
007 RET

Keyboard Octal Loader -- By Gregg Weber, 1000 Plaza Dr. Apt 311-C
State College, PA 16801

This is a copy of the loader program he has been using. It loads programs in octal from the keyboard, dumps programs in octal on the TVT, and executes programs in memory. He will soon add cassette load and dump routines.

Directions For Octal Loader

1. TVT connected to output port B (125)
2. Keyboard connected to I/put port 0
3. Start with 005
4. Change interrupt instruction to 300 continue
5. Operating instructions.

Program should type *
Example-- to load a program starting at 02 000
Type L.
Program should respond with H=
Type 002
Program should respond with L=
Type 000
Program should respond with 02 000
Type contents of 02 000
Program should respond with 02 001
When finished type F
Program should respond with *
To dump memory, type D and then enter address as before.
Program will dump 60 locations in octal.
To execute a program, type E, and enter address as before.
An incorrect command will result in a ? being typed.

Page 1 of 5
### OCTAL LOADER

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### Gregg Weber’s Keyboard Loader

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Page 5 of 5

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Modification to input mux module

This mod. causes input instruction "IO5" to input data from the interrupt instruction port. The addition of IC8 (and possibly a diode) are the only modifications needed. (To the Mark B)

Page 39 By Dave Bowles
TERRY RITTER'S EXECUTIVE-LOADER TTY DUMP SYSTEM
(Note: See Terry's writeup on this in NL #6)

By - Terry Ritter, 2524 Glen Springs Way, Austin, TX 78741
(512) 441-0036

Only One Restart Location Is Used

00 000 104 Restart - Jump To Executive
1 000 Loader
2 004
3 106 Executive - Modified
4 000 Instructions
5 007
6 300
7 007

04 000 250
1 320
2 121
3 000
4 101 (KEYBOARD PORT)
5 054
6 377
7 310
10 056
11 004
12 066
13 045
14 301
15 277
16 150
17 075
20 004
21 060
22 060
23 306
24 074
25 074
26 140
27 014
30 004
31 301
32 044
33 007
34 310
35 302
36 200
37 100
40 200
41 261
42 104
43 001
44 004
45 050 ASCII M = DISPLAY M
46 305 ASCII L = DISPLAY L
47 054 ASCII N = DISPLAY N (On Port D Display)

Notes:
Uses Keyboard-Strobe
No-Op Interrupt

Any input which is not a command is considered data; is masked and three bits
shifted into display from rt.

ASCII M = DISPLAY M
ASCII B = LOAD H FROM DISPLAY
ASCII Q = LOAD L FROM DISPLAY
ASCII O = LOAD M
ASCII Space = Increment H, L & Display
ASCII Backspace = Examine
ASCII Backspace = Display
ASCII Backspace = Examine
ASCII A = Call Sub (at H, L)

Non Implemented Commands

Non Single Byte
Terry Ritter's Executive Loader Continued

04 120 302
21 104
22 146
23 004
24 074
25 070
26 150
27 136
28 004
31 006
32 004
33 104
34 140
35 004
36 303
37 314
40 371
41 060
42 370
43 060
44 076
45 307
46 353
47 364
50 106
51 003
52 000
53 335
54 346
55 104
56 002
57 004
60 104
61 000
62 000
63 007
64 060
65 013
66 050
67 007
70 060
71 061
72 110
73 176
74 004
75 051
76 061
77 007
200 006
201 013
202 106
203 350
204 004
205 006
206 157
207 106

\[ \Rightarrow \] TTY Output
\[ \Rightarrow \] Bandot LF
\[ \Rightarrow \] TTY Output
\[ \Rightarrow \] TTY 2-Digit Translation & Output
\[ \Rightarrow \] TTY 3-Digit Translation & Output
\[ \Rightarrow \] Bandot Space
\[ \Rightarrow \] TTY Output

Reserved For Future Interpreter

\[ \Rightarrow \] TTY 3-Digit Translation & Output
\[ \Rightarrow \] Start Again

\{\}
Incr. D, E

\[ \Rightarrow \] Byte \rightarrow Bandot Translation
\[ \Rightarrow \] Mask, Shift, Pick Up Bandot

\[ \Rightarrow \] TTY Output

Page 2 of 3
Output To TTY B7 of Port 4
(Also on port 0 for effect)

Extra delay step included for faster
clocked 8008's.

Isolated Magnet-Driver

(constant-current design insures fast
attack and adjustable current; zener
protects transistor and insures fast
decay. Inductance in circuit requires
high voltage for performance comparable
to 120 volt systems)
suggestions the following software standard:

On another topic, I propose some software possibilities which might become standards: It may not be all that apparent, at first, but an 8008 machine-language program will run only when the program is located in the memory locations for which it was written. There is no particular problem in loading the program anywhere desired; the problem is changing the jump addresses for the program to correspond to the new location.

I propose that the present or original location of each program be identified by a jump as the program’s first step (see figure 1.). Additional space just after the jump address can be used as program ID bytes (see figure 2.), thus providing a convenient basis for program labeling and starting-address table-building programs. Note that the unconditional jump utilizes one of the 8008 “don’t care” codes which can be easily identified by the relocatable loader as a “start of new program.” Similarly, the last step of each program should be a special RETURN code which provides indication of the last step of program(s) in which all proceeding steps to the start of the program are to be located sequentially together.

Note also that a RETURN last step is standardized, rather than a HALT. The RETURN allows calling each program from a keyboard-controlled monitor program, then returning control to the monitor when the called program is complete.

![Figure 1. Jump identifies original starting location.](image)

![Figure 2. Program labels included.](image)

Cordially,

[Signature]

Terry F. Ritter
Vice President
PROPOSAL FOR UNIFYING INPUT/OUTPUT METHODS FOR 8008 AND 8080 USERS

By Brion Johnson
11 April 1975

1. There has been much discussion lately concerning a standard that would enable the ready exchange of programs between different systems. This would be especially good because the different essential programs on a system are much the same in nature but a lot of work to generate if a person starts from scratch. This proposal is aimed at those using INTEL 8008 or 8080 based systems, such as the MARK-8, MIL MOD-8, and ALT IR 8800 to name a few, with a goal of making programs standardized to this proposal runnable on any 8008 or 8080 system equipped with software as stated in this proposal.

2. A previous proposal has suggested that this standardization take place at a hardware level, by making specific I/O port allocations when the architecture is firmed up. This proposal does not use that approach because invariable the I/O configurations of every person's system is bound to be different due to personal choice, or pocketbook, or any number of other reasons, and also because the I/O structure of the 8008 differs radically from the I/O structure of the 8080.

3. The proposal is that program input/output be handled on a system level, which is the usual way that I/O is handled on most computers. Two elements are required, an IOCS (Input Output Control System - The term refers usually to a specific program that takes care of I/O responsibilities) and an exact format specification for calling on the IOCS to inform it of its task (here handled as a subroutine call).

4. The IOCS must (sorry) be written to fit the machine on which it will run. There is a bright side, though, as it may be the bare essentials and only take up about 40 to 50 locations or perhaps one may want to expand it to include such features as buffering, multi-level priority interrupt, usage with a comprehensive operating system supervisor, etc. Given time and sufficient interest, a typical small IOCS (bare bones) might be developed and published in this NL. This one might take and adapt as necessary to fit one's own system.

5. The IOCS proposed here works as follows; The program desiring an I/O service must tell the IOCS (A) The location or starting address of the data, (B) The number of 8 bit words to be transferred, (C) The format that the program looks at (the current format - binary, decimal, ASCII, etc - for outgoing data, or the format that incoming data is to be placed in), and (D) The device at which the operation is to be performed. When the IOCS receives this information, it proceeds with all of the housekeeping (is the device servicable; or is it busy, etc.) and gets everything set up to perform the I/O. Then it might go ahead and do the operation or if it is sophisticated enough, set up the interrupt system and return to the main program, bouncing back to send or receive the next word of data when the device signals that it is ready by causing an interrupt. The beauty of this is that both approaches "look" the same to the program, and hence the program may easily run on many different systems.
6. The format for calling the I LCS is as follows:

6.1 The A, B, C, and D registers contain data as follows:

6.1.1 The A register contains the lowest address of the block of data to be transferred.

6.1.2 The B register contains the number of 8 bit words to be transferred.

6.1.3 The C register contains the data format as follows:

```
D  D  D  D  D  D  D  D
7  6  5  4  3  2  1  0
```

D(7) is a 1 for output: A 0 for input.
D(6) thru D(4) are not used.
D(3) is a 1 for ASCII: A 0 for other.
D(2) is a 1 for 5 level Baudot code: A 0 for other.
D(1) is a 1 for Binary-Coded decimal (BCD), at two
BCD digits per 8 bit word: a 0 for other.
D(0) is a 1 for binary data (8 binary bits): a 0 for other.

6.1.4 The D register contains a device code number. Note
that this number does not specify input or output, and
note also that this number may be readily changed to
fit hardware by the I LCS.

6.1.5 Standard Device Code Allocations Are:

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<tr>
<td>001</td>
<td>System Output Device (perhaps line printer)</td>
</tr>
<tr>
<td>002</td>
<td>thru 007 System input/output</td>
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<tr>
<td>010</td>
<td>thru 377 Not Allocated</td>
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6.2 Program transfer to the I LCS is made by addressing a sub-
routine jump to location 000 070 such as CAL 070 000 or
RST 7.

6.3 Memory locations 000 070 thru 000 077 must not be used by
the program (these contain the transfer instructions to the
I LCS) and also memory locations 000 000 thru 000 007 must
not be used unless for restarting and then must be considered
volatile (as the I LCS may use it for interrupt in some cases
of implementation). The I LCS is assumed to be in upper
memory.

7. Programs written to this specification are assured of running on
any system which has an I LCS written to this specification provided,
of course, that there is room for both the I LCS and the program
in memory... The program should occupy the lower end of memory
with the exceptions as mentioned in 6.3. I hope that this may
provide a workable solution to this very important problem.

8. One word concerning 8008 and 8080 differences... There will be no
difficulty if 8080 users will limit themselves to only using the
8008 instruction set for programs to be exchanged among users. For
those who would be tempted not to (and I don't blame them), I would
like to see a program compatible with this proposal written in
8008 code that would take 8080 code and translate it to the eq-
uitable 8008 listing at the assembly level.
REGISTER ASSIGNMENTS FOR MCS-8 SUBROUTINES
By T. W. Fuller, Santa Barbara
20 April 1975

As a follow-up on the IOCS register assignments proposed by Brion Johnson, the following discussion recommends changes to that proposal, as well as assignments for general subroutine transfers. This will make coding more compact, and easier to implement and understand.

There are basically two ways in which a subroutine may be called with the 8008 instruction set. These are: 1) Using the address stack in a CALL or RST instruction, and 2) jumping to the entry address of the subroutine with the return address contained in two of the scratch pad registers. Obviously, if there is no more stack space, using the second method would be preferable to wiping out the bottom address in the stack by using the first.

In either type of calling method, it may be desirable to save the contents of the registers before executing the meat of the subroutine, so they may be restored before returning to the calling program. The only way these will be store is by using registers L and H. Therefore they cannot be assigned a definite function.

When the second, or jump entry method is used, two registers must contain the return address. It would be most convenient if they could be store directly in the JMP instruction which returns control to the main program. Also, when storing registers for later restoration, it is most convenient to store them in sequence in memory. Therefore, if registers A and B are stored in the second and third bytes of the returning JMP instruction, registers C, D, and E may follow them directly, saving 2 bytes of memory.

The only remaining problem is the manipulation of data, which appears to be well served by placing the starting address and byte count in the remaining 3 registers, as per Brion's proposal. No further information is basically necessary, and the subroutine would only be complicated by requiring more pointers. These registers may be used for any purpose if data is not to be transferred in quantities greater than 3 bytes.

When the CALL method is used, registers A and B are not required to indicate the return address and may be used as necessary to the subroutine.

With these assignments in mind, a slight shuffling of the proposed IOCS parameters is in order so that the assignments may be consistent, and they appear in the table below. Register assignments which are optional are enclosed in parentheses. Returned values may vary, depending on how immediately their values will be used.

<table>
<thead>
<tr>
<th>REGISTER</th>
<th>CALL METHOD</th>
<th>JUMP METHOD</th>
<th>CALL IOCS</th>
<th>RETURNED VALUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>FUNCTION OF SUBROUTINE</td>
<td>LOW ORDER FORMAT OF RETURN TRANSFER</td>
<td>FUNCTION OF SUBROUTINE</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>FUNCTION OF SUBROUTINE</td>
<td>HIGH ORDER DEVICE CCDE</td>
<td>FUNCTION OF SUBROUTINE</td>
<td></td>
</tr>
</tbody>
</table>
The resulting house keeping code for the jump method might appear as follows:

**SUBRIN:**

MVI L, RETURN+1(L)  'Set up to store registers'
MVI H, RETURN+1(H)
MOV M, A          'Store return address'
INR L
MOV M, B
INR L
MOV M, C          'Store remaining registers'
INR L
MOV M, D
INR L
MOV M, E
...  
(SUBROUTINE)
...

MVI L, RETURN+3(L)  'Set up to restore registers'
MVI H, RETURN+3(H)
MOV C, M          'Restore registers'
INR L
MOV D, M
INR L
MOV E, M

**RETURN:**

JMP O  'Return'
SB, 4     'Set aside block of 4 bytes'  'for registers B through E'
In Brion's proposal, the low order 4 bits of register D indicate the method used in encoding the data to be transferred. Each bit is assigned a different method, thus limiting the number of codes to 4.

One of the advantages of using such a system is the ease with which it can be implemented in a "bare bones" I/O control system (BBIOCS).

There are some facts to consider, however. There are a wide variety of I/O devices available for use in our "community", and not all of them use the same codes or characters sets. There are modifications in the number of special characters, and in whether or not shifting must be a separate operation for teletypes.

It would be advantageous to adopt an assignment in which the four low order bits are considered a single number indicating the coding of the data. In this way it would be possible to assign numbers 0 thru 3 to the proposed four codes, since they are common, and this would be easily incorporated into a BBIOCS. Any other coding or modifications to these four could be indicated by a larger number.

If it is desired to recognize modifications to the original four codes, it would be possible to assign them values whose lower two bits indicate the basic coding scheme, and the upper two bits would indicate the version of the modification. In this way a BBIOCS would not have to be concerned with the modifications, but just look at the lower two bits to determine the coding scheme.

There may still be room for different coding schemes among those values yet unassigned, although this might present a problem for the BBIOCS. It may be better to use of the unassigned bits (bits 4-6) as a flag indicating an odd-ball code.

An example of a BBIOCS to process register D, and select the proper I/O handler might be the following, assuming that registers A, B, C have been used or saved, and that this routine and all handlers reside in page 0 of memory:

<table>
<thead>
<tr>
<th>Addr.</th>
<th>Contents</th>
<th>Label</th>
<th>Instruction</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>303</td>
<td></td>
<td>MOV A,D</td>
<td>Load A with spec.</td>
</tr>
<tr>
<td>001</td>
<td>044</td>
<td></td>
<td>ANI 203</td>
<td>Mask I/O bit and</td>
</tr>
<tr>
<td>002</td>
<td>203</td>
<td></td>
<td>RAL</td>
<td>code spec, clr C</td>
</tr>
<tr>
<td>003</td>
<td>022</td>
<td></td>
<td>JNC JUST</td>
<td>Set C=I/O bit</td>
</tr>
<tr>
<td>004</td>
<td>100</td>
<td></td>
<td></td>
<td>If C=0 skip to</td>
</tr>
<tr>
<td>005</td>
<td>011</td>
<td></td>
<td>JUST</td>
<td></td>
</tr>
<tr>
<td>006</td>
<td>000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>007</td>
<td>004</td>
<td></td>
<td>ADI 010</td>
<td>Add 2*length of</td>
</tr>
<tr>
<td>010</td>
<td>010</td>
<td></td>
<td>RRC</td>
<td>Input Handler table</td>
</tr>
<tr>
<td>011</td>
<td>012</td>
<td>JUST:</td>
<td>ADI TABLE(L)</td>
<td>Justify and block C</td>
</tr>
<tr>
<td>012</td>
<td>004</td>
<td></td>
<td>MVI H,000</td>
<td>Add address of</td>
</tr>
<tr>
<td>013</td>
<td>026</td>
<td></td>
<td></td>
<td>Handler table</td>
</tr>
<tr>
<td>014</td>
<td>056</td>
<td></td>
<td></td>
<td>Clear high order</td>
</tr>
<tr>
<td>015</td>
<td>000</td>
<td></td>
<td></td>
<td>address</td>
</tr>
<tr>
<td>016</td>
<td>360</td>
<td></td>
<td>MOV L,A</td>
<td>Set L to get handler add.</td>
</tr>
<tr>
<td>017</td>
<td>307</td>
<td></td>
<td>MVC A,M</td>
<td>Load A with handler add.</td>
</tr>
<tr>
<td>020</td>
<td>066</td>
<td></td>
<td>MVI L,JUMP+1</td>
<td>Set L to mod. JMP instr.</td>
</tr>
<tr>
<td>021</td>
<td>024</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>022</td>
<td>370</td>
<td>Page 48</td>
<td>MOV M,A</td>
<td>Modify JMP instr.</td>
</tr>
</tbody>
</table>
Ted Lincoln 410 Bell Ave. Santa Ana, Cal. 92707. Finally got the Mark-8 and TVT working in Dec. TVT modified for cursor control, erase and home controlled from keyboard. It also has simplex duplex modes. Mini uses 51 memory instead of 1101 and contains a relay control and a sense board. (almost working) I have a DAC and mag tape modem in process. Delays in getting these on line are not technical but lack of time. (I am an engineer designing computer interfaces for a simulation lab.)

I'd like to make some suggestions.

1) Two modes will be better than one. Dr. Suding's design would be useful for telephone as well as ham. Another design should be adopted for use for high density recording.

2) When adding connectors to the Mark 8 use at least 100 to 120 pins. My choice is 120. Two connectors of 60 each. This allows bussing all important lines plus about thirty spares. Board location is then easily changed. Use I.C. sockets and headers for I/O signals. One sixteen pin socket for two inputs or outputs. Cost less than a dollar even from slip joints.

3) Standardizing data format on mag tape is not important. As long as the person giving you the tape explains the format used you can read into memory reformat and rerecord with your own system.

4) I've got a RTC designed and as soon as I am able to get enough time to get it working I will send along the info.

5) An idea to your readers. When mounting wirewrap IC sockets to vector boards. Drill out the holes of two opposite corners and mount PC board eyelets. Eyelets can be purchased from a local PC board manufacturer, Newark Electronics, etc. Most require a #51 drill. For example drill out holes on the board for pins #1 and #8. Insert eyelet. By holding the eyelet in the hole with a center punch and pushing on the other side of the eyelet with an automatic center punch the eyelet will peen to the board. Insert socket and solder base of pin to eyelet. Socket is now solid on board making it easier to wire.

Ted suggests the "Bugbooks" for those readers asking about books on basics. These start with "this is a diode" and end up with micro processor use and applications. Bugbook I and II, and laboratory workbooks are available for $18.95, and instructors manual for $3.50. The books are centered around EL instrument circuit designer sockets and "outboards", functional modules that plug into the sockets. Contact Edwards Associates, Calif. Federal Bldg., Suite 320, 608 Silver Spur Road, Palos Verdes Peninsula, CA 90274 (213) 377-0975. One of the newest things available is a set of "bugbacks", a set of printed labels gummed on the back that illustrate IC pin connections. For debugging a tough circuit, these would be fabulous. $4.95 for a set of 500 individualized labels.
A TABLE OF DOUBLE PRECISION WORDS FOR AN 8 BIT MACHINE

If we wish to use numbers higher than 255 decimal in computer calculations using 8 bit words we find that we must concatenate two or more words which is called double or higher precision. Suppose we have the decimal number 2783, we would find that the binary equivalent is:

1 0 1 0 1 1 0 1 1 1 1 1 which in octal is 5337.

Now if we split this into two words of 8 bits each it would be

0 0 0 0 1 0 1 0 and 1 1 0 1 1 1 1 1

Note that the bit arrangement is the same but the octal is now 012 and 337. The first number is called the high order and the second number is called the low order of the double precision number.

Tables of decimal to octal numbers are found in many computer texts and following is the table of octal to double precision numbers.

<table>
<thead>
<tr>
<th>00XX</th>
<th>000 0XX</th>
<th>30XX</th>
<th>006 0XX</th>
<th>60XX</th>
<th>014 0XX</th>
</tr>
</thead>
<tbody>
<tr>
<td>01XX</td>
<td>000 1XX</td>
<td>31XX</td>
<td>006 1XX</td>
<td>61XX</td>
<td>014 1XX</td>
</tr>
<tr>
<td>02XX</td>
<td>000 2XX</td>
<td>32XX</td>
<td>006 2XX</td>
<td>62XX</td>
<td>014 2XX</td>
</tr>
<tr>
<td>03XX</td>
<td>000 3XX</td>
<td>33XX</td>
<td>006 3XX</td>
<td>63XX</td>
<td>014 3XX</td>
</tr>
<tr>
<td>04XX</td>
<td>001 0XX</td>
<td>34XX</td>
<td>007 0XX</td>
<td>64XX</td>
<td>015 0XX</td>
</tr>
<tr>
<td>05XX</td>
<td>001 1XX</td>
<td>35XX</td>
<td>007 1XX</td>
<td>65XX</td>
<td>015 1XX</td>
</tr>
<tr>
<td>06XX</td>
<td>001 2XX</td>
<td>36XX</td>
<td>007 2XX</td>
<td>66XX</td>
<td>015 2XX</td>
</tr>
<tr>
<td>07XX</td>
<td>001 3XX</td>
<td>37XX</td>
<td>007 3XX</td>
<td>67XX</td>
<td>015 3XX</td>
</tr>
<tr>
<td>10XX</td>
<td>002 0XX</td>
<td>40XX</td>
<td>010 0XX</td>
<td>70XX</td>
<td>016 0XX</td>
</tr>
<tr>
<td>11XX</td>
<td>002 1XX</td>
<td>41XX</td>
<td>010 1XX</td>
<td>71XX</td>
<td>016 1XX</td>
</tr>
<tr>
<td>12XX</td>
<td>002 2XX</td>
<td>42XX</td>
<td>010 2XX</td>
<td>72XX</td>
<td>016 2XX</td>
</tr>
<tr>
<td>13XX</td>
<td>002 3XX</td>
<td>43XX</td>
<td>010 3XX</td>
<td>73XX</td>
<td>016 3XX</td>
</tr>
<tr>
<td>14XX</td>
<td>003 0XX</td>
<td>44XX</td>
<td>011 0XX</td>
<td>74XX</td>
<td>017 0XX</td>
</tr>
<tr>
<td>15XX</td>
<td>003 1XX</td>
<td>45XX</td>
<td>011 1XX</td>
<td>75XX</td>
<td>017 1XX</td>
</tr>
<tr>
<td>16XX</td>
<td>003 2XX</td>
<td>46XX</td>
<td>011 2XX</td>
<td>76XX</td>
<td>017 2XX</td>
</tr>
<tr>
<td>17XX</td>
<td>003 3XX</td>
<td>47XX</td>
<td>011 3XX</td>
<td>77XX</td>
<td>017 3XX</td>
</tr>
<tr>
<td>20XX</td>
<td>004 0XX</td>
<td>50XX</td>
<td>012 0XX</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21XX</td>
<td>004 1XX</td>
<td>51XX</td>
<td>012 1XX</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22XX</td>
<td>004 2XX</td>
<td>52XX</td>
<td>012 2XX</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23XX</td>
<td>004 3XX</td>
<td>53XX</td>
<td>012 3XX *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24XX</td>
<td>005 0XX</td>
<td>54XX</td>
<td>013 0XX</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25XX</td>
<td>005 1XX</td>
<td>55XX</td>
<td>013 1XX</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26XX</td>
<td>005 2XX</td>
<td>56XX</td>
<td>013 2XX</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27XX</td>
<td>005 3XX</td>
<td>57XX</td>
<td>013 3XX</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Example shown above.

George L. Haller, Apr. 1975
Summer Address
Hound Ears Club
Blowing Rock, NC  28605

Page 50
MEMORY TEST PROGRAM FOR MARK-8

Purpose of the program is to thoroughly check the semiconductor memory used with the 8008 for ICs that will not accept data correctly or have problems in their internal address decoding circuitry.

The program starts at location 000 and halts at location 101 upon completion. Pseudo random bit patterns are written into the entire memory (except that portion where the program resides) and then are read back and checked against the pattern written. This process is repeated with 207 different starting points in the random bit pattern. Execution time is approximately 45 minutes for 16K of memory.

No peripheral devices are required, only the means of jamming a NO-OE instruction (LAA = 3008) into the interrupt instruction port is necessary.

Upon detection of a read error, the program will halt. The LED register connected to output port Ø will indicated which bit of the 8 bit byte was incorrectly read, thus establishing which column the defective memory IC is in. Jamming a NO-OE into the interrupt instruction port will cause the program to halt with the high order address bits of the defective IC. The two displays enables the user to pinpoint the defective IC. The lowest order 8 bits of the address are not displayed as it is immaterial which bit inside the IC is defective, the entire IC must be replaced. Jamming a second NO-OE will cause the program to continue until completion or until another read error is detected. Note: if the program halts with all eight LEDs lit, it indicates a short on the address lines or a wiring error in the memory address circuitry.

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>INSTRUCTION</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>046 LEI</td>
<td>Load register E with initial &quot;random number&quot;</td>
</tr>
<tr>
<td>001</td>
<td>001 001</td>
<td></td>
</tr>
<tr>
<td>002</td>
<td>026 LCI</td>
<td>Load highest 6 bits of last address in memory plus 1 (1008 for 16K, 0048 for 1K, 0088 for 2K, etc.)</td>
</tr>
<tr>
<td>003</td>
<td>XXX XXX</td>
<td></td>
</tr>
<tr>
<td>004</td>
<td>056 LHI</td>
<td></td>
</tr>
<tr>
<td>005</td>
<td>000 000</td>
<td></td>
</tr>
<tr>
<td>006</td>
<td>066 LLI</td>
<td>Load starting memory test address</td>
</tr>
<tr>
<td>007</td>
<td>120 120</td>
<td></td>
</tr>
<tr>
<td>010</td>
<td>250 XRA</td>
<td>Clear LED display</td>
</tr>
<tr>
<td>011</td>
<td>121 OUT</td>
<td></td>
</tr>
</tbody>
</table>

This section clears display and initializes registers

This section writes random pattern into memory

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>INSTRUCTION</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>012</td>
<td>334 LDE</td>
<td>Store starting random number for each pass</td>
</tr>
<tr>
<td>013</td>
<td>106 GAL</td>
<td>Call random number</td>
</tr>
<tr>
<td>014</td>
<td>105 105</td>
<td></td>
</tr>
<tr>
<td>015</td>
<td>000 000</td>
<td>Set all bits of accum. equal to carry bit</td>
</tr>
<tr>
<td>016</td>
<td>230 SHA</td>
<td>Store</td>
</tr>
<tr>
<td>017</td>
<td>370 LMA</td>
<td>Increment memory address location and continue writing</td>
</tr>
<tr>
<td>020</td>
<td>060 INL</td>
<td></td>
</tr>
<tr>
<td>021</td>
<td>110 JPZ</td>
<td></td>
</tr>
<tr>
<td>022</td>
<td>013 013</td>
<td>Continue writing until maximum memory address is reached</td>
</tr>
<tr>
<td>023</td>
<td>000 000</td>
<td></td>
</tr>
<tr>
<td>024</td>
<td>050 INH</td>
<td></td>
</tr>
<tr>
<td>025</td>
<td>305 LAH</td>
<td></td>
</tr>
<tr>
<td>026</td>
<td>272 CPC</td>
<td></td>
</tr>
<tr>
<td>027</td>
<td>110 JPZ</td>
<td></td>
</tr>
<tr>
<td>030</td>
<td>013 013</td>
<td></td>
</tr>
<tr>
<td>031</td>
<td>000 000</td>
<td></td>
</tr>
</tbody>
</table>
This section reads data and checks it against pattern written

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>032</td>
<td>065</td>
<td>LLI</td>
</tr>
<tr>
<td>033</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>034</td>
<td>056</td>
<td>LHI</td>
</tr>
<tr>
<td>035</td>
<td>000</td>
<td>000</td>
</tr>
<tr>
<td>036</td>
<td>343</td>
<td>LED</td>
</tr>
<tr>
<td>037</td>
<td>106</td>
<td>CAL</td>
</tr>
<tr>
<td>040</td>
<td>105</td>
<td>105</td>
</tr>
<tr>
<td>041</td>
<td>000</td>
<td>000</td>
</tr>
<tr>
<td>042</td>
<td>260</td>
<td>SBA</td>
</tr>
<tr>
<td>043</td>
<td>257</td>
<td>XRM</td>
</tr>
<tr>
<td>044</td>
<td>150</td>
<td>JTZ</td>
</tr>
<tr>
<td>045</td>
<td>056</td>
<td>056</td>
</tr>
<tr>
<td>046</td>
<td>000</td>
<td>000</td>
</tr>
<tr>
<td>047</td>
<td>121</td>
<td>OUT</td>
</tr>
<tr>
<td>050</td>
<td>001</td>
<td>HLT</td>
</tr>
<tr>
<td>054</td>
<td>250</td>
<td>XRA</td>
</tr>
<tr>
<td>056</td>
<td>060</td>
<td>INL</td>
</tr>
<tr>
<td>057</td>
<td>110</td>
<td>JFZ</td>
</tr>
<tr>
<td>060</td>
<td>037</td>
<td>037</td>
</tr>
<tr>
<td>061</td>
<td>000</td>
<td>000</td>
</tr>
<tr>
<td>062</td>
<td>050</td>
<td>INH</td>
</tr>
<tr>
<td>064</td>
<td>272</td>
<td>GPC</td>
</tr>
<tr>
<td>065</td>
<td>110</td>
<td>JFZ</td>
</tr>
<tr>
<td>066</td>
<td>037</td>
<td>037</td>
</tr>
<tr>
<td>067</td>
<td>000</td>
<td>000</td>
</tr>
</tbody>
</table>

Display bits in error
User jams a NO-OP to display address of bad IC
User jams a NO-OP to continue with program
Increment memory address location
Continue reading and comparing until maximum memory address is reached

This section initializes the random number subroutine with a different number for the next write pass through memory.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>070</td>
<td>343</td>
<td>LED</td>
</tr>
<tr>
<td>071</td>
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This section is a pseudo random number generating subroutine. It generates 207 of the possible 256 combination of 8 bits and can be used as the basis for a number of computer games. The main program above uses only the bit that is shifted into the carry position, not the actual random number generated.

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Load accum. with previous random number
Rotate 3 bit positions
Exclusive OR with previous random number
Rotate new bit into carry
Load accum with previous random number
Rotate carry into A7 creating new random number
Save number in register E
## CROSS-LISTING

### 8008/8080 INSTRUCTION SETS

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(spec. by H & L)

*Bytes 2 & 3 not shown*

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By Roger L. Smith
4502 E. Nancy Lane
Phoenix, AZ 85040

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Page 53
SYSTEM/MINAC II Overview

By - Brion Johnson, 1423 Alta Vista Road, Santa Barbara, CA 93103

(1) General Description

SYSTEM/MINAC II is a general-purpose medium speed small scale
digital computer processing system built around the Intel 8008-1
microprocessing chip. Architecture is buss-oriented, with a "wired
or" cpu input buss shared by memory, interrupt, and input; and with
a latched address and direct data cpu output buss. Physically, the
processor is housed in a seven inch by 19 inch rack mount card cage
with 12 card slots. Card slots 2 and 4 are reserved for the CPU
board which contains the 8008-1 chip, but otherwise, the slots are
bussed and may contain any card. The minimum operating configuration
consists of the memory card (93410 - 256 locations) and the cpu card,
used in conjunction with the front panel.

(2) Memory

Memory for the system consists of 8192 locations of 8 bits each
(1 byte) organized in halfwords (2 bytes) with a write protect bit
and program accessible flag bit associated with each halfword. The
write protect bit prevents accidental erasure of information while
the flag bit may be used for parity, word mark, EOF, etc. Data
access time is 2.5 micro-sec, and full cycle time is 6 micro-sec.
The storage medium is magnetic ferrite cores which retain information
when power is removed. The unit is a model 28RV4096 made by Ampex
Computer Products Corp.

(3) System Teletype

The teletype (used for system commands or as needed) is a Teletype
Model 14 typing reperforator. The TTY uses a 5-level Baudot Code.
Typing is done on a 3/8" wide gummed paper tape.

(4) System Teleprinter

Page Output is provided by a CW/895/UI teleprinter mfg. by Mite
Corp. The teleprinter uses 5 level baudot code, and can type 76
characters per line at 40, 60, or 100 wpm.

(5) High Speed Tape Punch

High speed paper tape output is provided by a Teletype Corp.
Model BRPE2 punch. Capacity is seven level at 1100 wpm.

(6) Paper Tape Reader

Two medium speed paper tape readers are available to read 8
level paper tape. These units are mechanical, manufactured by the
Soroban Corporation.

(7) Magnetic Cassette

A cassette interface is proposed using FSK encoding upon
unmodified audio consumer cassette tape recorders.

(8) Multiport

Bitwise input/output is available over multiport, originally
planned for 8 each 8 bit words out and 4 each 8 bit words in.
4. The Character Set

4.1 Methods of Changing and Expanding

The current character set is described in the table in 4.2 and the typehead layout in 4.3. You will probably desire to replace some of the fractions with more useful characters. A proposed set of characters is shown in the table in 4.2 and a procedure for replacing characters is included in a later section. In order to have upper case H and S print it will be necessary to remove two springs to disable their function bars as is also described later.

The character set chosen is a compromise between several conflicting considerations, however, it is very close to the standard Baudot communications set. It is possible to create some additional characters by combining characters as follows: (!)=(')+()., (+)=(-)+(+), (#)=(-)+(S)+(X), and ($)=(S)+(S). Since there is no backspace facility, the best way to achieve this result is to separately control the non-print and non-feed solenoids which are presently connected in parallel. This would require an additional drive control and rewiring the solenoids inside the machine in order to get access to them separately. Then it would be possible to turn on the non-feed solenoid, print multiple characters and turn off the non-feed solenoid just before the last of the multiple characters.

4.2 Code Table

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4.3 Typehead Layout

The diagram on page 4 is the original typehead layout specification for the Speigel Project. It will be very useful when you are changing typefaces on the typehead.

5. Machine description

The tables and figures of this section will help you to find your way around the Creed. The component location figure and table and the special component location figure should get you oriented. The combination of the wiring diagram and wiring layout and color coding should enable you to work with the wiring if you desire to. The operations counter chart and figure will explain its operation. Some additional figures are placed elsewhere in the manual where it seemed appropriate.
8. Basic Creed Monitor

The Basic Creed Monitor (BCM) takes up the first 256 word page of memory and performs many essential functions. The monitor commands listed below, which are entered via the Creed keyboard, largely replace the panel functions and are much more powerful and easier to use. The loader program is essential in order to get other programs into memory conveniently.

Although the BCM is intended to be in a Read Only Memory (1702A PROM) in page 0, it also requires an area of RAM (read/write memory) in page 2 for temporary storage and user options. The BCM uses 3 of the 8 restart instructions, but the other 5 are available for user use by means of pointers in RAM. There is also a pointer to allow the user to add his own monitor commands which are two letters, V followed by a letter chosen by the user.

A serial monitor will also be provided which will differ from the following listing in that a JMP RD instruction will be inserted at BCIN (331). Another version of the serial monitor (BCM-S2; the first serial monitor will be called BCM-S1) with reassigned addresses and two more commands (display H and display L) will be offered later.

A two page monitor will also be offered called BCM-2 (on two 1702A's) which will perform a few more commands and do conversion between ASCII and Baudot as well as between a 6 bit code (5 Baudot bits and a case (upper=1 and lower=0) bit) and Baudot. The BCM-2 will also have about half of the dump (to paper tape or cassette interface) routine. The rest of the dump routine may be tailored to the desired format by utilizing the appropriate pointers in RAM and adding the correct subroutines. A couple of changes are necessary in the BCM listing included here to utilize it with the second page of the BCM-2. The changes are inserting the commands JFZ 407; JMP 400 at location 136, in order to extend the monitor command search. The second page of the monitor (see listing in 9. ) will be located in page 1. Other versions of the monitor using other pages for RAM, e.g. page 10, and for the second page of the monitor will be offered if there is sufficient interest. It would be possible to order the first page of BCM-2 and load the second page in RAM, however it would require loading manually via switches the following instructions every time the processor is turned on: JMP CLP at 400; CFZ 1005 at 407 and JMP CLP at 412.

8.1 Basic Creed Monitor Commands.

0,l,...,7 - Shift buffer left 3 bits, put octal digit in low 3 bits and display.
L - Put buffer in L, clear buffer and display.
H - Put buffer in H, clear buffer and display.
M - Put buffer in memory word addressed by H:L, clear buffer, increment H:L and display buffer.
C - Display memory word addressed by H:L.
I - Increment H:L.
D - Decrement H:L.
O - Load memory from serial input (paper tape or cassette).
X - Execute loaded program.
V* - Execute user control routines or programs as defined by user in RAM.
A* - Display L.
B* - Display H.
S* - Put H:L in start address (1001).
N* - Put H:L in end address (1003).
Z - Dump memory from start to end address. Format determined by user.

# - Only in BCM-2.
* - Only in BCM-2 or BCM-S2.
8.2 Loader format

\[ \text{bbbb...bhbccdefghgh...ghb}
\]

b - blank tape
c - low 4 bits of low 8 bits of load address
d - high 4 bits of low 8 bits of load address
e - low 4 bits of high 8 bits of load address
f - high 4 bits of high 8 bits of load address
g - low 4 bits of a data word
h - high 4 bits of a data word

The high order bit of each 5 bit word is ignored, except in looking for the blank header and trailer, i.e. the 5th bit may be 1 or 0 except that 0000 must always be 10000 rather than 00000.

8.3 Subroutine descriptions.

<table>
<thead>
<tr>
<th>SUBROUTINE</th>
<th>ADDRESS</th>
<th>REGISTERS DESTROYED</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIME</td>
<td>10</td>
<td>C</td>
<td>WAIT FOR 6.67 milliseconds</td>
</tr>
<tr>
<td>INHL</td>
<td>40</td>
<td>H,L</td>
<td>INCREMENT H AND L COMBINED</td>
</tr>
<tr>
<td>CA2</td>
<td>147</td>
<td>A,C,H,L</td>
<td>SEARCH TABLE- SEE COMMENTS IN LISTING</td>
</tr>
<tr>
<td>WD</td>
<td>227</td>
<td>A,B,C,D</td>
<td>COMBINE TWO 5 BIT WORDS, STORE IN MEMORY AND INCREMENT H:L</td>
</tr>
<tr>
<td>RD</td>
<td>250</td>
<td>A,B,C</td>
<td>GET 5 BIT WORD FROM SERIAL 100 WPM DEVICE AND PUT IN A (LOW 5 BITS)</td>
</tr>
<tr>
<td>CD</td>
<td>301</td>
<td>A,D,E</td>
<td>DECREMENT D:E</td>
</tr>
<tr>
<td>CI</td>
<td>311</td>
<td>D,E</td>
<td>INCREMENT D:E</td>
</tr>
<tr>
<td>BCOT</td>
<td>315</td>
<td>A,C</td>
<td>TRANSMIT LOW 5 BITS OF A TO CREED</td>
</tr>
<tr>
<td>BCIN</td>
<td>331</td>
<td>A,C</td>
<td>GET CHARACTER FROM CREED AND PUT IN LOW 5 BITS OF A</td>
</tr>
<tr>
<td>INII#</td>
<td>440</td>
<td>A,B,C</td>
<td>GET CHARACTER FROM CREED KEYBOARD, TRANSLATE TO ASCII AND PUT IN A</td>
</tr>
<tr>
<td>IN6#</td>
<td>454</td>
<td>A,B,C</td>
<td>GET CHARACTER FROM CREED KEYBOARD, TRANSLATE TO 6 BIT CODE AND PUT IN A</td>
</tr>
<tr>
<td>OTII#</td>
<td>617</td>
<td>A,B,C</td>
<td>TRANSLATE ASCII CHARACTER IN A TO BAUDOT AND TRANSMIT TO CREED PRINTER OR PUNCH</td>
</tr>
<tr>
<td>OT6#</td>
<td>642</td>
<td>A,B,C</td>
<td>TRANSLATE 6 BIT CHARACTER IN A TO BAUDOT AND TRANSMIT TO CREED PRINTER OR PUNCH</td>
</tr>
</tbody>
</table>

8.4 Addition of 1702A's to Mark-8 memory board.

One or two 1702A's may be added to a Mark-8 memory board by a simple process as follows. Obtain a 24 pin socket and a piece of perf board about the size of the socket. Using a small drill and the perf board as a patern, drill holes for the socket in one of the blank areas above or below the 7442 decoder. Insert the socket and connect the power and ground leads. Connect the address and data output lines in parallel with those for the 1101's. Connect one of the enable outputs of the 7442 to the select input of the 1702A. If the desired enable output is already connected to a row of 1101's, e.g. the enable for page 0, then move to the 1702A and connect one of the other enables to the row of 1101's or if desired leave it unconnected. If information on the pin connections for the 1702A is desired, request when ordering the 1702A.
BASIC CREED MONITOR

* RESET 0
  
  0  CL  JMP 1013  JUMP TO USER RST POINTER
  3  CLA  LEB  PUT B IN LOW ADR
  4  CLA  SBA  LBA
  10  OUT 10  DISPLAY BUFFER ON PANEL
  10  TIME  LC1 147  WAIT FOR 6.67 MS
  12  TL  DCC
  12  JFZ  TL  RET
  12  HLT  UNUSED WORD

* RESET 1
  
  20  TL  JK  JMP 1016  JUMP TO USER RST POINTER
  23  CC  LAM
  30  WD  RLC
  33  NDI  CL 360
  40  INHL  INHL
  44  CH  LDB  PUT B IN HIGH ADR
  50  JMP 1024  JUMP TO USER RST POINTER

* RESET 2
  
  71  LAI 377  INITIALIZE TTY OUTPUT
  80  OUT 11
  80  13
  75  CLP  CAL  BCIN  GET A WORD FROM CREED KEYBD
  75  LHC  H=0
  75  LHI  L(TTBL-1)
  75  LCI 11  LOOP INDEX
  105  CB  INL
  105  DCC
  105  JTZ  CA  JMP IF NOT OCTAL DIGIT
  105  CPM
  105  JFZ  CB  JMP IF NOT THIS DIGIT
  105  DCC
  105  HLT  UNUSED WORD
  105  HLT  UNUSED WORD

* RESET 3
  
  30  JMP 1021  JUMP TO USER RST POINTER
  33  NDI 360
  40  INHL  INHL
  44  CH  LDB  PUT B IN HIGH ADR
  50  JMP 1024  JUMP TO USER RST POINTER

* RESET 4
  
  40  INHL  INHL
  44  CH  LDB  PUT B IN HIGH ADR

* RESET 5
  
  50  JMP 1024  JUMP TO USER RST POINTER
  53  CDA  DCE
  53  :IDA
  53  RPZ
  53  DCD
  53  RET

* RESET 6

60  JMP 1027  JUMP TO USER RST POINTER
63  CX  JMP 1000  JUMP TO EXECUTE POINTER
66  CV  JMP 1032  JUMP TO EXTD CTL POINTER

* RESET 7 - LAST WORD OF LAST JMP IS EXECUTED
* BY RESET 7 AS A ONE WORD INSTRUCTION
* WHICH IS A NOP FOR THE FOLLOWING

***** START MONITOR *****

105  CB  INL
105  DCC
105  JTZ  CA  JMP IF NOT OCTAL DIGIT
105  CPM
105  JFZ  CB  JMP IF NOT THIS DIGIT
105  DCC
105  HLT  UNUSED WORD
105  HLT  UNUSED WORD

136  CFZ  1005  EXECUTE CONTROL ROUTINE IF Z=0
136  JMP  CLP  GO BACK TO MAIN LOOP
144  CA3  INL  INCREMENT TABLE ADR POINTER
144  RTZ  RETURN IF END OF TABLE

* TABLE SEARCH ROUTINE. START AT H:L ADR
* AND GO TO END OF PAGE. EACH TABLE ENTRY HAS
* TWO WORDS: CHARACTER AND LOW ADR. IF A IS
* FOUND IN TABLE Z=0 AND JMP TO LOW ADR IN THIS
* PAGE IS CONSTRUCTED AT 1005. IF A IS NOT
* IN TABLE THEN Z=1.
147 CA2 CPM
   JNZ CA3
153 CF INL
   CONTROL CHARACTER FOUND
   LCM
   LAH
   LLI 5
   CONSTRUCT JMP INSTRUCTION AT
   LHI 2
   1005
   LMI 104
   INSERT JMP OP CODE
   INL
   LMC
   INL
   LMA
   LHD
   LLE
   RET
173 LOAD
   LLI 0
   LOAD MEMORY FROM SERIAL DEV
   LHI 2
   SET UP JMP AT EXEC. LOCATION
   LMI 104
   INSERT JMP OP CODE
   RST 40
   INCREMENT H:L
202 LD1 CAL WD
   GET LOW ADR FROM TAPE
   Jnz LD1
   SKIP HEADER
   CAL WD
   GET HIGH ADR FROM TAPE
   RTZ
   DCL
   DCL
   LLM
   LHA
220 X CAL WD
   LOAD LOOP
   RTZ
   STOP IF BLANK TRAILER
   JMP X
   * GET TWO 5 BIT WORDS AND COMBINE THEM INTO
   * ONE 8 BIT WORD
227 WD CAL RD
   GET FIRST 5 BIT WORD
   RTZ
   NDI 17
   MASK OUT ALL BUT 4 BITS
   LEA
   CAL RD
   GET SECOND 5 BIT WORD
   RTZ
   RLC
   SHIFT SECOND WORD IN ORDER
   RLC
   TO COMBINE WITH FIRST
   RLC
   WORD
   JMP WD2
   CONTINUE AT WD2
250 RD
   INF 0
   GET A 5 BIT WORD FROM CREED
   NDAB
   DESTROYS A,B,C
   JTS RD
   WAIT FOR START BIT
   LBI 100
   LOAD MARKER BIT
   INP 0
   WAIT
   RST 10
   NDAB
   ADD A AND B AND CARRY = 0
   LBA
   RAR
   JFC RL
   LOOK FOR MARKER BIT
   RRC
   LBA
257 RL
   RST 10
   MASK OUT THE BIT
   NDI 200
   ADD A AND B AND CARRY = 0
   LBA
202 LD1
   JMP CDA
   CONTINUE AT CDA
301 CD
   LAE
   DECREMENT D:E
305 CW
   LMB
   WRITE B AT ADR IN MEMORY
311 CI
   INE
   INCREMENT ADR POINTER
315 BCOT
   ORI 140
   BASIC CREED OUTPUT
320 OUTL
   OUT 11
   PUT OUT A SERIAL BIT
331 BCIN
   INF 0
   BASIC CREED INPUT
   NDI 100
   DESTROYS A,C
   JTZ BCIN
   WAIT FOR STROBE BIT
   RST 10
   WAIT 1/2 BIT TIME
   RAR
   NDAB
   DESTROYS A,C
   RTZ
   RETURN IF FINISHED WITH WORD
   JMP OUTL
   RST 10
   WAIT 1/2 BIT TIME
   RTZ
   NDI 17
   MASK OUT ALL BUT 4 BITS
   LEA
   CAL RD
   GET SECOND 5 BIT WORD
   RTZ
   RLC
   SHIFT SECOND WORD IN ORDER
   RLC
   TO COMBINE WITH FIRST
   RLC
   WORD
   JMP WD2
   CONTINUE AT WD2
BCM-2 CONTINUED

433 CN  LLI 3  STORE H:L IN END ADDRESS
  JMP CSN  GO TO COMMON PART
440 INII CAL IN6  ASCII INPUT FROM 5 BIT DEVICE
  LHI 1  INDEX INTO TABLE TO TRANSLATE
  ADI 100  GET ASCII WORD FROM TABLE
  LHA  RESTORE H AND L
  IAM
  LHB
  LLC
  RET
454 IN6  6 BIT INPUT FROM 5 BIT DEVICE
  LBH  SAVE H AND L
  LCL  CASE BIT ADDRESS - 1
  LHI 2
  LLI 10  SAVE L IN RAM
  LMC
  INL
464 A  CAL BCIN  GET A 5 BIT CHARACTER FROM TTY
  CPI 37  IS THIS LETTER CHARACTER?
  JPFZ B  IF NOT GO TO B
  LMC  SET CASE TO LTR (0)
  JMP A

500 TRTB  000  BLANK TAPE (NUL)
501  105  E
502  012  LF
503  101  A
504  040  SPACE
505  123  S
506  111  I
507  125  U
510  015  CR
511  104  D
512  122  R
513  112  J
514  116  N
515  106  F
516  103  C
517  113  K
520  124  T
521  132  Z
522  114  L
523  127  W
524  110  H
525  131  Y
526  120  P
527  121  Q

530  117  O
531  102  B
532  107  G
533  377  FIG (NO CORRESPONDENCE)
534  115  M
535  130  X
536  126  V
537  377  LTR (NO CORRESPONDENCE)
538  000  BLANK TAPE (NUL)
539  063  3
540  012  LF
541  055  -
542  040  SPACE
543  100  @
544  070  8
545  067  7
546  015  CR
547  075  =
548  064  4
549  056  .
550  054  ,
551  046  &
552  072  :
553  050  ( (Fig)
554  065  5
555  042  ""
556  066  %
557  062  2
558  045  %
559  060  0
560  061  1
561  071  9
562  077  ?
563  047  !
564  377  FIG (NO CORRESPONDENCE)
565  043  /)
566  043  /#
567  073  ?;
568  377  LTR (NO CORRESPONDENCE)
569  600 B  CPI 33  IS THIS FIGURE CHARACTER?
570  JPFZ C  IF NOT GO TO C
571  LMC 40  SET CASE TO FIG (40)
572  JMP A  GET ANOTHER 5 BIT CHARACTER
573  612 C  DCL
574  LCM
614  LLC LHB RET
617  OT11 LBH LCL LHI 1 LLI 100
625  OSLP INL INL JTS DEF CPM JFZ OSLP
635  DEF LAL SUI 100 LHB LLC
642  OT6 LBH LCL
644  OIIIE LHI 2 LLI 7 LMB INL LMC
675  SC LBA NDI 40 CPM LMA JTZ SC NDA
706  LFIG LAI 37 CFZ LFIG CAL BCOT LAB DCL DCM DCL LHM LLC JMP BCOT
711  DUMP RST 1 RST 1 RST 1
714  CAL HDTL PUNCH HEADER (HDTL IS A POINTER IN RAM)
730  LHI 2 LLI 4 LDM DCL LLM DCL DCL DCL
735  CAL AOT8 DCL AOT8 DCL LLM LHA CAL OT8 LAD CPH JFZ A
740  JMP HDTL A IF NOT TO END THEN DO ANOTHER WORD
745  A IF NOT TO END THEN DO ANOTHER WORD
746  A IF NOT TO END THEN DO ANOTHER WORD
763  SAVE 6 BIT WORD
766  MASK OUT CASE BIT
770  IS THE CASE BIT THE SAME?
772  UPDATE CASE BIT
774  PUT LTR IN A
776  IF IT WAS FIG THEN LOAD FIG
778  SEND CASE SHIFT CHARACTER
780  SEND OUT THE CHARACTER TO CREED
782  RESTORE H AND L FROM RAM
784  PUT FIG IN A
786  WAIT
788  A DISPLAY I ON PANEL
792  A DISPLAY H ON PANEL
796  S STORE H:L IN START ADDRESS
799  N STORE H:L IN END ADDRESS
802  Z L(DUMP) DUMP MEMORY TO PUNCH OR TAPE
As one soon tires of loading a mini-computer such as the Mark 8 via the interrupt-jam port data switches, it becomes apparent that a calculator style entry of the octal digits is needed. In the following two diagrams, such a device is described. One will note the following features:

1) Digits are entered most significant digit first with automatic shifting of previously entered digits to the left with each new entry up to a maximum of 377.

2) Should more than three digits be entered or the leftmost digit (representing bits 7 and 6) be greater than 3, the display will show an error indication of 888.

3) The "CLEAR ENTRY" key may be pressed at anytime to clear the display and output register. After an entered number is used (as signaled by pressing the Mark 8 LAH, LAL, or DEP keys), the next digit entered will automatically clear the output register and display before appearing, thus speeding up entry of one number after another.

4) Not only is this design simpler than that appearing in the Dec. 1974 issue of Popular Electronics, it is more convenient to use in that leading zeros need not be entered and there is automatic clearing of output register and display after an entry is used.

I am currently working on a PC board for this design and when ready will mail Xerox copy upon receipt of SASE. As for parts used, the following notes apply: Keyswitches are from Solid State Systems, Inc. and do not require additional debouncing--others might. Readouts are Opcoa SLA-1's. As for interfacing with Mark 8, you may simply replace the 8 interrupt port data switches with the keyboard loader and make the connections to the LAH, LAL, and DEP switches. Or, you may do as I've done and leave the interrupt port as is after adding a separate Jam input port to which the keyboard loader is permanently connected.
Octal Keyboard Input Loader — By Wm. Severance, Jr.
**MARK-8 BUS SIGNAL DESCRIPTION**

By Laurence L. Plate, Jr., 2320 Skyline Way, Santa Barbara, CA 93109

<table>
<thead>
<tr>
<th>INTER-BOARD WIRE NO.</th>
<th>FUNCTION</th>
<th>SOURCE BOARDS</th>
<th>DESTINATION BOARDS</th>
<th>SYMBOL(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OUT PORT MSB R BIT</td>
<td>MA CPU</td>
<td></td>
<td>A13,R2</td>
</tr>
<tr>
<td>2</td>
<td>not used</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>COMMON GROUND</td>
<td>ALL GND,GROUND</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>STATE CONTROL SIGNAL</td>
<td>CPU DI</td>
<td></td>
<td>S0,S1,S0</td>
</tr>
<tr>
<td>5</td>
<td>STATE CONTROL SIGNAL</td>
<td>CPU DI</td>
<td></td>
<td>S1,S1,S1</td>
</tr>
<tr>
<td>6</td>
<td>+5 VOLT POWER</td>
<td>ALL +5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>-9 VOLT POWER</td>
<td>MA,CPU -9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>CPU READY LEVEL</td>
<td>MA CPU RDY,READY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>MEMORY ADDRESS</td>
<td>MA CPU D0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td>D1</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td>D2</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td>D3</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td>D4</td>
</tr>
<tr>
<td>14</td>
<td>INPUT BUS LINES *</td>
<td>DI MM,OL</td>
<td></td>
<td>D5</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td>D6</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td>D7</td>
</tr>
<tr>
<td>17</td>
<td>I/O OUTPUT SIGNAL **</td>
<td>CPU ***</td>
<td></td>
<td>OUT, OUTPUT</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td>D7</td>
</tr>
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<td>19</td>
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<td>D6</td>
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<td>20</td>
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<td>D5</td>
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<tr>
<td>21</td>
<td>OUTPUT BUS LINES</td>
<td>CPU MA,MM</td>
<td></td>
<td>D3</td>
</tr>
<tr>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td>D2</td>
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<td></td>
<td></td>
<td>D1</td>
</tr>
<tr>
<td>24</td>
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<td></td>
<td></td>
<td>D0</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>MEMORY READ/WRITE SIGNAL</td>
<td>CPU MM</td>
<td></td>
<td>R/W</td>
</tr>
<tr>
<td>27</td>
<td>I/O INPUT SIGNAL</td>
<td>CPU DI</td>
<td></td>
<td>IN</td>
</tr>
<tr>
<td>28</td>
<td>I/O OUTPUT SIGNAL</td>
<td>CPU OL</td>
<td></td>
<td>OUT</td>
</tr>
<tr>
<td>29</td>
<td>CYCLE CONTROL SIGNAL</td>
<td>MA CPU CC1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>CYCLE CONTROL SIGNAL</td>
<td>MA CPU CC1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>CPU LAL SIGNAL</td>
<td>CPU MA LAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>CPU LAH SIGNAL</td>
<td>CPU MA LAH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>OUT PORT LSB R BIT</td>
<td>MA CPU A12,R1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>I/O DATA ENABLE SIGNAL</td>
<td>CPU DI,OL</td>
<td></td>
<td>DEN</td>
</tr>
<tr>
<td>35</td>
<td>I/O INTERRUPT SIGNAL</td>
<td>MA CPU INT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>KEYBOARD INTERRUPT</td>
<td>MA CPU EX INT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>CPU WAIT FLAG ***</td>
<td>CPU N/C FLG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>HIGH MEMORY ADD. BIT</td>
<td>MA MM A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>DITTO &amp; I/O PORT BIT</td>
<td>MA MM,DI,OL B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>DITTO &amp; DITTO</td>
<td>MA MM,DI,OL C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>DITTO &amp; DITTO *****</td>
<td>MA MM,DI,OL D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Memory address lines and input bus lines are not common.

** Titus expansion signal for additonal output ports (note: it bypasses the RR/00 condition).

*** for Titus' port expansion logic.

**** apparently for slow memories

***** Wires 39-41 serve a double duty as shown above.

Prepared by Laurence L. Plate, Jr.
Universal Calculator Circuit with all control inputs and outputs negative true.

(a) WRITE ENABLE
(b) INPUT ENABLE
(c) 
(d) 
(e) 
(f) 
(g) 
(h) 

(a,d) are BCD inputs to select a keyboard input (up to 4)
(b,e,f,g,h) are BCD inputs to select a digit output (up to 16)
(l,m,n,o) are BCD outputs after conversion from 7-segments
(k) is a Decimal Point output

This circuit is similar to the one to be offered by the Digital Group, P.O. Box 6528
Denver, Colorado, 80206.

A from any digit which always appears in the answer
INPUT ENABLE causes \( \overline{A} \) to preset so \((i) = 1\); When \(A\) appears with Write Enable \((i) = 0\)
When selected digit appears with WRITE ENABLE, \((i)\) is true
segment outputs a,b,e,f,g are used as the 5 address lines to the 8223 PROM
resistor-diode network suggested by the Digital Group as MOS to TTL converters
74150 output goes low when selected digit is true

TRUTH TABLE FOR PROGRAMMING 8223 FOR 7-SEGMENT CONVERSION TO BCD

<table>
<thead>
<tr>
<th>Decimal Equivalent</th>
<th>Address Lines For Segment Outputs</th>
<th>Outputs Of ROM (BCD Equivalents)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>01111</td>
<td>0000</td>
</tr>
<tr>
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<td>0110 5 segment b</td>
</tr>
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<td>6*</td>
<td>11101</td>
<td>0110 6 segment 6</td>
</tr>
<tr>
<td>7</td>
<td>00011</td>
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</tr>
<tr>
<td>8</td>
<td>11111</td>
<td>1000</td>
</tr>
<tr>
<td>9</td>
<td>11011</td>
<td>1001 5 or 6 segments &lt; 9</td>
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</table>
FLASH!! A 4K & 8K version of BASIC from the folks at MITS!!

In the latest (& first) copy of the Altair Users Group newsletter, "COMPUTER NOTES", the people who brought you the Altair 8800 have announced the availability of a 4K and an 8K version of BASIC (Beginner's All-purpose Symbolic Instruction Code). Now, if you've had occasion to use BASIC in the past then you realize that it is unquestionably the language for the home computer. If you haven't had any experience with it...then by all means start doing some checking into the subject.

We've included the two ads from the newsletter for your information. In another section of the Altair newsletter the price for the 8K BASIC was given as $500 and the Extended BASIC was $750 for non-members. As you can see, the price drops rather sharply if you own an Altair 8800. And, if you own an 8800 you should be receiving the ML, but at $30 per year for non-owners we would be somewhat hesitant to recommend it (although it is a very nice publication). Some of the features of the ML include frank discussions of some of the "boo-boos" MITS may have made so that owners can get them straightened out; introduction to the MITS Service Department; software tips (which includes quite a bit on their new BASIC); new products & price lists; a software contest; maintenance contracts; questions & answers; and etc. (in case we've overlooked anything).

Another interesting paragraph in the ML mentioned that if you own a Mark-8 or a Shelby (?) or an M16 National Computer and you would rather have an Altair 8800, then MITS will offer you $150 on a trade-in.

4K Altair BASIC Language

<table>
<thead>
<tr>
<th>STATEMENTS</th>
<th>COMMANDS</th>
<th>FUNCTIONS</th>
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</thead>
<tbody>
<tr>
<td>IF...THEN*</td>
<td>DATA</td>
<td>RHD</td>
</tr>
<tr>
<td>GOSUB</td>
<td>LET</td>
<td>SOR</td>
</tr>
<tr>
<td>RETURN</td>
<td>DIM</td>
<td>SIN</td>
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<td>NEXT</td>
<td>RESTORE</td>
<td>INT</td>
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<td>READ</td>
<td>PRINT</td>
<td>SIG</td>
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<td>INPUT</td>
<td>STOP</td>
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</tr>
<tr>
<td>END</td>
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</tbody>
</table>

NOTES: *IF...THEN can be followed by a statement. Example: IF A=S THEN PRINT B

2LET is optional in variable assignments. Example: A=S is identical to LET A=S

3PRINT within PRINT statement tabs to print column X.

4CLEAR deletes all variables.

FEATURES

Multiple statements per line, separated by a colon ":" (72 characters per line)
Approximately 750 bytes available for program and variable storage before SIN or SIN, RHD or SIN, RHD, SOR are deleted.
*DELETE deletes a whole line and "=" (or underline) deletes last character typed.
Direct execution of any statements except INPUT.

Two character error code and line number printed when error occurs.
Example: ? US ERROR IN 50 would indicate a reference to an undefined statement in a GOTO, etc., during execution of line 50.

All results are calculated to at least six decimal digits of precision.
Exponents may range from $10^{-38}$ to $10^{37}$.
Maximum line number of 65535.
### 8K Altair BASIC Language

**Statements**
- IF...THEN
- GOSUB
- RETURN
- FOR
- NEXT
- READ
- INFOUT
- END
- DATA
- LET

**Commands**
- LIST
- RUN
- CLEAR
- SCRATCH
- CONT
- LOG
- EXP
- TAN
- ATN
- INT
- PRE

**Functions**
- COS
- RND
- SQR
- ABS
- LEN
- IN
- FME

**Features**
- Multiple statements per line, separated by a colon (:) (72 characters per line)
- Approximately 500 bytes available for program and variable storage before ATN or COS, SIN, TAN are deleted.
- "D" deletes a whole line and "A" or "U" (underline) deletes last character typed.
- Multi-statement (up to 255) arrays for both strings and numbers.
- Direct execution of any statements except INFOUT.
- Character error code and line number printed when error occurs.

**Strings**
- Maximum length = 255 characters
- String concatenation (AS = BS)

**MITS Operating System**

The operating system is designed to facilitate assembly language program development on an Altair 8800 with at least 8K of memory and a serial I/O board (for either teletype or COMPTER 1/0).

### Altair Extended BASIC Language

Extended BASIC has all the features of the 8K BASIC plus:
1. PRINT USING for formatted PRINT statements
2. DISK I/O (to Altair floppy disk)
3. Double precision (13 digit accuracy) add, subtract, multiply, divide.

A minimum of 12K is required to support Extended BASIC. The first release of Extended BASIC is planned for July, 1978. The 8K and 8K BASICS are available today. Many more features, such as integer variables (16 bits) and RESTORE clauses in IF statements, are scheduled for future implementation.
WE RUSHED ANOTHER ISSUE OUT IN A HURRY BECAUSE BOTH JOHN AND I HAVE COMMITMENTS COMING UP IN JULY. I HAVE TO TRAVEL TO SACRAMENTO FOR A THREE WEEK NATIONAL SCIENCE FOUNDATION INSTITUTE ON TEACHING A PRE-ENGINEERING COURSE IN THE HIGH SCHOOL. JOHN WILL SOON BE STARTING A SERIES OF TRAINING COURSES.

EVERYONE THAT ORDERED BACK ISSUES SHOULD HAVE RECEIVED THEM BY NOW. IF YOU DIDN'T EITHER WE MESSED UP OR THE POST OFFICE DID. PLEASE LET US KNOW IF YOU ORGIED AND GOT MISSED. SORRY ABOUT THE PRINT QUALITY ON 1-4 REPRINTS. THE REDUCED FORMAT MAKES COPY QUALITY VERY CRITICAL AND ALL I HAD TIME TO DO AT THAT TIME WAS TO DUMP PAPER TAPES ON TO OUR FAST PRINTER.

CARL HELMERS OF M.P. PUBLISHING CO., BOX 378, BELMONT, MA 02178 HAD THIS TO SAY IN A RECENT LETTER: "JUST A PAGE TO INFORM YOU OF THE DEMISE OF ECS MAGAZINE AND - LIKE A PHOENIX FROM ITS MAILING LIST ARISE THE BEGINNING OF 'BYTE'! I GOT A NOTE IN THE MAIL ABOUT TWO WEEKS AGO FROM WAYNE GREEN, PUBLISHER OF '73 MAGAZINE' ESSENTIALLY SAYING HELLO AND WHY DON'T YOU COME UP AND TALK A BIT. THE NET RESULT OF A FOLLOW UP IS THE DECISION TO CREATE BYTE MAGAZINE USING THE FACILITIES OF GREEN PUBLISHING INC. I WILL END UP WITH THE EDITORIAL FOCUS FOR THE MAGAZINE WITH THE BUSINESS END BEING MANAGED BY GREEN PUBLISHING.

THE IDEA OF THE MAGAZINE IS TO PROVIDE A FORUM FOR IDEAS AND COMMUNICATIONS ON THE "HOME BREW COMPUTER" THEME AND ITS PRACTICAL APPLICATIONS FOR GAMES, AS AN AID TO SMALL BUSINESS AND PROFESSIONAL PEOPLE'S NEEDS, AND FOR THE NON-PRACTICAL HARDWARE-HACKERS WHO BUILD THINGS AND LET THEM SIT ON THE SHELF. THE FORUM IS THE MAGAZINE, AND ITS SUSTAINANCE COMES FROM A COMBINATION OF SUBSCRIPTIONS AND ADVERTISEMENTS. THE SUBSCRIPTION PRICE WILL BE $10 FOR A CHARTER SUBSCRIBER PER ANNUM, AND $12 FOLLOWING THE INITIAL "TURN ON" TRANSIENTS. ECS MAGAZINE SUBSCRIBERS WILL BE SERVICED ON A TWO FOR ONE BASIS FOR THE REMAIN- DER OF THEIR PRESENT SUBSCRIPTIONS. INDIVIDUAL COPIES WILL SELL FOR $1.50."

HAL NOVICK CALLED ABOUT A MONTH AGO WITH THE NEWS THAT THEY DID GET THE SELECTRIC TYPEWRITER TERMINALS THEY WERE BIDDING ON. I ORDERED ONE AND FOR $275 DELIVERED PRACTICALLY TO THE DOOR. I GOT A BEAUTIFUL I/O SELECTRIC TYPEWRITER IN A PRETTY CASE WITH A 8 LEVEL PAPER TAPE READER ON ONE SIDE AND AN 8 LEVEL PAPER TAPE PUNCH ON THE OTHER IN VIRTUALLY PERFECT OPERATING CONDITION NOT ALL OF THEM WERE QUITE THAT GOOD BUT I THINK ITS THE BEST BUY WE HAVE SEEN YET IN A HARD COPY PRINTER. ONE STILL HAS TO SOLVE THE ASCII TO SELECTRIC AND VICE VERSA CODE CONVERSION BUT IT SHOULDN'T BE TOO HARD WITH THE NATIONAL $22 ROM AVAILABLE. THEY HAVE SOLD OUT ON THE FIRST BATCH BUT ARE GOING TO GO AFTER MORE. SO THEY WILL KNOW HOW MUCH MONEY THEY HAVE TO WORK WITH THEY ARE GOING TO ASK FOR REFUNDABLE DEPOSITS IN ADVANCE IF YOU WANT TO RESERVE ONE. WRITE HAL AND ENCLOSE AN SASE IF YOU'D LIKE FULL DETAILS.

HAL NOVICK, 2810 HENDERSON COURT, WHEATON, MD 20902 (301) 933-7453 OR (703) 920-7200 HE SUGGESTS CALLS BE MADE PERSON TO PERSON.
DEAR MAURY,

I HAVE RECEIVED YOUR LETTER DATED 6-21-75

1) SHIP MY KEYBOARD ON OR BEFORE JULY 1, 1975 OR RETURN MY CHECK.
2) SHIP MY OTHER PARTS NOW OR RETURN MY CHECK NOW! I HAVE WAITED
MORE THAN 2 MONTHS AND I CAN'T WAIT ANY LONGER.

I MUST STOP PAYMENT IF I HAVE NOT RECEIVED SHIPMENT ON OR BEFORE JULY
7, 1975. IF YOU AREN'T SURE YOU CAN DELIVER BY THAT DATE, JUST RETURN
MY CHECK NOW.

I WOULD VERY MUCH LIKE TO ORDER SEVERAL OTHER THINGS IN YOUR FLYER
BUT I CAN'T TRUST YOU. I SUPPOSE I'LL HAVE TO FIND ANOTHER SOURCE. THIS
IS TOO BAD SINCE YOU SEEM TO CARE ABOUT THE COMPUTER HOBBIES MARKET.

I AM SENDING A COPY OF THIS TO HAL SINGER

SINCERELY,

KEN

W. PAUL FARR, 3723 JACKSTADT ST., SAN PEDRO, CA 90731 SAYS THAT ORGAN-
IZATIONAL MEETING FOR THE LOS ANGELES HOBBY COMPUTER GROUP WAS A SMASH-
ING SUCCESS. HE ESTIMATES ABOUT 150 PEOPLE ATTENDED. THE FIRST PEOPLE
STARTED ARRIVING AROUND NOON AND THE LAST DIDN'T LEAVE UNTIL AFTER SIX.
A TREMENDOUS AMOUNT OF TALENT AND INFORMATION WAS BROUGHT TOGETHER
BUT HOW CAN WE GET USEFUL WORK AND DIRECTION OUT OF SUCH A MONSTER
GROUP? PAUL GOT PHIL MORK'S "CHOMP" RUNNING FOR THE MEETING TO MANY
PEOPLE'S DELIGHT. HE APPRECIATED THE DISCUSSION ON I/O HANDLERS IN NL#7
AND SAYS A LOT OF THIS KIND OF THING IS NEW TO HIM AND INDESPENSIBLE IN
HIS CONTINUING EDUCATION.

MY NAME IS BILL LEWIS AND I HAVE HAD MY MARK-8 UP SINCE
DECEMBER. I HAVE A SWTP TERMINAL AND KB. THE KB SWITCHES HANG UP
LIKE EVERYONE ELSE'S, BUT I HAVE PROGRAMMED AROUND IT. AT THIS
TIME, I ONLY HAVE 768 BYTES OF MEMORY, BUT IT IS ENOUGH TO HOLD
AN OCTAL ASSEMBLER WITH ONE BLOCK LEFT OVER. A FRIEND OF MINE
HAS PURCHASED AN ALTAR 8800 AND IT RUNS FINE (AND FAST) EXCEPT
YOU CANNOT LOAD THE STACK. IT ALWAYS SEEMS TO CONTAIN ONES. (BY
THE WAY, THE CHIP DOES NOT HAVE INTEL WRITTEN ON IT) YOUR
NEWSLETTER HAS HELPED MY UNCOUNTED TIMES AND I WOULD LIKE TO
CONTINUE TO RECIEVE IT. I AM ENCLOSING A CHECK FOR $ 6.00.

My mailing address is: BILL LEWIS
6620 N.E. COTTER
KANSAS CITY, MO 64119
From John Craig.....

Ted Lincoln, 410 Bell Avenue, Santa Ana, Calif. 92707, was recently a student in my Varian V-70 Systems course. He has a Mark-8 up and running but is building a new chassis for the boards to convert it to a bus-oriented system. His goal is to build another processor board with an 8080 and be able to just plug it in in place of the 8008. In the truest sense Ted is a computer interface expert. He's responsible for designing interfaces between an aircraft simulator system and about five different computers (Sigma, PDP-11, V-73, Altair 8800, and more). Hopefully, Ted will come up with some neat inexpensive interfaces for you folks with 8080's. Ted got together with six other co-workers and set up what we consider a pretty good system for getting info on this hobby. Each member of the group subscribes to one of the various newsletters being put out today and they then make copies and exchange them. When you consider that each one of the NL's being put out cost five or six dollars it would be quite a bundle to get all of them. (Save them bucks wherever ya can, folks. They're gonna be needed for peripherals.)

---

We're terribly sorry the last newsletter was a little late to inform some of the people in the L.A. area about the meeting at Don Farboll's place on June 15th. (The NL's were misrouted and by the time we received them there were two or three grams overweight.) Apparently in the next issue we'll send out an error notice, anyway, Judge Pierce Young and Don Farboll hit a couple of bugs getting the word out. The meeting was attended by 120 people and there was standing room only in the auditorium. Four or five people brought their computers and set them up. There was also some selling and trading going on. A survey form was filled out by all the participants so that a determination could be made regarding the direction for an L.A. club. George Tate (home ph: 663-2604) was given the organization responsibilities and he reports that it looks like the club will be of unlimited size but will have to be broken up into steering committees and there is also the problem of a large meeting place to be resolved. A tentative August meeting is in the works but firm word on that will be forthcoming. Contact any one of the three gentlemen mentioned if you're interested.

---

Joe Huffman in Corona, California is currently working on design of a Universal Controller using an 8080 microprocessor. His objective is to come up with a controller which can be used for interfacing an 8008 or 8080 with a TTY or TTY, and tape cassette and also be used as a Block Transfer Controller.

---

The Amoth Team (father & son) sent us a couple of letters recently totaling 50 pages. One of the sections dealt with Jim Fry's A to D converter and some bugs they discovered. If we could get camera-ready copy of same we'd like to reproduce it in a future newsletter.

---

If you're planning on starting a Mark-8 soon, you might consider holding off until the next NL. We're going to publish complete plans & wirelists for Tom Boyko's wirewrap version. We can get limited versions of the board for about $10.
First ACSNJ Meeting A Success

The first meeting of the ACSNJ was held on Friday night, June 13th at UCTI (Union County Technical Institute) in Scotch Plains NJ. There were 32 people in attendance. The gathering was scheduled for 7-10PM, but people started arriving at 6:30 and some did not leave until the lights were finally turned off at 10:30PM. Here are some of the highlights of the gathering:

Ed LaFlante had his Altair 8800 processor up and running with a demo memory swapping program. Several other Altair owners tried their hands at entering some of their pgms. Several Altair owners complained about slow delivery on extra circuit boards from MITS and non-delivery from mini-micromart.

Bob Silva had his home-built computer terminal on line to the ECN computer located at Rutgers University. They have a fantastic library of pgms (lots of games too) as well as BASIC, FORTRAN, APL and several other languages (all interactive). Bob built his terminal using Don Pancher's TVT-I for the display and a reworked Univac keyboard with an improved version of Lancaster's ROM encoder circuit. Bob designed the additional circuits for terminal operation (scrolling, CR, LF, UART, etc.) and is using a Bell-103 modem. He plans now to rework the circuit to display 1,024 characters on the screen (64 character/line, 16 lines) to enhance its operation as a terminal (512 characters is just too little for interactive work with a large system).

Bob just graduated from UCTI (electronic technology) and is planning to continue his education for a Bachelor's degree in Florida, so contact him quickly before he leaves the area if you want info on his system.

Norm Compton had his music computer running. It was playing the Beatles' "Yesterday" as well as running through the chromatic scale over 3 octaves. Norm designed and built the system. It uses a 6-bit word stored in a 1024x6 recirculating shift register memory (it was the cheapest way to go at the time this was designed). 4-bits are used to encode the scale and 2-bits for octave and rhythm control. The system is programmed via a switch panel and the memory output via decoding, controls a VCO. A DAC is used to form harmonic rich musical tones whose harmonic content is controllable via the DAC. The system can play a single-note melody of as much as 1024 notes and elements of rhythm over a range of three full chromatic octaves. The entire unit (incl. power supply) is the size of a music box.

Norm is also a graduate of UCTI and is continuing his education toward a Bachelor's degree at NJIT (formerly NCE).

Between 8 and 9PM we had a business meeting. It was decided to formerly found the ACSNJ and for Sol Libes (that's me) to be the President. It was decided that we should hold monthly meetings (for the present) since things are changing so rapidly. The next meeting is scheduled for Friday July 18th and will be held again at
UCTI. Most attendees found this a convenient meeting point. Rodger Amidon and Marty Nichols volunteered to give a talk on "programming the Altair 8800 versus the Mark-8". Frank Kacerek volunteered to maintain the mailing list on his computer system and run addressing labels as required. It was agreed to start a newsletter (this is the first one) to keep people posted on what is going on in NJ. Information was distributed on other available newsletters, organizations, and sources of parts.

31 people completed a 2½pg questionnaire. Here is a compilation of data from them:

**CPU's built:**
- Mark-8: 4
- Altair 8800: 5
- Other: 5
- **Total:** 14 (9 are running)

**I/O Devices:**
- TVT-I: 4
- TVT-II: 2
- Sunding TVT: 2
- Teletype: 3 (2-type 33, 1-Creed)
- Cassette: 6
- Other: 1

**Where Do People Live?**
- **NJ counties:**
  - Middlesex: 9
  - Union: 8
  - Passaic: 4
  - Somerset: 2
  - Morris: 2
  - Essex: 2
  - Other: 3
  - **NYC:** 1
  - **Staten Island:** 1

**Occupations:**
- **Students:** 9 (1-HS, 2-AAS, 4-BS, 2-MS)
- System Programmers: 4
- Electronic Tech: 4
- Self-employed: 4
- College teachers: 3 (Computer Field Eng. 2)
- Electronic Consultant: 2
- Mgr in business: 2
- Other: 3

**Education:**
- Tech School: 6
- AAS: 8
- BSEE: 3
- BS (business): 2
- BS (science): 2
- MS: 2
- MA: 1

Free coffee and cookies were provided at the meeting by UCTI. $26 was collected to cover mailing expenses, etc. through the next few months.

A Directory of society members is attached to this newsletter. It should assist members in exchange of info, parts, etc.

I will be out of NJ during July and August and Bohdan Lukashewsky has agreed to coordinate things until I get back. Call him, Marty Nichols, Rodger Amidon or Mike Price for info.

By the way, Mike Price and Fred Holcomb are selling a wide selection of TTL, etc. logic. Their price sheet should be in with this mailing.

**Remember:** Next meeting July 18th, Friday night, 7PM at UCTI

Marty Nichols & Rodger Amidon speakers: "Programming Altair Versus Mark-8"

See you all in September.........Sol Libes
I stated in my first letter I am building a system centered around an Altair which I purchased as a PK (partial kit) in March. My system will have 12K of dynamic RAM initially with hopes of adding an equal amount of core in the future. I/O is both local, through a Southwest Tech. TVT which I built from scratch, and remote through a modem. I added a modem with automatic phone answer because I have access to a TVT with paper tape at work. I hope to get MITS extended BASIC on the unit, but not at the prices they are talking. I cannot understand why MITS wants to jeopardize their market position with poor sales policies. I am sure you have heard from many dissatisfied customers.

As I stated in my previous letter I have an extensive workshop and may be able to provide services to other members. The workshop includes silkscreen and photographic facilities for PC board and dress panel production. I presently have a screen made up to print Altair front dress panels. The screen prints a duplicate of the stock MITS front, less the MITS logo, on any material. I have made several for people here in Texas on 1/8 inch gray Plexiglas. For any members building Altairs from scratch these panels add the final touch for a nice looking system. I will supply them complete with predrilled holes and bed bosses for $20.00. For an additional $5.00 I will print any logo a member wants across the bottom in the same location MITS puts theirs. If any one is interested they can order one immediately or write to me and ask for info and photos. I can also supply main and memory boards for Southwest Tech. TVT for $25.00 a set. I hope to have my plating through unit running within a month, any boards supplied before then will not be plated through. If any of the members want a special PC board or screen printed front panels made have them call or write and I'll be happy to help them. I have toyed with the idea of making screens up for the Altair boards but I don't know how much interest there is. If anyone is interested have them call or write. I'm not interested in making a profit from this service, I'm just trying to pay for my workshop.

I also think that some of the members might be interested to know that the major surplus market centers are not always the best place to get some IC's (memories etc.). Some times it is better to deal with Industrial electronic dealers. For example, I am doing business with an Industrial OEM supplier in Houston who is selling 2102's for $3.50 in lots of ten, he also is selling 8080's for $175.00. Everything he sends out he tests before shipping. I believe that the surplus centers are selling new rather than surplus stock for many of the ISI and MSI devices based on the prices they want. Two very cooperative surplus centers that don't advertise are:

Horbach & Mademan
401 E. Erie Ave.
Philadelphia, Pa. 19134

and,

Surplus Center
1000-1015 West 6th St.
P.O. Box 8229
Lincoln, Nebraska 68501
402/435-4366

RICHARD LERSETH, 8245 MEDITERRANEAN WAY, SACRAMENTO, CA 95826 (916)445-7872 OR (916)381-0335 IS AN ASSOCIATE WATER QUALITY ENGINEER FOR THE STATE OF CALIF. DEPT. OF WATER RESOURCES. AS PART OF HIS WORK HE WROTE A FORTRAN IV PERSPECTIVE PLOTTING PROGRAM WHICH HE WILL MAKE AVAILABLE TO THOSE INTERESTED FOR THE COST OF DUPLICATION. HE PROVIDED THE FOLLOWING CROSS REFERENCE FOR NL'S 1-7 AND SAYS IT WAS A ONE PASS COMPILING AND HE PICKED ITEMS IMPORTANT IN BUILDING A COMPUTER SYSTEM BY NEOPHYES. HE WILL BE TAKING A MICRO PROCESSOR SYSTEMS COURSE AT LAWRENCE LIVERMORE LABS THIS SUMMER AND WILL TRY TO GET AS MUCH MATERIAL OF INTEREST TO THE COMPUTER HOBBYIST WHILE HE IS THERE.
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<th>SUBJECT</th>
<th>NAME</th>
<th>NL/PG</th>
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**BOOKS, NEWS LETTERS, & LITERATURE**

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Dear John and Hal,

Don Lancaster has forwarded me a copy of your April 15 edition. This is a nice newsletter. Should be very helpful to all of the computer freaks who are getting into their own machines. Note that several of your readers didn't appreciate Don's upside down keys on the KBD-2. We were also less than thrilled with this, but it wasn't possible to correct it for the cost we wanted to have in the kit. Also note that some folks had problems with the strobe pulse. This is not due to insufficient debouncing, but is caused by slow rise time. This was noted on prototype TVT-2 units. Correction was easy here. Since strobe pulse went into a 7400 gate, we simply replaced the pack with the new "Schmidt Trigger" gate pack - 74123. Presto, no more problem.

We are now in production on a new keyboard kit, KBD-3. This has a one chip MOS encoder (AY5-2376) which gives you a typewriter style keyboard with all the keys right side up. You also get both upper and lower case, or just upper - selectable. You also get a choice of strobe pulse polarity, jumper selectable. Only problem is that it sells for $49.95. Price reduction should be possible when the encoder chips become less expensive.

Glad to see that most of your readers are happy with the TVT-2. We tried to make this kit as universal as possible by not forcing anyone to buy features they did not want, or need. I know - it costs too much. Would you be interested in a deal for your subscribers? Since these are the type people that we particularly want to reach, I would be willing to give them a 15% discount on the TVT-2 kit and plug-in units. If you consider this a good deal will be happy to send special order blanks. How many?

We are real interested in just what MITS is up to also. They have a demo truck going around in our part of the country that is due here Friday. Supposed to have an Altair 8800, ASR-33 and diskette system running BASIC. Did you see their ad in the latest Computer Decisions? For only $9,000 + dollars you can have an Altair with 16K running Super Basic, a printer and a Diskette system. BASIC is "FREE" with the machine. They got to be kidding. Will let you know what the demo looks like.

Daniel Meyer

---

TEXAS COMPUTER CLUB TO BE ORGANIZED

Texas Computer Buff's interested in home computer systems are urged to contact L.C. Walker, Rt. 1 Box 272, Aledo, Texas 76008 --Aledo is in the Ft. Worth, Tx. area---
I HAVE FINISHED THE CIRCUIT TO COMMUNICATE WITH A BIG COMPUTER BY PHONE. AT LAVAL UNIVERSITY THERE IS AN IBM 370 WITH A PL. THEY HAVE AN INTERFACE TO USE ASCII AND TTY 38. IT WORKS ALSO WITH TTY 33 AND MY TUT, BUT WITHOUT GREEK ALPHABET AND SPECIAL APL SYMBOLS. I ADDED A MODULATOR AT 2225 AND 2025 Hz TO COMMUNICATE WITH A TTYP HAVING AN ACOUSTIC COUPLER. I USE THE TTY AT MY LABORATORY AND I CAN CONTROL MY MARK-8 WHICH IS AT HOME. I AM SENDING YOU:

1) THE SYMBOLIC DUMP OF MY MONITOR WHICH IS MIL EXCEPT FOR INPUT AND OUTPUT AND SOME OTHER ROUTINES.
2) AN OCTAL DUMP OF THE MONITOR
3) A PAPER TAPE OF THE PROGRAM TO PUT IN THE MARK-8 TO LOAD THE MONITOR AND DUMP IT.
4) A PAPER TAPE OF THE MONITOR
4) A CASSETTE WITH A) BOTH PROGRAMS IN THE 2 MODES:
   1270-1070 Hz AND 2225-2025 Hz
   B) THE OCTAL DUMP OF THE MONITOR IN THE 2225-2025 Hz MODE.

I CHOOSE THE SLOW (BUT SAFER) 9.09 MS PER BIT TO COMMUNICATE WITH A BIG COMPUTER OR A TTY OVER THE PHONE. I CAN COMMUNICATE OVER THE PHONE WITH ANYONE HAVING A TTY AND AN ACOUSTIC COUPLER. I WILL SEND AT 2225-2025 Hz AND RECEIVE AT 1270-1070 Hz. I CAN THEN SEND THE MONITOR (8 BITS) OR THE OTHER PARTNER CAN CONTROL MY MARK-8 THRU THE MONITOR!!!

WE WILL TRY TO PRINT SOME OF THE LISTINGS IN THE NEXT NEWSLETTER AND HOPEFULLY COME UP WITH A WAY OF PROVIDING DUPLICATE TAPES AND CASSETTES SOON.

HERE IS A COPY OF THE AD THAT WAS SUPPOSE TO APPEAR IN THE NL BEFORE ALL THE DURA MACH 10 SELECTRIC TYPEWRITER TERMINALS GOT SOLD OUT JUST TO MAKE YOU FEEL BAD AND BECAUSE I'VE GOT A LITTLE ROOM I'VE GOT TO FILL AND I'M OUT OF TIME.

4 SALE Government Surplus I/O Selectric Typewriters

We have eight Dura-Mach 10 machines. Each machine includes an IBM I/O Selectric, paper tape reader, paper tape punch, and some have large carriages. Price -- $225 plus $25 packing & handling plus $25 shipping with any excess packing or shipping to be refunded.

All machines should be presumed to have some defect. All Selectric movements appeared to work however all machines are sold "AS IS". No guarantees, no COD, no credit. Full payment required with order. Please expect a two week delay before shipment if payment is by personal check. Machines in best shape will be sold first.

Please note, we are patent attorneys and not in the typewriter business and therefore must impose the above conditions of sale. If there is sufficient interest an attempt will be made to obtain additional units but price will be subject to change.

Shipping will be made by Amtrack or other suitable way. If you have a preference, please specify. If interested contact:

Hal Novick, 2810 Henderson Court, Wheaton, MD 20902
(301) 933-7453 or (703) 920-7200 (suggest call be made person-to-
person)

Due to possible problems, we have scrapped one working machine in order to provide spare parts on a first come, first serve exchange basis. Parts will be provided free to the extent of the supply however please enclose return postage with requests.

Any order received after all typewriters have been sold will be returned immediately.
KEN A. MCGINNIS, MD, PO BOX 2078, SAN MATEO, CA 94401 APPARENTLY HAS BEEN RESIGHED BY REQUESTS FOR INFORMATION ON PHI-DECK CASSETTE TRANS- PORTS. HE'D APPRECIATE PEOPLE WRITING DIRECTLY TO: INDIVIDUALIZED INSTRUCTION INC., 1901 W. VALVIT, PO BOX 25308, OKLAHOMA CITY, OK 73105 FOR INFORMATION. HE'S NOT A DEALER AND TO AVOID A TAX MESS, HE'S NOT GOING TO MAKE ANYTHING IF PEOPLE ORDER THRU HIM BUT IF ENOUGH PEOPLE POOL THEIR ORDERS THEY WILL BENEFIT FROM A QUANTITY DISCOUNT. HE WILL ORDER FOR PEOPLE IF THEY SEND $100 PER DECK. HE WILL REFUND ANY UNUSED MONEY PROMPTLY. AFTER HE HAS 50 ORDERS DELIVERED, HE WILL SEND EVERY-ONE THE QUANTITY DISCOUNT. A SIMPLE CIRCUIT FOR CONTROLLING ONE USING THREE CHEAP SURPLUS RELAYS IS INCLUDED. THIS DECK IS SO SIMPLE TO USE, HE THINKS ANYONE COULD MAKE A CONTROLLER BUT HIS ONE BIG PROBLEM IS A WAY TO SENSE END OF TAPE MOTION. HE IS NOW CONSIDERING A CIRCUIT WHICH USES OPTICAL ENCODING TO DETERMINE TAPE POSITION AS WELL AS END OF MOVE- MENT.

Controller for Phi-Deck

KA. McGinnis

I don't have a suitable motion sense circuit

DAN WINGREN, 2714 1/2 GREENVILLE AVE., DALLAS TX 75206 SAYS THAT HE HAS ONLY RECENTLY LEARNED WHAT "BYOB" MEANS AND I STILL DO NOT KNOW "SASE".

SASE IS "SELF ADDRESSED STAMPED ENVELOPE" DAN AND IS NEARLY A NECESSITY WHEN CORRESPONDING WITH ANY LARGE OUTFIT. THE TIME NECESSARY TO ADDRESS ENVELOPES AND THE COST OF POSTAGE NEARLY GUARANTEES THAT YOUR CORRESPONDENCE WILL BE IGNORED UNLESS YOU DO INCLUDE AN "SASE". YOUR CHANCES ARE GOOD AT LOSING THE DIME YOU SPENT FOR A STAMP STILL BUT YOU MAY GET RESULTS. EVEN RADIO-ELECTRONICS IS REQUIRING THEM NOW IN ORDER TO GET A REPLY TO A LETTER.
M. DOUGLAS CALLIHAN, BERKLEY STREET R.F.D. #1 BERKLEY, MA 02780 MENTION THAT HE HAD AN ONGOING PHI-DECK CASSETTE TAPE PROJECT AND SENT THESE COMMENTS:

WITH REGARDS TO THE PHI-DECK PROJECT, HERE IS WHERE I AM SO FAR.
1. I AM LETTING THE WISER HEADS DECIDE JUST WHAT FORMAT THE DATA SHOULD BE WRITTEN IN... AT THE PRESENT TIME I AM LEANING TOWARD THE "SUDDING-DIGITAL GROUP" CONCEPT... HOWEVER, THE "T-C-H" WOULD BE FINE, EXCEPT I HAVE NOT HEARD FROM THEM. I GAVE THEM MY $6.00 AT THE DAYTON HAMVENTION, AND HAVE WRITTEN TO STEPHEN STALLINGS AND INCLUDED AN ENVELOPE AND HAVE YET TO HEAR ANYTHING FROM THEM. I SURE HOPE THEY HAVEN'T FOLDED, AS I WOULD LIKE TO TRY THE CHAMBERLAIN INTERFACE. SO MUCH FOR MY GRIPEs!
2. I THINK THAT ANYONE WHO PAYS THE PRICE FOR THE PHI-DECKS SHOULD BE ABLE TO AFFORD A "SEARCH" CAPABILITY BY USING STEREO RECORD-PLAY BACK HEADS IN THE UNIT, AND RECORDING DATA ON CHANNEL "A" BETWEEN THE BLOCKS ON "A", A PULSE SHOULD BE RECORDED ON CHANNEL "B". IT MAKES NO DIFFERENCE WHAT THE FREQUENCY OF THIS PULSE IS, BUT IT SHOULD BE RECORDED ON THE TAPE BEFORE YOU USE IT FOR DATA. WHAT I AM REALLY SAYING IS THAT THE CASSETTE SHOULD BE FORMATTED ON THE "B" CHANNEL BEFORE DATA IS APPLIED TO IT. TO DO THIS YOU HAVE TO KNOW HOW MANY BITS (OR BYTES OR WORDS) YOU WILL HAVE IN EACH BLOCK. YOU ALSO HAVE TO HAVE A BLOCK NUMBER ON CHANNEL "A" BEFORE YOUR DATA IS ENCODED. I PLAN TO USE A 2.5 INCH INTER-RECORD GAP BETWEEN BLOCKS, FOR START UP AND STOP DOWN. (THIS IS VERY CONSERVATIVE.)
3. AFTER THE "B" CHANNEL IS FORMATTED TO THE USER'S CONFIGURATION, DATA BLOCKS MAY BE WRITTEN ON "A" CHANNEL. SOFTWARE CAN TAKE CARE OF ANY TIMING LOOPS, AND BLOCK NUMBERING ON CHANNEL "A".
4. AS DATA IS READ, FROM CHANNEL "A", THE BLOCK NUMBER IS STORED IN MEMORY. WHEN DATA IS REQUESTED FROM A DIFFERENT BLOCK, A COMPARISON IS DONE. IF THE BLOCK NUMBER IS THE SAME, NOTHING HAPPENS, BECAUSE THAT BLOCK HAS JUST BEEN READ AND THE CONTENTS SHOULD BE IN MEMORY. IF THE NUMBER IS LESS THAN THE ONE WE NOW HAVE, WE ENABLE THE "TAPE MOVING IN THE REWIND DIRECTION, HEAD ENGAGED, SPEED UNREGULATED" (PAGE 31, APPLICATION NOTES FOR PHI-DECK) AND WE ALSO ENABLE CHANNEL "B" PLAYBACK AMP.
WE ARE NOW COUNTING THE CHANNEL "B" PULSES. WHEN WE COUNT THE NUMBER OF BLOCKS + 1, WE STOP THE TAPE. WE ENABLE "TAPE MOVING IN FORWARD DIRECTION, HEAD ENGAGED, SPEED REGULATED" AND WE LOOK AT THE BLOCK NUMBER AND COMPARE TO THE ONE WE WANT. THE "GO TO" NUMBER IS INCREMENTED BY 1 SO THAT WE STOP AT THE CORRECT BLOCK. N+1 IS CORRECT. IF THIS BLOCK NUMBER READ COMPARES WITH OUR N+1 NUMBER, THE FOLLOWING BLOCK SHOULD BE THE "N" BLOCK AND OUR SEARCH IS OVER. IF NOT WE COMPARE AND START ALL OVER AGAIN. TO FAST FORWARD SEARCH, OUR COMPARE STEP SHOULD SHOW A BLOCK NUMBER GREATER THAN THE ONE WE ARE AT, AND WE SEARCH FOR N BLOCK - 1. THE MICROPROCESSOR DECREMENTS THE BLOCK NUMBER. WE COUNT THE PULSES ON "B" CHANNEL AND STOP ONE BLOCK BEFORE "N" BLOCK AND READ THE BLOCK NUMBER ON CHANNEL "A", THEN COMPARE.

MUCH OF THE HARDWARE IS BASED ON 74193'S FOR PRESETTING COUNT UP, DOWN AND CONTROLLING THE PHI-DECK TO STOP AFTER CHANNEL "B" COUNTING IS DONE. WITH THIS SYSTEM, I REALIZE 2 INPUT AND 2 OUTPUT PORTS ARE TIED UP-- HOWEVER, CONTROLLING UP TO 8 PHIDECKS SHOULD BE POSSIBLE WITH VERY LITTLE MORE TTL. IT SURE IS CHEAPER THAN A DISK SYSTEM AND SHOULD BE GOOD FOR ABOUT ALL THE STORAGE THE AVERAGE HOBBYIST WITH VERY LITTLE MONEY TO SPEND SHOULD NEED. I EXPECT TO USE THIS SYSTEM ON AN 8080 SYSTEM (NOT NECESSARILY THE ALTAIR 8800) BUT IT SHOULD BE APPLICABLE TO 8086 SYSTEMS AS WELL. IT DOES HAVE THE DRAWBACK OF NEEDING 25% OF THE PORTS AVAILABLE TO 8086 USERS. I AM VERY INTERESTED IN ANY AMPLIFICATION ANYONE IN THE MICRO-8 GROUP WOULD CARE TO DO ON THIS SYSTEM.

AS FAR AS NOISE INTERFERENCE IS CONCERNED, IF THE CHANNEL "B" PULSES ARE OF SUFFICIENT DURATION AND LEVEL, THE AMPLIFIER SETTING ON THE CHANNEL "B" INPUT SETTING CAN BE SET LOW ENOUGH THAT ONLY THE ACTUAL PULSES ARE READ, AND POSSIBLY SOME TYPE OF ANTI-NOISE LIMITER COULD BE USED TO FILTER OUT ALL BUT THE ACTUAL PULSES.

I SURE WISH I COULD HEAR FROM THE COMPUTER HOBBYIST PEOPLE!!
Several weeks ago, I mentioned that I would write up a description of the hardware push/pull stack I had implemented on my Mark-8. At that time the stack itself was fully operational, but I planned further modifications to establish a bus system that would reduce the number of wires between the Mark-8 and my peripheral breadboard. As it turns out, such a system is not trivial.

It was my intention to extend the Mark-8 data bus (pins 25-18) some ten feet to my breadboard; timing signals would be generated by circuitry added to the Mark-8 CPU board, and be similarly extended to the breadboard. This scheme would appear to allow address data to be latched into the peripheral registers during T1 and T2, as well as making the bus contents available during T3 and T4, all on 12 wires (plus power) instead of 26. While I am quite sure that such a system can be implemented, my attempts, using ribbon cable, and standard TTL as line drivers were not successful. Although many timing windows were configured, most giving apparently-suitable waveforms to the distant latches, latched data was rarely correct. It seems probable that transient pulses on the timing lines were latching transitional data, but this is not confirmed. In any case, this simple project quickly got out of hand time-wise, and was terminated prior to success.

For some time, I have been planning some rather complex software systems for my home computer, including a machine-language trace/editing system, and an interpreting language suitable for extensive complex-algebra manipulations. Very soon, however, I became aware of several of the serious deficiencies in the 8088 instruction set. In particular, the 8088 allows no true interrupt service, since it is normally impossible to fully save the processor state at the time of the interrupt and restore it after the interrupt has been answered. There is also no normal access to the program counter or the PC stack. These particular deficiencies are now corrected in some degree with external hardware. In addition, construction of the stack system, as well as other peripherals, implied use of input ports not available on the Mark-8. Accordingly, an input-port bus system was developed that made input ports 1-7 available on the peripheral breadboard. The presented hardware modifications and additions thus consist of additional input port capability, a push/pull stack designed for interrupt service (including flag latch), and program counter access.

The Input Port System

Since it was desired to place input ports 1-7 on the external breadboard, one approach that seemed reasonable was to place the appropriate data on port 1 input of the Mark-8. This appeared to reduce external complications, since port timing was still accomplished within the Mark-8 itself.
Input data from ports 1-7 is accepted on port 1 of the Mark-2 after modification of the select circuitry associated with IC7, the port-select 7442 on the input board. This modification consists of the addition of seven germanium diodes (which form a seven-input negative-logic OR gate) between the 1-7 outputs of the 7442 and pin 6 of IC6, the 7402 controlling the 8263 input multiplexers.

The input-port structures are configured from six sets of 2-946 quad 741T NAND gates each, with gate outputs in parallel (alternately, 12-7403's could be substituted, with eight pull-up resistors on the common buss). This results in a low-impedance inverted-data buss to the computer, where eight inverters (two more 946's) correct the data into the port 1-7 channel.

On the peripheral board it is necessary to develop signals similar to those to and from our (now modified) 7442 on the input board. This requires all high-address lines (bits 9-15) for development of Den (I/O enable), INPUT, as well as the port-select signals. Six of the 7442 output lines are inverted (complements of one 74C4) and used to enable the appropriate input ports (one non-inverted line is used for the POP instruction in the stack, yet to come).

The Hardware PUSH/POP Stack

The Push/Pop stack is designed to store the complete status of the CPU prior to execution of an interrupt routine; this includes all registers and flags. Although a software system could be used to identify and store the flags, in this implementation an INPUT 7 instruction causes the flags to be latched externally during what is effectively an OUTPUT-type command (PUSH). These flags are then brought into the accumulator (by another PUSH) and stored on the stack on top of the registers. When status is to be recovered, flag values are easily POPed from the stack and used as an address into a data table in the last sixteen words of a particular page. The appropriate data is then loaded into register A which is added to itself to set the flags to their original values. The registers are then recovered from the stack the accumulator to restore the original CPU status.

The concept for the PUSH/POP stack is taken directly from an article by Tom Pitanan writing in Electronic Design for November 22, 1974 (p. 202), although the logic is re-designed for perhaps more-available IC's. Two 7489 RAM's are used as a 16-level stack with a 74193 as level-counter. Two 946's (and another diode) provide appropriate timing signals, while a single 7475 latches the flags from the data buss. Timing signals T3 and T4 are required by the stack implementation and are obtained via ribbon-cable from IC17 pin 3 and IC11 pin 10, respectively, on the CPU board. The necessary input commands (IN5 and NOT IN7) are already available from the Input Circuitry. Four data-buss lines are required for the flag latch, however.

The original stack level need not be set to any particular value, since the 74193 is a mod-13 counter and will traverse the stack as a circular list. Hence, the original level-value is meaningless unless it is desired to detect a stack overflow. In the absence of such hardware modifications, of course, it is the responsibility of the programmer not to exceed the stack capacity.
EIGHT INPUT PORTS

2-946/PORT (CDTL!)

PORT 1
INPUT

PORT 2
INPUT

PORT 1 ENABLE

IN2
from other ports

7404

AddEd Wire

OPEN THIS RUN!

PORT SELECT CIRCUITRY
(on peripheral board)

CPU BOARD MODIFICATION

Page 17
FUSH/POP STACK

INPUT 7 = 117
PUSH
T1: T1LATCH ← A
T2: T2LATCH ← INSTRUCTION
T3: A ← FLAGLATCH
T3+T4: LEVEL ← LEVEL+1
T4: STACK ← T1LATCH
T4: FLAGLATCH ← FLAGS

INPUT 6 = 115
POP
T1: T1LATCH ← A
T2: T2LATCH ← INSTRUCTION
T3: A ← STACK
T3+T4: LEVEL ← LEVEL-1

LEVEL COUNTER + STACK

STACK CONTROL LOGIC
Simple Stack Test

00 100 301 push
00 101 117 sequential
data
00 102 010
00 103 110
00 104 106 RECOVER
00 105 000 pop stack loop
00 106 121
00 107 000 wait for display
00 110 115
00 111 104
00 112 106
00 113 000

00 102 can be 011

Simple flag Recover Test
(needs flag table at 01 360)

change 01 076 for various flags at 01 104

01 075 006
01 076 340 modify at will
01 077 200
01 100 117
01 101 117
01 102 117
01 103 121
01 104 000 display flags
01 105 250 before save
01 106 117
01 107 117
01 110 121
01 111 000 display altered flags
01 112 056
01 J13 001
01 114 115
01 115 115
01 116 115
01 117 360
01 120 377
01 121 200
01 122 117
01 123 117
01 124 121
01 125 000 display recovered flags

Page 19
$077 = \text{DELAYED AUTO-INTERRUPT AND P.C. ACCESS}$

The diagram illustrates a circuit with a memory/data bus, CPU bus, and various logic gates, including T3, SS1, and SS2. The notation $(\text{A14})^+$ and $(\text{A15})^+$ indicates inverted signals in the port-select system.

Delays through RETURN execution and post start of next instruction cycle:

**Execution Stream**

```
<table>
<thead>
<tr>
<th>PCL</th>
<th>PCH</th>
<th>FETCH</th>
<th>POP</th>
<th>X</th>
<th>PCL</th>
<th>PCH</th>
<th>FETCH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

4-6 state delay: 18-24 nsec

**To Input Port 4**

```
16 15 14 13 12 11 10 9
```

**To Input Port 5**

```
8 7 6 5 4 3 2 1
```

**Note:**

```
5 +
12 H
POWER
```

This hardware system saves the PC address of the last executed step of the traced operation:

$\text{A15} = \text{A0}$
Program Counter Access

Certain types of programs, in particular TRACE systems, require more than just valid interrupt-handling capabilities; they also may require access to the last value of the program counter before the interrupt. My implementation is to use a special RETURN code to activate a delayed interrupt. As the last instruction of an interrupting system, control passes back to the original program; the delayed interrupt allows one complete instruction to be executed before the interrupting program is again entered. The interrupting program can include octal display of the state of the CPU, or test to determine if display is necessary. Typically, an ASCII SPACE might return processing to the original program until the interrupting program determines that display is again desirable.

Of course, access to a 14-bit address implies that two input ports must be used to regain the data. This paper thus embodies the following input port assignments: 4: PCH; 5: PCL; 6: PUSH; 7: POP.

Back to the Stack

The stack could alternately have been arranged to store register data without channeling it through the accumulator, by using 3xx (x ≠ 7) NO-OP instructions. This method would preclude the use of the 3xx NO-OP in a timing loop, although an output instruction could be used instead. But, although register PUSH operations would be quite convenient, POP would still need to come in through the accumulator, and a new protocol system would be necessary to detect and store the flags in a register, so this method is not as attractive as it first appears.

The POP instruction does not destroy stack data, so repeated POP's may be used to gain access to the stored previous state of the CPU. Of course, 16 POP's are necessary to rotate the stack to its original position. The stack may also be used for temporary storage (for, say, EXCHANGE H,L -type instructions) if care is taken not to overflow the stack and thus destroy stored state-recovery data.

TERRY SAYS THE INCLUDED ARTICLE PLUS HIS OSCILLOSCOPE SYSTEM YET TO COME REPRESENT WELL OVER 2 MONTHS OF SPARE TIME WORK. HE SAYS SARDO IS FAST AT DELIVERING 1708A AND 5314 PROMS AND THEY ARE JUST A LITTLE SLOW (SPEC AT 1.7 MICROSEC) BUT SHOULD WORK OK. MINI MICRO MART IS VERY VERY SLOW AND THEIR BOARD DESIGNER IS JUST PLAIN INCOMPETENT. HE'LL SUPPLY MORE ON THIS LATTER. HE LIKE PARTICIPANT'S ADVICE ON WHETHER THE COMPUTER HOBBYIST AND DIGITAL GROUP NEWSLETTERS ARE WORTHWHILE. HE GETS 20 MAGAZINES PER MONTH NOW BUT WILL SUBSCRIBE IF PARTICIPANTS RECOMMEND THEM HIGHLY ENOUGH.

BILL FULLER, 2377 DALWORTH 157, GRAND PRAIRIE, TX 75050 AND L. G. WALKER ARE TRYING TO GET A GROUP GOING IN THE NORTH TEXAS AREA AROUND JUNE 30. CONTACT THEM IF YOUR ARE INTERESTED.
On Computer Systems

It is becoming increasingly evident that the usefulness of a computer system is not defined by the CPU chip alone. One system may clearly be superior to another based on the ease of interfacing external systems of various size, control, and power requirements. These external systems may be of such a nature as to logically be considered part of the CPU system, but may necessarily be physically located at some distance from the CPU circuitry. This situation leads to a hodge-podge of wires radiating from the computer chassis proper, a situation that can only get worse, as field developments are not reflected in improved sets of available PC boards.

While a powerful bus-structure is clearly important in a useful computer system, there is an obvious trade-off between the number of wires leading to a complex peripheral, and the circuitry needed to transmit the same number of signals on fewer wires. It would seem to me that four uni-directional busses would be worthwhile: a 16-bit address bus, and two busses consisting of 8-bits of data to, and data from the CPU. This would imply a minimum of 32 wires to a moderately-distant peripheral under ideal conditions; systems in a state of flux can get considerably messy.

8008 BASIC?

For some time I have been trying to track down the 8008 BASIC which is rumored to be extant. First, I obtained the IEEE report R75-20 by Weaver, et. al., "A Basic Language Interpreter for the Intel 8008 Microprocessor," which generally discusses the syntactical aspects of the system, but gives no source code, machine code, or other details. Hal probably has the report stuck away somewhere, and perhaps somebody at the University of Illinois in Urbana has some details that we can use.

Then, in the March '75 PCC Newsletter p.21, a letter by Chuck Polisher of Boulder Colorado seemed to indicate that an 8008 BASIC system was available from the National Technical Information Service of the US Department of Commerce. But these people replied that the given reference numbers did not correspond to their system, and an enclosed fee schedule indicates that a document search runs $50. So, if you have any firm info on an 8008 BASIC, please get it to me or Hal so we can follow it up and make the system available. Thanks.

8008 vs 8080 vs ?

The 8080 chip is far more powerful than the 8008, due to improvement in interrupt handling areas, and instruction microcodes that replace several 8008 instructions with one.

It also radically reduces the address multiplexing that makes the 8008 supporting circuitry so complex.

But even the power of the 8008 is just beginning to be felt, and there are several board-sets available to support the 8008 -- presently, the 8080 users are generally locked into one system, one supplier. It will be a lot easier to recommend an 8090 system when several appear and their comparative merits
become apparent. Speed, although highly emphasized as an important factor, is relatively unimportant for experimenters, especially if they are using Dr. Suding's calculator interface design for numerical calculations. (There are several advantages in this, first, all data can be stored in similar formats inside the computer, saving format-conversion systems for I/O to and from people. Second, the many complex functions offered on the interface eliminate not only a floating-point-package, but development of transcendental routines as well, and this is no trivial task.) Although calculations occur inside the calculator chip at 50-60K speed, I/O to and from the calculator chip is quite slow (since the chip was designed for people, blinding speed was not important, and switch de-bouncing and digit-multiplexing was). This means that a slow 8085 may run neck-and-neck with the super 8080 using the calculator interface. The alternative is extensive software systems for the 6080 to allow processing at 8080 speed. But these will probably need to be loaded prior to each session, and may not be available anyway.

If the above seems equivocal, it is. There is no best, or even best-value machine right now, things are still in a very early stage for home computer experimenters. But if I had to buy a computer right now, it would not be the Altair, but the MO-8 system, with its beautiful, beautiful plated-through PC boards.

For the future, there are more and more CPU chips becoming available, although they are not cheap enough in onses to do us much good yet. But the RCA COSMIC may be especially interesting to high-level language designers, due to its unique pointer structure. Further, the same processor may soon be announced in Silicon-on-Sapphire technology, increasing its top speed by an order of magnitude. In particular, the COSMIC does not seem to process data internally, but uses sixteen 16-bit internal registers as pointers to data in memory. It is this pointed-to data which is brought in, processed, and returned to memory; a very fancy system.

-- Review, Please! --

Money and time are things that most experimenters have in short supply, and it does not make a lot of sense for each and every one of us to guess about what we are going to get, or how we will be treated when dealing with a new device or company. Experimentation is not so competitive that you can't find a couple of hours to type a short review of your transaction. Was delivery prompt? Was the merchandise high-quality? Did the manufacturer respond to your requests for adjustment of faulty or otherwise unacceptable merchandise? Did you deal with a man, or a nameless corporation (I always like to know who I am dealing with)? Do try to be objective. Along these lines, I will shortly present a review of the Mini/ Micro Kart calculator interface kit. It will not, unfortunately, be wholly complementary.

PS I still offer help via SASE to those who need it. Please be specific! And it may take a little while -- things are really piling up around here.
Dear Hal Singer...

My husband...not I...is the subscriber to your newsletter. He is the individual in our household who comprehends electronics, logic and that kind of jazz; I don't. Therefore, he finds your newsletter stimulating, valuable & looks forward to receiving each issue--as a substitute for a wife who doesn't understand him when it comes to electronics.

Why am I writing? Because 1) I like him when he's in such a good mood after reading your newsletter...and 2) because I am a professional newsletter (for-profit) editor. We're both scared that comes about the September or October issue, the Micro-8 newsletter may disappear, which we don't want to see happen.

It seems to me that, even for a non-profit venture, the number of pages you are giving per issue, plus the amount of the postage is skinning it pretty damn tight--especially if the renewal money is slow coming in (it always is) at the end of the October term when subscriptions run out. We'd be happy to pay out another $3 to $5 per year to keep Micro-8 coming. You might also consider selling pages of advertising at $10-15 ea. to a few legitimate-but-small businesses interested in this field. This way (or either way), there would be a kitty to pay secretarial costs, etc., any time the burden gets too great...

Our best wishes for the success (continued) of the newsletter & assurances we'll be happy to pay more if you put out a call in the next issue...

Julie Woodman

PS Have you run into anyone who is 1) willing to buy programs from MITS in the face of the ferocious contract drawn up by their legal eagles (enclosed) and/or knows anything about copyright law as it relates to programs???

PPS. If you do decide to sell advertising on any basis, please let us know right away; we may have a product of interest to your readers.

You are right, Julie, we do cut it pretty close financially but our effort is to try to provide a service that is unavailable and vital if this hobby computer thing is to get going right, that of trying to get people together. The whole operation is being run as a student body activity thru our high school computer center and although it is probably legal to sell advertising, so far it is just not worth the effort. If is more fun and I think more valuable to be able to pick those items of advertising that seem to be of most interest to the participants. The last few months have seen an enormous increase in the incoming requests for newsletter subscriptions and an enormous decrease in the items submitted for inclusion in the newsletter. We still have our regulars like Terry Ritter, Phil Mork, William Severance Jr., etc. but I can't help think that there are a lot of people out there (with over 800 people that have requested copies of the NL) that have programs and information (especially ALT'HR 8300) that just haven't taken the time to prepare and submit it. A profit making magazine has to generate its own material by paying authors. A newsletter depends on contributions of material from active involved participants. Lack of submitted material would seem more likely to kill the newsletter than financial problems at the present time.
ROGER L. SMITH, 4502 E. NANCY LN., PHOENIX, AZ 85040 (602) 968-0774

WRITES WITH GOOD NEWS FOR BAUDOT TELETYPE OWNERS — THE ASCII TO BAUDOT CONVERTER BOARDS HAVE BEEN THOROUGHLY DE-BUGGED AND WILL SOON BE AVAILABLE FROM SWTP. WRITE DAN MEYER AT SWTP FOR PRICING. THERE ARE TWO BOARDS, ONE FOR ASCII TO BAUDOT AND THE OTHER FOR BAUDOT TO ASCII. THE BOARDS HAVE PLATED-THRU HOLES AND THE CIRCUITS ARE SUCH THAT THEY WILL FIT EITHER TV TYPEWRITER I, OR TV TYPEWRITER II AND WILL WORK WITH EITHER THE 8008 OR 8080 COMPUTER (WITH OR WITHOUT THE TV TYPEWRITER).

HE SAYS, "BELIEVE ME, IT'S REALLY A PLEASURE TO DO AN OCTAL DUMP OF MEMORY TO ITY (IN MY CASE ONE OF BOB COOK'S CREED MACHINES) AND NOT HAVE TO WORRY ABOUT THE ASCII TO BAUDOT CONVERSION! SO, NO ONE SHOULD WORRY ABOUT BUYING A BAUDOT-CODED MACHINE BECAUSE WITH THE ASCII TO BAUDOT CONVERTER BOARD, THE COMPUTER CAN'T TELL THE DIFFERENCE."

ROGER GAVE US PERMISSION TO REPRINT THE SCHEMATICS. ONLY THE ASCII TO BAUDOT ONE IS INCLUDED (THE HARD ONE AND SINCE MOST PEOPLE WILL BE USING A SEPARATE ASCII KEYBOARD, THE IMPORTANT ONE) BECAUSE OF LIMITED SPACE. WE WILL TRY TO GET THE BAUDOT ASCII INTO THE NEXT ISSUE.

RE HAS PURCHASED THE DESIGN FOR A FUTURE ARTICLE BUT WHO KNOWS HOW LONG IT WILL TAKE TO GET INTO PRINT.

<table>
<thead>
<tr>
<th>ASCII - BAUDOT CONVERTER 8223 TRUTH TABLES</th>
<th>ICII</th>
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<tr>
<td>Word</td>
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Note: This was transcribed in a hurry, from Roger's old writeup and is subject to errors. Check it and report any bugs. H. Singer

Page 25
Dear Hal & John,  

I hope a letter like Bill Fuller's in the #7 NL doesn't discourage you from "bad mouthing" anything that needs it. If he wants to read only rave reviews of the Altair, reading PE will make him feel better.

I bought an Altair too, but only after going over its good and bad points scattered throughout the previous NL's, for which I'm most greatful.

Re your comment that Radio-Electronics may be a joke, there certainly isn't any joke about the thousands of frustrating man-hours that must be wasted because the magazine will never admit a mistake and print a complete correction (corrections, usually incomplete, appear only as letters from the author, implying that it's all the author's fault).

The only joke about it is the money they're missing by not sending out a second book of corrections for $10 to the people who bought the original constructional data for $5. Come to think of it, maybe they would have done just that if you hadn't started the NL.

Regards,

Jim Callas

P.S.: I didn't like the NL format at first glance, but once in a binder--it's good.

---

DAVID W. JOHNSTON, PO BOX 3781, WASHINGTON, DC 20007 SAYS THE HEWLETT PACKARD HP-65 PROGRAMMABLE CALCULATOR IS FAIRLY WELL KNOW WITH 11 APPLICATION PACS AND OVER 2000 Programs ACCORDING TO THEIR LATEST CATALOG. WHAT IS NOT SO WELL KNOW IS THAT THERE IS AN INTERFACING DEVICE KNOWN AS THE "OPTACON" (TELESENSORY SYSTEMS, 1869 PAGE MILL ROAD, PALO ALTO, CA 94304) THAT PROVIDES AN INTERFACE WITH VIBRATING REEDS SO A BLIND PERSON CAN USE THE HP-65 BY FEELING THE REED'S PATTERN WITH HIS FINGER TIPS. PHOTOTRANSISTORS ARE USED TO READ THE CALCULATOR DISPLAY. I WOULD IMAGINE THAT THE OPTACON COULD BE USED WITH OTHER CALCULATORS. IT SEEMS TO ME THAT AN INTERFACE LIKE THIS COULD BE USED TO CONNECT THE HP-65 AND OTHER CALCULATORS TO MICRO AND MINI-COMPUTERS AND SAVE A LOT OF PROGRAMMING AND ALSO MAKE USE OF HP'S OVER 2000 PROGRAMS. REFER TO "HP-65 KEYNOTES", WINTER 1975, VOL 1, NO. 3 FOR MORE DETAILS.
If you are having trouble locating an ASCII keyboard/encoder and are considering the SWTP kit, execute an immediate interrupt and read this first! Having reviewed the specs in their catalog I invested a dollar or so for a phone call to inquire if they had a better keyboard coming up that would include upper and lower case letters. The girl handling my call said no, so I gave my Mastercharge number, and about three weeks later received the kit. (The day after the kit arrived, I received my June issue of Ham Radio magazine and lo and behold the kit I really wanted was prominently featured in the SWTP ad. Strike one.)

Eventhough the construction manual was no more than one sheet and a reprint of the original magazine article, I was not worried as I have had over ten years experience building from construction articles. All the parts plugged nicely on the board until I came to the 52 switches comprising the actual keyboard. Either SWTP got a bargain on misformed switches from the manufacturer or their board driller suffers from depth perception impairments. A ten minute struggle to insert the first switch resulted in a broken switch and a complete recycling of the profanity section of my main core! Each hole required re-drilling, and it still required one hour to insert the first ten switches. (Strike two.) Practise improved the situation, and the remaining fifty-one survivors were installed in another ninety minutes.

SWTP, to eliminate the cost of a double sided board (the Popular Electronics article quoted the board price at $17.50) etched programme jumpers on four strips of pc board. Unfortunately, the board driller must also man the shears for them, since each strip needed about fifteen minutes work with a file to get it to lay flat against the main board.

The next day I decided to inform SWTP of my considered opinion of their kit, and also try and get a replacement switch. After getting my call shunted to four different people (I was paying prime time rates, too!), I was told that I could have a new switch sent to me for $.75. I still haven't gotten the switch, but it has only been a week.

The crowning blow happened tonight when I received my first two issues of the NL. Somebody complained that his SWTP kit puts out a slash when no key is depressed. Having made only a random check of a few characters, I ran down to the basement and set up my keyboard for a test....you guessed it. Has anybody got a cure?

SWTP Keyboard/Encoder: hope my enclosed comments can prevent others from getting this keyboard. The slash condition is really disturbing since I had planned to use the keyboard input for my cassette interface input also. By the time I add a 7475 pair as a latch triggered by the KP pulse and cleared so as to show a '000' octal code output, I will have forked over a lot more money for a lot worse piece of gear than I could have obtained from the surplus market. Also, the mechanical action of the SWTP switches is atrocious. It is virtually impossible to firmly press a key, hold it closed for about ½ second, and then release it without getting another KP strobe and the associated code for a slash up at the output.

By the way, my replacement switch finally arrived after the Mastercharge bill had been processed. It took exactly three weeks?! Another local hobbyist was short one switch with his kit. Eventhough he had purchased the TVT at the same time, he was also charged $.75 for the missing switch.

I relay the comments of several friends that are impressed with the no nonsense equipment/supplier reviews. As my company advertises in other magazines, I am well aware that a promise to advertise is usually rewarded with a favorable new product review. Likewise, if no ad is placed, no new product review is published. My partner built the Mark 3 that I am playing with now. I am well on the road to completing my own. He got him up and running, but without any software experience, he got bored and set it to me. Unfortunately, I made the mistake of telling him about the users group, Virtual Group, and T.H. He subscribed to all and now wants his machine back.

Keep up the good work. Your serious efforts will still be needed even after the commercial interests start publishing. (Byte Magazine will debut in August published by Wayne Green of 73 Magazine fame)

LEE S. MAIRS, 415 QUINBY ROAD, ROCHESTER, NY 14623 (716)473-6139
Page 28
HERB NEILINGER, 745 NE 178TH TERRACE, MIAMI, FL 33162 HAS REALLY ENJOYED THE NEWSLETTERS AND IS FINDING A WEALTH OF INFO AND ADDITIONAL SOURCES OF INFO FROM IT. HE HAS AN OPERATING ALT AIR, TVT, AND IS IN THE PROCESS OF FINDING THE BEST CASSETTE INTERFACE BEFORE BUYING IT. HE IS IN THE PROCESS OF DEVELOPING A PROGRAM FOR STOCK AND COMMODITY FUTURE PRICE FORECASTING. HE REALLY CAN'T TEST THE VALIDITY OF THE PROGRAM TIL HE ADDS THE CASSETTE AS HE WILL HAVE TO ENTER DAILY PRICE MOVEMENTS FOR AT LEAST TWO YEARS BACK ON 40 ODD COMMODITIES TO SEE IF THE BUY/SELL SIGNALS ARE REASONABLY VALID BASED ON PAST PRICE PERFORMANCE AND PAST FUNDAMENTAL STATISTICAL INFO. MAYBE IT WILL BE RUNNING IN THREE MONTHS. HE IS SEMI-RETIRED AND MAKES A PRETTY FAIR LIVING NOW FROM STOCK AND COMMODITY TRADING. HE HAS HAD A HECK OF A PROBLEM WITH MAURY GOLDBERG AT MICRO MINI MART. HIS CHECK TO HIM FOR SOME MEMORIES CLEARED HIS BANK IN APRIL AND AFTER THREE LONG DISTANCE CALLS, ALL HE GETS ARE FLIMSY EXCUSES ABOUT MIX-UPS IN THE HIS ORDER DEPARTMENT, ETC. SO NO WONDER HE COULDN'T GET MASTER CHARGE TO OK HIM. IN HIS LAST PHONE CALL ON 17 JUNE HE GAVE MAURY TEN DAYS TO DELIVER OR HE'D GO TO THE POST OFFICE DEPT. AND FILE A FORMAL COMPLAINT. HE WOULD LIKE TO KNOW IF ANYONE ELSE HAS HAD THE SAME PROBLEMS. HE SAYS HE BUILT A GREAT CABINET FOR THE TVT AND OCTAL KEYBOARD FROM 1/4" PLEXIGLASS SCRAP HE PICKED UP AT A LOCAL FABRICATOR. IT'S EASY TO WORK WITH (SABRE SAW, DRILLS, SANDPAPER, ETC). HE USED CORNER BRACKETS INSIDE FOR JOINT REINFORCEMENT AND THE PLASTIC WAS A SMOKEY TYPE WHICH IS SEMI-TRANSPARENT AND VERY SHARP LOOKING. HERB WOULD LIKE TO FIND SOMEONE ELSE TO WORK WITH IN THE MIAMI AREA BUT HAS NOT FOUND A NAME YET IN ANY OF THE NEWSLETTERS.

JOHN D. WITROW, JR., 233 W. MT. ST., KERNERSVILLE, NC 27184 RESPONDED TO THE POP ELECT. MENTION AND SAYS WE'VE SOLD HIM ON THE MICRO-8 NEWSLETTER. HE IS PARTICULARLY INTERESTED IN THE 8080 AND PLANS A SYSTEM FOR USE IN 1) LARGE-SCALE STORAGE 2) GRAPHICS DISPLAY APPLICATIONS 3) SPEECH SYNTHESIS AND AUDIO RECOGNITION, ETC., ETC., ETC. (HE SAYS HE CAN'T YET SEE THE END OF POSSIBLE APPLICATIONS.) HE PROMISES US SEVERAL NEWSLETTER SUBMISSIONS AND SAYS OUR EFFORTS SEEM TO HAVE EXPANDED SOMETHING LIKE A ROBERT A. HEMLEIN PLOT!! (NOW I HAVE TO FIND OUT WHO ROBERT A. HEMLEIN IS.)

A. J. GREER, 2139 ETHEL PORTER DRIVE, NAPA, CA 94558 RECEIVED A COPY OF NL #6 FROM A FRIEND. HE IS INTERESTED IN MICROPROCESSOR APPLICATIONS TO LABORATORY INSTRUMENTATION, DATA ACQUISITION, AND DATA DISPLAY. AS OF YET HE HAS NOT STARTED CONSTRUCTION OF A COMPUTER AND WOULD BE INTERESTED IN OPINIONS ABOUT WHICH SYSTEM IS BEST. HE HAS MARK-8 INFORMATION AND WANTS TO GET SCHELBI-8H INFO. THE ALT AIR IS DEFINITELY OUT OF HIS PRICE RANGE. HE IS INTERESTED IN 2K OR 4K MEMORIES USING 2102'S FOR THE MARK-8. HE IS ALSO INTERESTED IN POSSIBLE MARK-8 INPUT PORT EXPANSION.

ROBERT A. VAN WINKLE, 238 WOODBRIDGE AVENUE, YUBA CITY, CA 95991 (THIS IS AN ADDRESS CHANGE) COMPLIMENTS US ON A FANTASTIC NL #7 AND SAYS HE HAS A THREE PIECE MODEL 28 TTY WHICH HE WOULD LIKE TO GET RID OF. ITS COMPOSED OF THE MODEL 28 PRINTER, THE TAPE PUNCH AND THE TAPE READER AND IF ANYONE IN THE YUBA CITY-SACRAMENTO AREA IS INTERESTED, THEY SHOULD CONTACT HIM. PROGRESS ON THE MARK-8 HAS HIT A BRICK WALL IN THE FORM OF CIRCUIT CARDS. HE'S HAVING TROUBLE GETTING THE ARTWORK DONE TO INCLUDE EDGE CONNECTORS. AS SOON AS THEY ARE DONE HE WILL MAKE THEM AVAILABLE FOR THOSE LOOKING FOR AN ECONOMICAL SOURCE OF EDGE CONNECTORS. ROBERT WOULD LIKE TO RECOMMEND DELTA ELECTRONICS, PO BOX 1, LYNX, MA 01903. THEY OFFER A "RACK OF EDGE CONNECTORS FOR $8.95 PLUS POSTAGE."
ROBERT JONES, 33363 LYNNE AVE., ABBOTSFORD, B.C., CANADA, V2S 1E2 HAS
THE FOLLOWING TO SAY:

I'D LIKE TO TELL YOU A LITTLE ABOUT MYSELF AND PERHAPS TRY TO CONTACT
SOMEONE IN THE GROUP WHO HAS A COMPUCORP CALCULATOR, OR A MONROE (WHICH
IS BASICALLY A COMPUCORP "WORK" IN A MONROE CASE).

FIRST, MY MAIN ELECTRONICS INTERESTS WERE DIGITAL LOGIC SYSTEMS DESIGN
(THIS IS THE FIELD IN WHICH I SPECIALIZE AND IN WHICH I EARN MY BREAD-
AND-BUTTER) AND ELECTRONIC MUSIC, BUT SINCE I BOUGHT A COMPUCORP SCIENT-
IFIC PROGRAMMABLE CALCULATOR ABOUT 2 1/2 YEARS AGO, MY HOBBY INTERESTS
HAVE SHIFTED TO MICRO-COMPUTERS. I BEGAN BY TAKING MY COMPUCORP APART;
PAINSTAKINGLY TRACING OUT ALL THE PCB BUS-LINES AND DRAWING A CIRCUIT
DIAGRAM. UNFORTUNATELY, I FOUND IT EXTREMELY DIFFICULT TO GET ANY TECH
INFO FROM COMPUCORP (IN FACT, THEY REFUSED TO RELEASE ANY DATA AT ALL),
SO THAT ALTHOUGH I HAD A CIRCUIT DIAGRAM, MOST OF THE IC PINS AND OUT
GOING TERMINAL POINTS WERE UNIDENTIFIED. HOWEVER, BY DEVIOUS MEANS,
OVER THE YEARS I HAVE MANAGED TO SECURE A COPY OF THE SERVICE-MANUAL AND
ALSO OBTAINED ONE FOR THEIR NEWEST MODEL, THE 325 ALPHA. IF YOU HAVE
ONE OF THESE MACHINES, YOU MAY WANT TO CONTACT ME. FOR MY OWN PART, I
AM STILL ANXIOUS TO TRACK DOWN THE TRUTH TABLES FOR THE VARIOUS IC'S
AND ALSO INFO ON COMPUCORP'S LATEST TEST-PROCEDURES SUCH AS HOW TO MAN-
IPULATE INTERRUPTS OR TO JAM DATA DIRECTLY INTO RAM, ETC.

I WAS GOING TO GET AN ALTAIR 8800 AND THEN I READ ABOUT THE NEW MOTOR-
OLA 6800 SERIES AND HAVE ORDERED THE EVALUATION KIT OF 7 CHIPS AND INFO
FOR $300. WITH LUCK, I SHOULD GET THESE PIECES WITHIN A WEEK OR SO AND
WILL THEN BEGIN TO BUILD MY OWN COMPUTER. MAINLY IT WILL BE A FUN THING,
JUST FOR THE JOY OF BUILDING MY OWN COMPUTER TO BEHAVE THE WAY I WANT
IT TO (I HOPE!!!), AND THEN EXPERIMENTING WITH PROGRAMMING, ESPECIALLY
FOR COMPUTER-GAMES. I AM A NEWCOMER TO COMPUTER TECHNOLOGY AND HAVE
A LOT TO LEARN ABOUT VARIOUS ARCHITECTURES, LANGUAGES, AND SO ON, SO FOR
SOME TIME TO COME I WILL PROBABLY BE GETTING MORE FROM THE GROUP THEN I
WILL BE PUTTING INTO IT.

I HAVE ALREADY BOUGHT THE MARTIN RESEARCH BOOK - WELL, ALMOST BOUGHT IT
ANYWAY, AS IT ARRIVED WITH ABOUT 65 PAGES OF TEXT MISSING. I WOULD
HAVE THOUGHT THEY'D BE MORE CAREFUL PUTTING TOGETHER A BOOK WHICH COSTS
THIS MUCH.

DON'T GIVE UP ON THE NEWSLETTER. AMATEURS LIKE MYSELF NEED SUCH A GROUP
OR GROUPS. I SHOULD SAY, AS I'VE TAKEN OUT SUBSCRIPTIONS TO THE COMPUTER
HOBBYIST AND THE DIGITAL GROUP'S NL'S AS WELL. I AGREE WITH COMMENTS RE
POPULAR ELECTRONICS - - I WOULD MUCH RATHER SEE A CONTINUING SEMINAR
ON COMPUTER SYSTEMS, RIGHT FROM THE GROUND UP, THAT THESE THINLY DIS-
GUISED "ADVERTISEMENT" TYPES OF ARTICLES.

WHILE ON THE SUBJECT OF ELECTRONICS MAGAZINES, THE CLOSING ARTICLE OF
"RADIO ELECTRONICS" SERIES ON THE TUT II SHOWING HOW TO COUPLE THE UNIT
INTO A TV HAS ONE UNLABELLED ARROW ON THE CIRCUIT DIAGRAM. NATURALLY, I
WROTE TO ASK THEM WHERE IT WENT. ABOUT 2 WEEKS LATER I GOT A POST-CARD
FROM THEM - POSTAGE 13 CENTS - POINTING OUT THAT IN VIEW OF THE HIGH
COST OF POSTAGE THEY WERE UNABLE TO REPLY TO MY QUERY REGARDING THE TUT
II AS I HAD NOT ENCLOSED A SASE. CAN YOU IMAGINE? IN HALF THE SPACE
THIS TOOK UP ON THE POSTCARD, THEY COULD HAVE ANSWERED MY QUERY. IN
ANY CASE, IT SHOULD HAVE BEEN OBVIOUS THAT IF ONE READER NEEDED THIS INFO
THEN SO WOULD OTHERS, AND THE REPLY SHOULD PROPERLY HAVE BEEN MADE IN A
SUBSEQUENT ISSUE OF THE MAGAZINE. SO MUCH FOR COMMON SENSE!!!!!
Suddenly, with about six cheap cassette interface that work known to us, the problem of which one is to become the standard faces us. In a letter to the Digital Group, I asked "What do we do now?" This was their reply. (No information was available on the Computer Hobbyist Magazine unit at that time.)

the digital group

po box 6528
denver, colorado 80206

March 31, 1975

We can understand your concern about setting standards on the cassette interface so as to allow easy program interchanges. Even with Dr. Suding's local influence, several experimenters in Colorado are committed to building their own version of a cassette interface as well as his. A bunch of rugged individualists these experimenters.

The digital group, which, of course, is totally unbiased in its opinions, would like to contribute the following points on the interface situation. (Dr. Suding may contribute his own opinions later.)

Mod-8 - The design looks good but our reservations are the following:

1. The interface software looked good as long as the ROM was going to be available - looks like it will be an orphan at best now and so far we have no information from Mini-Micro Mart that it can be obtained.
2. If you don't have a ROM, then you need 196 bytes of RAM storage for interface software.
3. The level of the volume control of the recorder appears to be a fairly critical adjustment.

Scelbi -
1. Way too many ICs.
2. Too complex and therefore too expensive.

Suding -
1. Costs under $5 in parts (excluding PC board - you can afford a Suding on top of anything else).
2. Requires only 135 bytes of storage - 88 for the write routine and 47 for the read routine. The read routine (Cassette Dumper) can be put in 2 8223's easily.
3. Recorder volume control not critical - if you can hear it playing back (after bypassing speaker cutoff), the computer can understand it. Also very difficult to overload.
4. Tuning the circuit is not critical or particularly sensitive - tuning it using a scope for frequency accuracy is adequate.
5. PC Board and all parts, in various forms are being made available very shortly (see project update) as well as an assembled, tested, and tuned version for those who lack basic test equipment. Prices available soon.
6. Software is currently being distributed on cassette with this interface and, as you know, a great deal more is in the pipeline. About 50 packets have sent out so far.
7. As further verification of the quality of the circuit, we put in a cassette that was binding severely and had a great deal of audible wow - it still loaded!
Dr. Suding's comparison of the three cassette systems written on March 22, 1975 follows. Contact Dr. Suding thru the Digital Group.

Unfortunately, every designer views "his design is best", so there will not be perfect agreement. However, "independent judges" should consider the following when selecting a standard.

1. Minimum Software requirement, especially on "Cassette to Memory" (since you have to "key in" this unless on ROM).

2. Simplest Hardware circuitry - Costwise and Tuning.

3. Most Reliable operation - Noise immunity, dropout resistance, speed fluctuation proof, varying signal levels, tone purity.

4. Possible compatibility with other designs.

5. Number in use.

Perhaps your readers would make the best ultimate judges. Have each designer detail the merits of his system, or have an independent party parallel the qualifications. I have included my views on the following sheet.

Regards,

Dr. Robert Suding

COMPARISON OF MONITOR 8 - SCELBI - SUDING CASSETTE SYSTEMS

1. Software Requirements:

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<th>System</th>
<th>Read</th>
<th>Write</th>
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<tr>
<td>MIL</td>
<td>Estimated at 100 bytes</td>
<td>Maybe 150 bytes (Certain routines are called but not listed.)</td>
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<tr>
<td>SCELBI</td>
<td>104 bytes</td>
<td>60 bytes</td>
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<tr>
<td>SUDING</td>
<td>47 bytes</td>
<td>87 bytes</td>
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Comments: MIL and Suding systems are roughly identical except that Mil includes a parity bit. The Scelbi is totally incompatible with anything. The Suding system requires only 1/2 the amount of manual "cold start" entry to run in the tape, and the programming has been placed on 1 1/2 8223 ROMs for "instant startup". MIL has died, and the MIL ROM (16K) has never been correctly built, only a "defective ROM" with a bad bit (from Maury Goldberg of Mini Micro Mart).

2. Hardware Circuitry:

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<th>System</th>
<th>Details</th>
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<tr>
<td>MIL</td>
<td>Simple circuitry with AM detection of the 6Khz tone. 6 ICs, 1 transistor. Square Wave output.</td>
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Page 32
Scelbi- Complex circuitry with FM detection of the tones 1.3KHz and 2.6 Khz - Many ICs.

Suding- Simple circuitry with FM detection of the tones 2125 and 2975. 4 ICs.

Comment: The FM detection system of the Scelbi and Suding circuit is vastly superior to the AM detection system of the MIL with regard to noise, dropout, and extraneous signals in general. The tuning of any of the systems is not difficult. The software of either the MIL or the Suding system will operate the Suding hardware. The Scelbi circuit uses harmonic related tones of 1300 and 2600, which would impair the signal/noise ratio of the upper tone. The Suding circuit uses standard teletype frequency shift tones which are harmonically unrelated. The 2125 - 2975 tones used by the Suding circuit also allow its use in copying wide shift ham radio teletype signals without modification. The Suding circuit uses a triangular wave, much cleaner than the square wave outputs of the other systems. The Suding circuit is being developed as a PC Board by Signal Systems of Colorado Springs, Colorado.

3. Reliable operation:

MIL - The AM detection system of the MIL is much less problem immune than an FM system. The parity checking circuit does have advantages, but an LRC or CRC system would be even more desirable and could be implemented in any system. However, the parity checking operation requires more "Read Cold Start" storage, meaning more user effort to initially load.

SCELBI- Somewhat higher baud rates are used by the SCELBI system, but the split and combining is wasteful.

SUDING- Non-standard 400 baud used, but could be increased/ decreased under software control. Only load errors that have ever occurred have been due to either very dirty and worn tape head, or very bad tape speed shift due to cassette internal bind or motor slippage.

Comment: It appears all three work, but I feel the Suding system or the Scelbi system have an advantage, at least theoretically, over the MIL.

4. Compatibility - the Suding circuit will work with either MIL software or its own. The MIL hardware requires a strange output logic pulse that could be bypassed to work with the Suding cassette software. Scelbi is not compatible.

5. Number in use - Unknown - 50 people have received a cassette of the Suding software in the 2 weeks since announcement. Feedback included in the requests indicates enthusiasm. All new software developments by Dr. Suding and the digital group will be shipped via cassette.
PRIORITY INTERRUPT ENCODER FOR THE MARK-8

*NOTE*
This is so far an untested circuit. Some one may want to check it out.

DEVICE INTERRUPT LINES IN ORDER OF PRIORITY
INPUT GOES LOW (NEEDS PULL UP RESISTORS)

THE 74148 IS A B LINE TO 3 LINE PRIORITY ENCODER, IT COULD ALSO BE USED FOR A OCTAL ENCODER FOR A COMPUTER ENTRY TERMINAL.
Debouncer and repeat key addition to SWTP keyboard.
Connect RPT IN to unused key, other side of key to ground.
The unmodified keyboard is debounced only on leading edge.
With this modification, one clean transition to ground is made, lasting as long as the key is depressed.

Modification to cursor circuitry of SWTP-TVII. This circuit replaces the solid box cursor with single line above the character position, preventing the cursor from hiding a character.

JOHN E. TAYLOR, 2009 NORTH GEYER ROAD, ST. LOUIS, MISSOURI 63131 BELIEVES THAT THE NL'S MAY BE JUST ABOUT THE BEST VALUE IN TERMS OF INFORMATION THAT HE HAS EVER EXPERIENCED. HE IS WAITING FOR THE DUST TO SETTLE BEFORE STARTING CONSTRUCTION BUT WILL PROBABLY START A MIL MOD-8 IF HE CAN GET DELIVERY ON THE MONITOR. AS A PATENT LAWYER, HE WOULD LIKE TO POINT OUT THAT THIS IS A RAPIDLY CHANGING TECHNOLOGY, PATENTS ARE EXPENSIVE TO OBTAIN AND EVEN MORE EXPENSIVE TO ENFORCE AND THAT THE TIMES AND MANY JUDGES DO NOT FAVOR MONOPOLIES OF ANY SORT. THE AVERAGE PERSON MIGHT WELL FIND A BETTER INVESTMENT IN THE STATE LOTTERY. HE IS AGREEABLE TO OFFERING OFFHANAD ADVICE AT NOT COST REGARDING PATENTS BY PHONE ONLY AT (314) 966-4372 IN THE EVENING.
W. H. BURTNER, RR2, BOX 267, VALPARAISO, IN 46383 SAYS THAT THANKS TO THE NL, HE HAS HAD MANY HELPFUL REPLIES ON HIS MARK-8 PROBLEMS. HE IS NOW BUSY ADDING DR. SUDINGS ENHANCEMENTS AND CONSEQUENTLY HAS THE MARK-8 STREWN ALL OVER THE HOPE. HE CAN'T WAIT TO TRY THE DIGITAL GROUPS MODS AND SOFTWARE. MARTIN RESEARCH MADE HIM AN OFFER ON THEIR BOOK AT $40 BUT THAT STILL SEEMS HIGH. AFTER A THREE MONTH WAIT, HE FINALLY GOT THE TWO 4K MEMORY BOARDS ORDERED FOR THE ALTAIR. HE SAYS HE CAN'T KICK THOUGH BECAUSE IT TOOK 6 MONTHS TO GET THE PERIPHERALS ON THE RG5 KIT. IT SURE IS A DRAG THE WAY THESE SUPPLIERS SHUCK YOU AROUND ONCE THEY HAVE YOUR MONEY. HE COULD SURE USE SOME INFORMATION AND ADVICE ON THE BEST WAY TO PROVIDE I/O FOR HIS ALTAIR. IS ANYONE INTERESTED IN SHARING THE COST ON THE SOFTWARE? HE IS TRYING TO SET UP AN INTERFACE SO HIS CREED TTY CAN BE USED INTERCHANGEABLY BETWEEN THE ALTAIR AND THE MARK-8. APPARENTLY BOB COOK STILL DOES NOT HAVE THE TYPEFACE CHANGES FOR THE CREEDS. MAURO GOLDBERG SEEMS TO ALWAYS BE SO ENTHUSIASTIC ABOUT THE ITEMS HE IS PUSHING AND YET IT'S RATHER HARD TO PIN HIM DOWN TO DELIVERY. HE'S GLAD TO SEE SOME IDEAS ARE DEVELOPING WHERE THE MEMORY BOARDS CAN BE SHARED BETWEEN DIFFERENT COMPUTER TYPES AND THE COST IS GETTING INTO A MORE REASONABLE AREA. HE HOPES SOME OF THE BRAINY GUYS CAN COME UP WITH SOME STANDARDIZATION SOON. THERE ARE SO MANY OFFSHOOTS OF THE TAPE CASSETTE, THAT ITS BEWILDERING TO SOMEONE NOT IN THE KNOW. P.S. JUST GOT LICENSE AGREEMENTS ON MIT'S SOFTWARE AND APPARENTLY THEY ARE LETTING THE DOLLAR SIGNS SHOW IN THEIR EYEBALLS AND DO NOT INTEND THAT THIS MATERIAL IS TO BE SHARE AROUND. I WONDER HOW MANY FRIENDS THEY THINK THEY WILL MAKE WITH THIS ATTITUDE?

WILLIAM D. THOMAS, 3112 LIS PLACE, HIGHLAND, IN 46322 WOULD LIKE TO INFORM OTHER READERS THAT MINI MICRO MART OF 1618 JAMES STREET MAY NOT BE MAKING THEIR DELIVERIES AS ADVERTISED AND IS ALSO FAILING TO HEED INSTRUCTIONS FOR REFUNDS. HE ORDERED AN ASCII KEYBOARD FROM THEM IN MARCH AND HAS YET TO RECEIVE A REQUESTED DELIVERY OR REFUND WHICH I FINALLY DEMANDED. HE HAS COMPLAINED TO THE POSTAL INSPECTOR IN CHARGE, PITTSBURG, PA 15222 AND YOU MIGHT DO SO ALSO IF EXPERIENCING SIMILAR DIFFICULTIES. HE IS INTERESTED IN 8080 MINIS AND HAS AN ALTAIR THAT HE IS SLOWLY STARTING TO EXPAND. MIT'S DELIVERY TIMES ARE SO SLOW AS TO BORDER ON THE RIDICULOUS. HE IS LOOKING ELSEWHERE FOR PERIPHERALS.

LAURENCE L. PLATE, 2320 SKYLINE WAY, SANTA BARbara, CA 93109 FINALLY DECIDED HE HAD TO ABANDON THE MARK-8'S WIRED BUS ARRANGEMENT AND IS NOW INTERESTED IN CONTACTING OTHERS INTERESTED IN WORKING ON A CARD CAGE CONVERSION FOR THE MARK-8 SO WE CAN COMMUNICATE AND EXCHANGE IDEAS. HE IS USING A 26 CARD CAGE SYSTEM WITH 22/22 CONNECTOR CARDS (4 1/2 X 6 1/2) AND HAS ALREADY LAID OUT THE ORIGINAL RE MARK-8 CPU LOGIC ON THE CPU BOARD ON 3 PLUG CARDS. HE WILL SUPPLY FURTHER DETAILS ON THIS WORK AS SOON AS HE GETS ALL OF THE MARK-8 LOGIC WITH THE SUDING MODS LAID OUT. HIS DOCUMENTATION MAY AMOUNT TO ABOUT 100 PAGES OF DETAILED LOGIC DRAWINGS, ETC. HE JUST GOT THE NEW SUDING TTY PRINTED CIRCUIT BOARD WITH THE CHARACTER GENERATOR CHIP AND CRYSTAL. THE BOARD IS REALLY A BEAUTIFUL JOB WITH PLATED THRU HOLES, ETC. HIS ONLY GRIPE IS THAT IT IS NOT THE SAME SIZE AS THE CARDS IN HIS CARD CAGE (IT'S 4 1/2 X 6 1/2) SO HE IS GOING TO INSTALL IT INSIDE HIS NEW TV MONITOR SET SO ONLY THE 8 INTERFACE LINES NEED TO BE BROUGHT OUT. HE INTENDS TO DO EXTENSIVE INPUT MUX REDESIGN AND NEEDS DENSER MEMORY THAN 1101'S OR 2102'S SO IS NOW STUDYING THE AMI 56605BC 4K X 1 CHIP. THEY COST $35 IN UNITS AND $23 IN LOTS OF 100. HENCE ONE CARD IN HIS SYSTEM COULD HOLD 4K MEMORY WITH REFRESH LOGIC. ADDRESSING LOGIC WOULD BE ON ONE CARD SO HE COULD EXPAND TO 16K WITH ONLY 5 CARDS IN HIS SYSTEM. HE WOULD LIKE TO CONTACT OTHERS INTERESTED IN 4K CHIPS.
# 808 INSTRUCTIONS

<table>
<thead>
<tr>
<th>Function</th>
<th>Acc</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>H</th>
<th>L</th>
<th>MEM</th>
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<tr>
<td>LOAD REGISTER IMMEDIATE</td>
<td>006</td>
<td>016</td>
<td>026</td>
<td>036</td>
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<td>056</td>
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<tr>
<td>INCREMENT REGISTER</td>
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<td>020</td>
<td>030</td>
<td>040</td>
<td>050</td>
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<td>ADD REG to ACC → ACC</td>
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<td>ADD REG + ACC with CARRY</td>
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<tr>
<td>SUB REG from ACC → ACC</td>
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<td>“AND” REG with ACC → ACC</td>
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<td>“COMPARE” REG with ACC</td>
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## LOAD

### FROM

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## UNCONDITIONAL

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<td>CALL</td>
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<td>RETURN</td>
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<td>053</td>
<td>013</td>
<td>043</td>
<td>003</td>
<td>063</td>
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## Rotate

- Rotate "A" Left: 002
- Rotate "A" Right: 012
- Left thru Carry: 022
- Right thru Carry: 032

## PORT

<table>
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<tr>
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<th>OUT 24</th>
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<td>7</td>
<td>117</td>
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## RESTART (INT.)

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<td></td>
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<td>OX5</td>
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## IMMEDIATES WITH

### ACCUMULATOR CARRY

- ADD Imm: 004, 014
- SUB Imm: 024, 034
- "AND" Imm: 044
- "EX OR" Imm: 054
- "OR" Imm: 064
- "COMPARE" Imm: 074
Dear Hal,

Sorry I missed last meeting in Santa BArbara--this job has too much travel with it. Could you send a copy of the digital graphics oscilloscope display reprint from the MP Publishing paper? Several of us here would like to see it. I'll send it back posthaste.

A new rumor--well, actually it's more than a rumor. I talked with Bill Godbout up in Oakland. His company is coming out with a PDP-11 kit in October. It will be a complete 11/10 with cabinet, power supply, front panel, etc. May or may not contain the UNIBUS--they're still negotiating with DEC. Price will be under 1K in kit form, which makes it competitive with the LSI-11. It will come with the basic paper tape software--assembler, editor, etc. I don't know any more details except that it will be all TTL, which should make it a little easier to fix than the LSI-11. On the other hand the LSI-11 has a better instruction set (11/40), has the front panel simulator, hardwired floating arithmetic, etc. Hard to tell which is best, but if the OEM buy on the LSI-11 falls through this may be a good option. He is reluctant to talk much about it until the thing is on the shelf ready for delivery--says he doesn't want to get the MITS reputation for promising what isn't there. On the other hand it would be nice to let the amateur community know about it. You might give him a call.

The newsletter gets better and better--congratulations. I will try to get you a copy of the foil pattern for Doug Hogg's scroller before next issue--I'm trying to modify it to scroll on CR, scroll in both directions, allow computer blanking of the screen etc. I've ordered the Edwards Associates "Buggbook" series and will let you know how it looks.

Sincerely,

Jim McCord

Dear Hal and John:

You may have seen the recent advertising campaigns for Intersil's new IM 6100 chip that executes PDP-3 code and the OEM LSI-11 from DEC.

I am interested in getting 100 people to go in on an order for either. The units are expensive, BUT POWERFUL!! We could probably get the IM 6100's for under $200, each, while LSI-11's would be about $650, each. Maybe in 50 lot the LSI-11 could be purchased for $1,000 each.

Maybe people that feel they can afford this (after all, a lot of your readers have spent over $4-500 for lesser systems) would write to me. I will request deposits when I have enough responses to justify doing so, and will negotiate with the manufacturers. I have already phoned Intersil and talked with the IM 6100 product manager.

You're doing a great job on the Newsletter. The Vol. 1 #7 format is GREAT!

Very truly yours,

C. Richard Corner
Figure 6

BAUDOT TO ASCII CONVERTER

WE HAD A PAGE LEFT OVER SO ROGER SMITH'S BAUDOT TO ASCII CIRCUIT IS INCLUDED. SORRY, WE DON'T KNOW WHAT IS IN THE ROMS.
NUMBERS INSIDE CIRCLES REFER TO MARK-8 BUSS NUMBERS. POWER CONNECTIONS ON THE 2102 ARE +5 TO PIN 10, AND GROUND TO PIN 9. CLOSE MEMORY PROTECT SWITCH FOR ERASE PROTECTION. DISTRIBUTE 6 1UF CAPACITORS AND 2 100 UF CAPACITORS ON POWER LINES. ONE 74154 CAN PROVIDE HIGH-4 BIT DECODING FOR ALL 16K OF MEMORY. IN PRACTICE THIS IS PROBABLY EASIER TO USE ONE 74154 FOR EACH BOARD OF 4K WORDS. WORST CASE POWER CONSUMPTION OF 2K OF 2102 IS 1 AMP. THIS MEMORY DESIGN MUST BE USED IN CONJUNCTION WITH AN 1101 BOARD. WHEN USING THIS DESIGN IN CONJUNCTION WITH THE ORIGINAL 1101 BOARDS, PROPER DECODING CAN BE OBTAINED ON THE 1101 BOARDS BY CONNECTING A "BANK" SELECT OUTPUT OF THE 74154 TO PINS 9 AND 10 OF IC 34 IN PLACE OF THE #41 BUSS. IN OTHER WORDS BREAK THE FOIL BETWEEN BUSS LINE 41 AND IC 34 AND ATTACH A "BANK" SELECT LINE TO IC34. INSTALL THE JUMPER IN THE "ONES" POSITION ON ALL 1101 BOARDS. A BANK CONSISTS OF 4 PAGES OF MEMORY.
Computer Glossary

The beginner in this hobby computer thing is hopelessly anowed by all of the technical words and acronyms that people keep throwing around. It's difficult to communicate without using some of them.

Motorola published the following microcomputer glossary and I've added some of the terms people have asked me about. Motorola welcomes your suggestions for additional terms and suggested definitions. Send them to Motorola Semiconductor Products, PO Box 20912, Phoenix, AZ 85036.

Your name will be put on a mailing list to receive future editions.

ACCUMULATOR A temporary storage register associated with a processing unit.

ADDRESS A character or group of bits that identifies a particular part of storage, or some other data source or destination.

ALGORITHM A prescribed finite set of well defined rules or processes for the solution of a problem in a finite number of steps, e.g., a full statement of an arithmetic procedure for evaluating \( \sin X \).

ALPHANUMERIC Pertaining to a character set that contains letters, digits.

ARITHMETIC AND LOGIC UNIT A part of a microcomputer that includes operations, logic operations, and related operations. (An ALU is part of the MPU chip circuitry.)

ASCII American Standard Code for Information Interchange. The standard code, using 7 bit coded characters (8 bits including parity check), used for information interchange among data processing systems, communication systems, and associated equipment.

ASSEMBLER A program used to translate a machine language program from a symbolic language program.

ASYNCHRONOUS COMMUNICATIONS INTERFACE ADAPTER (ACIA) A general purpose programmable interface between the MPU and asynchronous I/O.

BAUD A unit of signalling speed equal to the number of discrete conditions or signal events per second. For example, one baud equals one bit per second in a train of binary signals.

BENCHMARK PROBLEM A problem used to evaluate the performance of hardware or software. It is a problem used to evaluate the performance of several microcomputers relative to each other, or a single microcomputer relative to system specifications.

BINARY-CODED DECIMAL NOTATION (BCD) A binary-coded notation in which each of the decimal digits is represented by a binary 4 bit number, e.g., in binary-coded decimal notation that uses the weights 8-4-2-1, the number "twenty three" is represented by 0010 0011 (compare its representation 10111 in the pure binary system).

BOOTSTRAP An existing version of a program that is used to establish another version of the program. A technique or device designed to bring itself into a desired state by means of its own action, e.g., a machine routine whose first few instructions are sufficient to bring the rest of itself into the microcomputer from an input device.

BRANCH In the execution of a microcomputer program to select one from a number of alternative sets of instructions. A set of instructions that are executed between two successive decision instructions.

BYTE A binary element string operated upon as a unit (normally 8 bits) and usually shorter than a computer word.

CENTRAL PROCESSING UNIT (CPU) A unit of a computer that includes circuits controlling the interpretation and execution of instructions.

COMPI lER A computer program used to translate a program expressed in a problem oriented language into a computer oriented language.

COMPUTER NETWORK A complex consisting of two or more interconnected computers.

CONTROL UNIT Coordinates all units of a computer in a timely, logical sequence.

CYCLIC REDUNDANCY CHECK CHARACTER (CRC) A character used in a modified cyclic code for error detection and correction.

DATA FLOW CHART A flowchart that represents the path of data in the solving of a problem, and that defines the major phases of the processing as well as the various data media used.

DATA PROCESSING The execution of a systematic sequence of operations performed upon data, e.g., handling, merging, sorting, computing.

DATA PROCESSOR A device capable of performing data processing, such as a desk calculator, a punch card machine, or a computer.

DATA SIGNALLING RATE In communications, the data transmission capacity of a set; the data signalling rate is expressed in bits per second.

DEBUG To detect, to trace, and to eliminate mistakes in microcomputer programs or in other software.

DIRECT MEMORY ACCESS (DMA) The process of obtaining data from storage, or of placing data into storage, directly and not depending on the usual flow of data through the processor.

DUMP To write the contents of a storage, usually from an internal storage to an external medium, for a specific purpose such as to allow other use of the storage, as a safeguard against faults or errors, or in connection with debugging.

DUPLEX In communications, pertaining to a simultaneous independent transmission in both directions.

DYNAMIC Refers to the finite storage time of charge within certain MOS circuits that depend on device capacitance to store information, and the need to constantly refresh or recharge these data locations. Contrast with static.

EMULATE To imitate on a system with another, primarily by hardware, so that the imitating system accepts the same data, executes the same programs, and achieves the same results as the imitated system. Contrast with simulate.

EXBR** Motorola trademark for EXORiser's firmware which minimizes the time required to develop users' programs.

EXORiser™ Motorola trademark for a systems development tool for evaluation of M6800 prototype hardware and software in its actual working environment. As the name suggests, the EXORiser "casts out" problems within the prototype system.

EVALUATION MODULE An evaluation system to check the operating characteristics of Motorola's M6800 microcomputer family of parts.

FIFO First in first out. A queueing technique in which the next item to be retrieved is the item that has been in storage the longest time.

FIRMWARE Software in hardware form. Example: Computer program in read only memory.

FLOW CHART A graphical representation of the definition, analysis or method of solution of a problem, in which symbols are used to represent operations, data, flow, equipment, etc.

FORTRAN (Formula translation) A programming language primarily used to express computer programs by arithmetic formulas.

GENERAL PURPOSE COMPUTER A computer that is designed to operate upon a wide variety of problems.

HARDWARE Physical equipment used in data processing, as opposed to computer programs, procedures, rules, and associated documentation. Contrast with software.

HYBRID COMPUTER A computer using both analog representation and discrete, or digital, representation.

INDEX REGISTER A feature to provide programming flexibility by providing additional addressing modes.

INSTRUCTION In a programming language, expression that specifies one operation and identifies its operands, if any.

INTERRUPT An external event that causes the computer to shift its attention to another problem.

I/O Input-output.

JUMP A departure from the normal sequence of executing instructions in a microcomputer.

MACHINE LANGUAGE A language, that is, a set of characters, conventions and rules used for conveying information, used directly by a machine.

MACRO-INSTRUCTION An instruction in a source language that is to be replaced by a defined sequence of instructions in the same source language. The macroinstruction may also specify values for parameters in the instructions that are to replace it.

MAIN STORAGE Program addressable storage from which instructions and data can be loaded directly into registers from which the instructions can be executed or the data can be operated upon. Usually an internal storage.

MASS STORAGE An auxiliary storage or very large storage capacity used for storage of data to which infrequent reference need be made.

MICROCOMPUTER INSTRUCTION An instruction that can be recognized by the microprocessor unit of the microcomputer for which it is designed. Synonymous with machine instruction.

MICROCOMPUTER PROGRAM A series of instructions or statements in a form acceptable to a microcomputer.
MICROCOMPUTER WORD A sequence of bits or characters treated as a unit and capable of being stored in one microcomputer location.

MICROPROCESSING UNIT (MPU) A unit of a microcomputer that includes circuits controlling the interpretation and execution of instructions.

MICROPROCESSOR Term applied to a semiconductor device for performance of arithmetic, logic and decision-making operations which are directed by a set of instructions stored in a memory device.

MIBUG Motorola trade name for a program which permits communication between the evaluation module and user's terminal.

MNEMONIC SYMBOL A symbol chosen to assist the human memory, e.g. an abbreviation such as STAA for store accumulator A.

MODEM (Modulator-demodulator). A device that modulates and demodulates signals transmitted over communication facilities.

MULTIPLEX To interleave or simultaneously transmit two or more messages on a single channel.

OBJECT CODE Output from a compiler or assembler which is itself executable machine code or is suitable for processing to produce executable machine code.

OFFLINE Pertaining to a device that is not online to the computer but is associated with its operation, i.e., an offline printing station. Pertaining to equipment or devices not under control of a central processing unit.

ONLINE Pertaining to a device under the direct control of a central processing unit, or to a user's ability to interact with a computer via a communication link or terminal.

OPERATING SYSTEM Software that controls the execution of computer programs and that may provide scheduling, debugging, input output control, accounting, compilation, storage assignment, data management.

PERIPHERAL INTERFACE ADAPTER (PIA) Provides a means of interfacing peripheral equipment to the microprocessing unit (MPU).

PROGRAM A series of actions designed to achieve a certain result. Loosely, a routine.

PROGRAMMING LANGUAGE An artificial language established for expressing computer programs.

READ To acquire or to interpret data from a storage device, from a data medium, or from another source.

REAL TIME Pertaining to the performance of a computation during the actual time that the related physical process transpires, in order that results of the computation can be used in guiding the physical process.

REMOTE ACCESS Pertaining to communication with a data processing facility by one or more stations that are distant from that facility.

SIMULATE To imitate one system with another, primarily by software, so that the simulating system accepts the same data, executes the same programs, and achieves the same results as the simulated system. Contrast with emulate.

SOFTWARE Computer programs, procedures, rules, concerned with the operation of a data processing system. Contrast with hardware.

SPACIAL PURPOSE COMPUTER A computer that is designed to operate upon a restricted class of problems.

STATIC Refers to the storage of data within a MOS circuit without the need for recharging the state of the information. Synonymous with DC. Contrast with dynamic.

SYMBOLIC LANGUAGE A programming language which expresses addresses and operation codes of instructions in symbols convenient to humans rather than in machine language.

TIME SHARING The interleaving in time of two or more independent processes on one functional unit. Pertaining to the interleaved use of time on a computing system that enables two or more users to execute computer programs concurrently.

USER TERMINAL An input-output unit by which a user communicates with an automatic data processing system.

VOLATILE STORAGE A storage whose content is lost when the power is removed.

WRITE To make a permanent or transient recording of data in a storage device or on a data medium.

ALTAIR 8800 - MITS'S CRAFTILY PROMOTED 8080 BASED COMPUTER SYSTEM.

ASR-33 - THE MOST POPULAR TELETYPE TERMINAL WITH PAPER TAPE 1/0 INCLUDED.

BURN-IN - PROCESS OF INITIALLY RUNNING COMPONENTS OR SYSTEMS AT EXTREME CONDITIONS TO ELIMINATE THE ONES THAT FAIL QUICKLY.

BYOB - BRING YOUR OWN BOOZE
DEC - DIGITAL EQUIPMENT CORPORATION
EROM - ERASABLE READ ONLY MEMORY
FSK - FREQUENCY SHIFT KEYING, A MODULATION TECHNIQUE
I/O - INPUT/OUTPUT
IMP-16 - NATIONAL'S 16 BIT MICROPROCESSOR CHIP SET
KSR-33 - AN ASR-33 WITHOUT PAPER TAPE
LST-11 - DIGITAL EQUIPMENT CORP.'S NEW PDP-11 MACHINE BUILT AROUND A CHIP SET JOINTLY DEVELOPED BY WESTERN DIGITAL AND DEC. 16 BIT, 4K MEMORY, KEYBOARD MONITOR BUILT IN, $654-50 OR MORE, $990 EACH.
MARK-8 8008 MICROCOMPUTER DESIGN BY JON TITUS THAT APPEARED AS A CONSTRUCTION ARTICLE IN THE JUNE 1974 RADIO-ELECTRONICS MAGAZINE.
MICRO-8 - USER GROUP AND NEWSLETTER NAME
MIL - MICROSYSTEMS INTERNATIONAL LIMITED, COMPANY NOW OUT OF BUSINESS
MIKE-2 - 8008 MICROCOMPUTER SYSTEM AVAILABLE FROM MARTIN RESEARCH CO.
MITS - NEW MEXICO BASED COMPANY PRODUCING THE ALTAIR 8800 SYSTEM
MOD-6 - 8008 SYSTEM DESIGNED BY MICROSYSTEM INTERNATIONAL, BOARDS AVAILABLE FROM SPACE CIRCUITS, 156 ROGER ST, WATERLOO, ONTARIO CANADA
MOD-80 - THE MOD-8 WITH A COUPLE OF BOARD CHANGES THAT ALLOW IT TO USE THE 8080 PROCESSOR
MONITOR-8 - THE SUPER KEYBOARD MONITOR AVAILABLE FOR USE WITH THE MOD-8 SYSTEM AND THAT CAN BE MODIFIED FOR USE ON ANY 8080 BASED SYSTEM
MONITOR-80 - MONITOR-8 MODIFIED FOR USE WITH 8080 PROCESSORS
MPS - MICRO PROCESSOR SYSTEM, A SET OF BOARDS BY DIGITAL EQUIPMENT CORP. BASED ON THE 8008 MICROPROCESSOR
NL - ABBREVIATION FOR NEWSLETTER
PACE - NATIONAL'S SINGLE CHIP 16 BIT PROCESSOR. BASICALLY A ONE PACKAGE IMP-16
PCC - PEOPLE'S COMPUTER COMPANY
PDP-8 - THE FIRST AND PROBABLY MOST USED MINICOMPUTER, BUILT BY DEC IN VARIOUS FORMS STARTING IN ABOUT 1961. STILL A VERY POPULAR 12 BIT MACHINE BECAUSE MORE SOFTWARE IS AVAILABLE THAN FOR ANY SYSTEM.

PDP-11 - A 16 BIT MINICOMPUTER SERIES BUILT BY DIGITAL EQUIPMENT CORP. FEATURING AN EXTREMELY VERSATILE INSTRUCTION SET.

PE - POPULAR ELECTRONICS MAGAZINE.
PRM - PROGRAMMABLE READ ONLY MEMORY
RAM - RANDOM ACCESS MEMORY
RE - RADIO-ELECTRONICS MAGAZINE
RGS-008A - 8008 BASED MICROCOMPUTER SYSTEM PRODUCED BY RGS ELECTRONICS.
ROM - READ ONLY MEMORY
SASE - SELF-ADDRESS STAMPED ENVELOPE
SCELBI 8H - 8008 MICROPROCESSOR SYSTEM PRODUCED BY SCELBI.
SCROLLING - ON VIDEO TERMINALS, ALL LINES MOVE UP ONE, TOP LINE IS LOST, BOTTOM LINE CLEARS FOR NEW ENTRY.
SWTP - SOUTHWEST TECHNICAL PRODUCTS CORP.
TGIF - THANK GOODNESS IT'S FRIDAY.
TTY - ABBREVIATION FOR TELETYPE WHICH IS A REGISTERED TRADENAME BUT IN SUCH GENERAL USE AS TO MAKE MENTIONING IT SOMEWHAT RIDICULOUS.
TVT - TV TYPEWRITER
TVT-1 - TV TYPEWRITER DESIGNED BY DON LANCASTER USING MOS SHIFT REGISTER MEMORY. ORIGINALLY APPEARED IN RE A COUPLE OF YEARS AGO. VERY POPULAR; THOUSANDS WORKING; A SOMEWHAT OBSOLETE DESIGN TO START NOW.

TVT-2 - TV TYPEWRITER DESIGNED BY A FELLOW IN TEXAS AND BEING SUPPLIED BY SOUTHWEST TECHNICAL PRODUCTS. INTRODUCTORY ARTICLE IN RE, FEB 75 USES TTL LOGIC, 2102 MEMORIES.

TVT-3 - NEW TVT DESIGN BY DON LANCASTER USING ABOUT 18 CMOS IC'S. INFO AND DOCUMENTATION PACKET TO BE AVAILABLE THRU PCC, PROBABLY IN THEIR SEPTEMBER 75 ISSUE.

TVT-4 - NEWEST TVT DESIGN BY DON LANCASTER USING ABOUT 14 CMOS IC'S. MERCHANDISING METHOD NOW BEING WORKED OUT.

UART - UNIVERSAL ASYNCHRONOUS RECEIVER TRANSMITTER. AN LSI CHIP NOW AVAILABLE FOR ABOUT $7 THAT COMPLETELY TAKES CARE OF SERIAL-PARALLEL AND PARALLEL-SERIAL CONVERSIONS.

8008 - THE FIRST POPULAR 8 BIT MICROPROCESSOR CHIP AVAILABLE FROM INTEL. SMALL PACKAGE SIZE REQUIRES DATA MUXPLEXING WHICH NECESSITATES A LARGE NUMBER OF SUPPORT IC'S. NEW LSI CHIP TO BE AVAILABLE SOON WILL INCLUDE ALL OF THE MUXPLEXING LOGIC.

8080 - PRESENTLY THE MOST POPULAR 8-BIT MICROPROCESSOR CHIP. PRESENTLY BEING SECOND SOURCED BY AT LEAST 6 COMPANIES AND DESTINED TO BECOME THE PDP-8 OF THE MICROPROCESSORS.

8080-A - INTEL'S NEW 8080 FEATURING FULL TTL DRIVE, JAMMING OF MULTIBYTE INT. INSTRUCTIONS, ETC. UNDOUBTEDLY PRODUCED TO MAKE LIVES OF SECOND SOURCES MORE COMPLICATED. WILL OPERATE IN REGULAR 8080 SOCKET.
NO FIELD SEEMS TO CHANGE AS RAPIDLY AS THIS HOBBY COMPUTER
THING. SOME BOMBSHELLS ARE ABOUT TO HIT THE HOBBY MARKET. LOOK FOR:

1) BILL GODBOUT'S COMPANY WILL ANNOUNCE TWO KITS ON SEPTEMBER 1:
   A) A PAGE 16 BIT SYSTEM WITH 1 OR 2 K OF MEMORY AND A COMPLETE
      LINE OF PERIPHERALS WITH A VERY LOW TARGET PRICE. A DETAILED INFORMA-
      TION PACKAGE IS BEING PREPARED AND WILL BE AVAILABLE SOON FOR A VERY LOW
      PRICE AND SHOULD BE VERY INFORMATIVE. (THE PAGE IS ABOUT 90% LIKE
      A DATA GENERAL NOVA AND THERE ARE SOME THAT HAVE HOPES THAT NOVA SOFT-
      WARE CAN BE MODIFIED TO BE USEABLE BUT THAT MAY BE A LITTLE OPTIMISTIC.)
   B) AN MSI-11 KIT FOR UNDER $1000. THIS IS A MICROPROGRAMMED
      CPU USING TTL LOGIC WHICH EMULATES THE FULL PDP-11/40 INSTRUCTION SET.
      BILL IS RELUCTANT TO DO MUCH ADVERTISING OR PASS OUT INFORMATION
      UNTIL THEY ARE READY TO DELIVER IN VOLUME TO TRY TO AVOID PROBLEMS THAT
      HAVE PLAQUED EVERY OTHER KIT COMPANY OFFERING SO FAR BUT EVERY INDICA-
      TION IS THAT WHEN THEY ARE READY TO GO, YOU WILL BE ABLE TO OBTAIN
      TREMENDOUS SYSTEMS FOR AN AFFORDABLE PRICE.

2) JOHN BURGOON OF SOLID STATE MUSIC IS FIRMING UP PLANS FOR A "SUPER
   8080 SYSTEM" WITH A BETTER DESIGN AND LOWER COST THAN ANYTHING SEEN YET.
   THIS IS A VERY EARLY LEAK SO DON'T BE UPSET IF INFORMATION IS UNAVAILABLE
   FOR ANOTHER MONTH OR SO.

3) EVERYONE HAS HIGH HOPES FOR THE M6800 SYSTEM ANNOUNCED BY SPHERE.
   THEIR ADVERTISING LITERATURE INDICATES THAT THEY DO REALIZE THE PROB-
   LEMS OF STARTING OUT A LOW BUDGET OPERATION BUT THEY SEEM TO INTEND TO
   DO EVERYTHING POSSIBLE TO DELIVER HARDWARE AND SOFTWARE AS SPECIFIED ON
   TIME. THEIR INTRODUCTORY PRICES ARE SUPERB BUT MAKE SURE YOU USE MASTER-
   CHARGE. DON'T GAMBLE THAT KIND OF MONEY ON GOOD ADVERTISING LITERATURE.

4) PROCESSOR TECHNOLOGY IS DELIVERING THEIR ADVERTISED ITEMS "OFF THE
   SHELF" WITH NOTHING BUT RAVE REPORTS. THEY ARE OFFERING 8080 SOFTWARE
   FOR LESS THAN COPYING COST. SOON SOFTWARE WILL BE AVAILABLE ON MASK
   PROGRAMMED ROMS VERY CHEAP. THEY ARE WORKING ON LOW COST CASSETTE AND
   DISK SYSTEMS AND OTHER ALTAIR PERIPHERALS AS FAST AS THEY POSSIBLY CAN.

5) MOS TECHNOLOGY REPORTEDLY ANNOUNCED PIN COMPATIBLE NEARLY IDENTICAL
   M6800 CPU CHIPS FOR $20 IN QUANTITIES OF ONE! (SEE ELECTRONICS, END
   OF JULY ISSUE.) IT ISN'T TOTALLY CLEAR HOW IDENTICAL THEY REALLY ARE BUT
   THAT MEANS THAT OTHER MANUFACTURERS WILL PROBABLY BE SHOOTING FOR THAT
   PRICE LEVEL WHICH MEANS WE CAN EXPECT TO SEE $24.95 8080'S, $15.95 8008
   'S & PACE, FS, AND OTHER CPU'S FOR ABOUT THE SAME PRICE. I'VE HEARD
   FROM SEVERAL SOURCES THAT THE EXPECTED PRICE OF AN M6800 IN A YEAR
   WILL BE ABOUT $10. IT SEEMS NOW THAT THE MOST IMPORTANT PRIORITY IS TO
   LIVE UP SUPPLIERS FOR THE SUPPORT CHIPS NECESSARY TO IMPLEMENT 5-6 CHIP
   CPU SYSTEMS.

6) BASIC'S KEEP SHOWING UP. MITS HAS DELIVERED AT LEAST ONE COPY OF
   4K BASIC (NO REPORT YET ON HOW WELL IT RUNS) AND THEIR 8K BASIC IS RUN-
   NING WELL ON THE 8080. PROCESSOR TECHNOLOGY WILL SOON RELEASE LISTINGS
   OF AN 8080 BASIC AND WILL PROBABLY SUPPLY IT IN ROM. ANOTHER 8080 BASIC
   I S RUNNING BUT NO INFORMATION CAN BE RELEASED ON IT. THE DIGITAL GROUP
   IS STILL TALKING ABOUT 8008 & 8080 BASICS BUT NOTHING IS AVAILABLE YET.
   THE MOST IMPORTANT PIECE OF SOFTWARE REIGHT NOW FOR MANY OF OU IS AN 8008
   BASIC. THERE ARE A LOT OF 8008 MACHINES AROUND AND THOSE OF US WITH THEM
   DON'T REALLY WANT TO BE LEFT OUT OF THE ACTION.
7) A NEW COMPANY IS STARTING THAT HOPES TO HAVE 8008/8080 VERSIONS OF FOCAL FOR ALL OF YOU FOCAL FREAKS THAT DID YOUR WORK ON DEC MACHINES.

8) FOR THE ALTAIR OWNERS, WOULD YOU BELIEVE AN 8K MEMORY MODULE FOR UNDER $200! I WANT TO DO SOME MORE CHECKING BEFORE I MENTION WHO HAS IT AND WHEN IT WILL BE AVAILABLE.
    ALSO FOR ALTAIR OWNERS, JOHN BURGOON OF SOLID STATE MUSIC HAS SOME REALLY BEAUTIFUL BOARDS AVAILABLE FOR I/O CONSTRUCTION. CONTACT HIM AT 1222 CAROLYN DRIVE, SANTA CLARA, CA 95050 296-7330. MARK 8 OWNERS, DON'T FORGET HIS 4K 2102 BOARD PLAIN OR STUFFED. REPORTS ARE THAT THE QUALITY IS SUPERB.

9) RUMORS FLOATING AROUND INDICATE THAT BYTE HAS ALREADY RECEIVED OVER 20,000 SUBSCRIPTIONS AND ADVERTISING RATES ARE UP TO $1500 A PAGE. THE FIRST ISSUE IS BACK FROM THE PRINTER AND WILL HAVE ABOUT 94 PAGES WITH MORE ADVERTISING THAN ANYTHING ELSE BUT LET'S REALLY SUPPORT THEM. IF IT TURNS OUT AS GOOD AS "73" MAGAZINE IT SHOULD BE AN INVALUABLE AID TO THE HOBBY EFFORT.

10) CURRENT RUMORS INDICATE THAT ONE CAN EXPECT DUAL FLOPPY DISK DRIVE UNITS SOON FOR UNDER $1000. LET'S HOPE IT'S REAL SOON.

11) EVEN MARTIN RESEARCH HAS HAD TROUBLE DELIVERING ALTHOUGH THINGS ARE COMING THRU NOW. IT WAS FRUSTRATING TO RECEIVE THE UNIT WITHOUT EVEN A PIECE OF PAPER TELLING WHICH KEYS ARE WHICH. DOCUMENTATION IS ARRIVING NOW AND THEY PROMISE MUCH MORE DETAILED DOCUMENTATION SOON. MANUALS, 4K MEMORY BOARDS, EXTRA 2112 MEMORY CHIPS, AND I/O BOARDS ARE STILL BACK- ORDERED. IT IS A NEAT LITTLE MACHINE, ALL UNITS ARE BEING SUPPLIED AS- EMBLED AND TESTED TEMPORARILY (RICHARD LERSETH WAS EXTREMELY UNHAPPY TO RECEIVE HIS ASSEMBLED. HE WAS REALLY LOOKING FORWARD TO SOLDERING!). THE KEYBOARD MONITOR SUPPLIED WITH IT READS A CALCULATOR KEYBOARD SO YOU CAN LOAD AND RUN PROGRAMS WITHOUT ANY PERIPHERALS, AND ITS STILL THE LOWEST COST FACTORY PREPARED KIT AVAILABLE. IT WILL SURE BE NICE TO GET THE FULL DOCUMENTATION PACKAGE THOUGH.

12) SCHELBI CONTINUES TO ADD TO THEIR LEGION OF SATISFIED OWNERS. THEIR MACHINE MAY NOT BE THE CHEAPEST OR THE PRETTIEST BUT IT IS EASY TO ASSEMBLE, DOES EXACTLY WHAT IT IS SUPPOSED TO, DELIVERY IS ON TIME, AND SUPPORT IS SUPERB. THEIR PROGRAMMING MANUALS CONTINUE TO EARN ABSOLUTELY RAVE REVIEWS!!

13) ROBERT SWARTZ HAS DELIVERED OVER 45 OF THE MIL MOD-8 DOCUMENTATION PACKAGES MENTIONED IN NL #7. HE HAS HIS OWN MACHINE MODIFIED FOR AN 8080 AND IS RUNNING MONITOR-80 ON IT. HE WILL SOON HAVE A FULL DOCUMENTATION PACKAGE PUT TOGETHER FOR THESE 8080 MODIFICATIONS.

    THIS IS THE NINTH ISSUE OF VOLUME 1 WHICH WILL CONCLUDE WITH #12.
    WE WILL THEN BE FACED WITH ANOTHER DECISION AS TO WHAT TO DO NEXT. IT IS QUITE POSSIBLE THAT A NEWSLETTER TYPE PUBLICATION WILL NO LONGER BE NECESSARY WITH ALL OF THE COMMERCIAL VENTURES THAT ARE NOW OPERATING. BUT, ONE CAN ARGUE THAT A STRICTLY NON-BUSINESS TYPE PUBLICATION IS NECESSARY TO PROVIDE A FORUM FOR HOBBYISTS THAT NEED TO THROW ROCKS AT COMMERCIAL TYPE BUSINESS VENTURES.
    WE WOULD LIKE YOUR ADVICE. PLEASE WRITE AND LET US KNOW WHAT YOU WANT TO SEE HAPPEN IN THE FUTURE.
    IN NL'S 10, 11, & 12 YOU CAN EXPECT TO SEE A COMPLETE ROSTER OF ALL PEOPLE THAT HAVE CONTACTED US (ABOUT 1200+) ARRANGED IN BOTH ALPHA- BETICAL AND ZIP CODE ORDER. IF YOU DO NOT WANT YOUR NAME AND ADDRESS TO APPEAR, PLEASE SEND US A POSTCARD SO STATING IMMEDIATELY. IF ALL YOU ARE WORRIED ABOUT IS RECEIVING SOME JUNK MAIL, PLEASE REMEMBER THAT THEY STILL MAKE GARBAGE CANS AND THE BENEFITS OF GETTING TOGETHER WITH OTHER FELLOW HOBBYISTS FAR OUTWEIGH THE CONVENIENCE OF A LITTLE JUNK
I'm afraid that telephone calls to Cabrillo High School regarding user group activities have completely swamped out the secretaries time. I'm usually unavailable during the summer and during the school year I am in class from 8:00 until 2:30 and cannot be reached. I realize that it is much more convenient to do business by phone (oh, what I wouldn't do for a WATS LINE) but I must ask that participants limit calls to the school to urgent ones only. My home phone (805-735-1596) will only be answered by me and you are welcome to call early or late. I may implement a recorded message unit so hang up within a minute if you get the recorded message so you will not be charged for the call. John Craig will soon be working in town and will have a phone at which he can be reached during the day. Thanks.

Theodore E. P. Sallume
Theodore E. P. Sallume
945 Via Fargo
Santa Maria, CA., 93454
A.C. 805-937-4541

Dear Hal,
You often talk about how we must "write-off" the money we send off to a supplier.
Diamond merchants have found a way to solve this problem. They send the goods on consignment to the buyers bank and for a fee the bank holds the goods until it receives payment. While this method is not practical for us, Master Charge has many of the same features including the cost.

A dealer can know in 10 minutes if your MC is good, this compares with 10 days for a check, however it will cost him 3%. Besides faster service, MC provides safety for your money as most banks when asked will back charge all payments for the goods not received.
Check with your bank in advance. BankAmericard would not give me that assurance over the phone. I have used this method on MC.

IMPORTANT NOTICE TO CUSTOMERS
New Legislation for Your Protection

The Song-Beverly Credit Card Act of 1971 (section 1747.90 of the California Civil Code) provides in part that the Bank's right to recover any credit extended to you for a purchase from a retailer through use of your MASTER CHARGE Card is subject to any defenses you may have as a buyer against the retailer as to such purchase, IF ALL OF THE FOLLOWING OCCUR:
(1) The purchase price of the item as to which you assert a defense exceeds fifty dollars ($50.00);
(2) The purchase was made in California;
(3) You have made a written demand on the retailer with respect to the purchase and have attempted in good faith to obtain reasonable satisfaction from him; and
(4) You give written notice to the Bank, naming the retailer and specifying the date of the purchase, the goods or services purchased and their cost, the nature of your defense (i.e., why you are dissatisfied) and any steps you have taken in attempting to obtain satisfaction and resolve the dispute.
If your defense is a valid one, following these procedures means that you may be relieved of part or all of your repayment obligation to the Bank as to the disputed purchase.

MASTER CHARGE Billing Errors
The new law also provides that if we, the card issuer, should make a billing error on your MASTER CHARGE account, we must correct it no later than 60 days from the date you mail to us written notice of the error. In the event of any such error, please provide full details of the problem in writing to the address noted on your regular MASTER CHARGE statement, or to Wells Fargo Bank, N.A., Credit Card Department, P.O. Box 44081, San Francisco, California 94144.

WELLS FARGO BANK, N.A.

P.S. Wells Fargo has indicated to me that there are similar federal laws which also apply and that the bank which carries the merchant's Master Charge is responsible if the merchant goes under. The only requirement for becoming a Master Charge merchant is to be on good terms with your bank. They think 3% is a lot for cashing a check so you might want to be a MC merchant yourself if you start selling surplus and deal only with merchants who honor MC. Remember the costs. TEPS
June 22, 1975

Stephen L. Diamond
311 Carl Street
San Francisco, CA 94117

Dear Hal:

Several months ago, I sent you a package containing the self-addressed, stamped envelopes sent to me by individuals interested in the Mark-8 user's group, details on my M6800 microcomputer development project, a long letter, and $5.00 to cover your costs in sending me future newsletters. I also sent tentative suggestions on an 8080/M6800 processor link, and mentioned some tentative plans for software to be implemented on the M6800 and a potential PDP-8 and PDP-15 style FORTRAN cross-assembler for the M6800 family. I'm sorry you didn't receive it.

Since then, I've started design and coding on a multi-programming real-time operating system for the M6800, with multiple software priority levels, deferred scheduling, and supporting multiple peripherals such as cassette, TTY, and punched tape to begin with. I'm planning on adding an A/D and D/A interface with possible DMA for high sampling rates. If you're not too familiar with the MC6800 CPU, let me mention a few features. The MC6800 is an 8-bit machine, with an architecture and instruction set very similar to that of a PDP-11. With a 1 microsecond cycle time, most instructions take 2 or 3 microseconds to complete, although some register functions can be completed in 1 cycle. It supports vectored interrupts, and has a mask instruction as well as a non-maskable interrupt input for high priority access. It can be run in a single-instruction mode for console debugging, and all peripherals and memory interface with the CPU on a single 8-bit bidirectional data-buss, just like a Unibus. The memory address buss is 16-bits wide for 64K address space for memory and peripherals. Motorola offers an evaluation kit, consisting of the Programming and Applications manuals ($50 worth), the MC6800 CPU, two 128 x 8 RAMS, two 16-bit parallel I/O interfaces, one serial port, and a ROM containing loading, I/O, and debugging firmware, all for $300.00. With the addition of some TTY drivers and a single is supply, the system is runnable using the sort of DDT like firmware ROM to examine and load memory locations, load paper tape programs, print registers, control interrupts, and so forth! Truly a third-generation microprocessor, and the CPU costs about the same as the 8080, at least from the prices I've seen in 73 Magazine. Also, AMI (I think) is an authorized second source, and offering chips made from the same wafers at lower cost.

We're planning to make available a ROM containing the real-time operating system, including centralized, device-independent I/O and more flexible debug facilities as soon as I've completed the software. With the low-cost vendor-programmed ROMs available, such a operating system would facilitate much M6800 development, I feel.

Well, Hal, that about wraps up my microcomputer activities for now. As I mentioned in my last letter, I have one unopened Mark-8 pc board set and a TV typewriter (earlier version) for sale, and offers are solicited. I'll keep you informed on the real-time system for the M6800, and send a schematic of the hardware configuration when we've laid out the pc boards (I'll send a layout too). Please keep me informed on 8080 and 8080 developments; I'll try to answer anyone's questions on M6800 family hardware and software.

Sincerely,

Stephen L. Diamond
Dear Hal,

Hope the enclosed is sufficient information on the Stampit-Etchit kit for the next newsletter. From the time I received my package from the Digital Group to when I had the cassette interface board made and all parts plugged and soldered was only two hours. The Stampit-Etchit kit sure beats blindly drilling holes and then point to point wiring! I forgot to mention that M-Tech will take phone orders for both Mastercharge or Bank Americard.

I still haven't received my Suding TV typewriter unit eventhough I sent them a check over two months ago and received a card that it would be shipped on 1 June. I sure hope they haven't given up the ghost before even publishing one Newsletter. Keep up the good work. The Micro 8 Newsletter seems to be the only continuing source of information.

Sincerely,

Lee S. Mairs

Stampit-Etchit Kit

For all of you without the elaborate camera equipment necessary to copy the printed circuit art layouts accompanying the various Mark 8 changes and enhancements, M-Tech Engineering, Inc., Box C, Springfield, Virginia 22151, has developed an elaborate set of rubber stamps for designing and fabrication of prototype printed circuit boards. The basic SE-2 kit contains eight stamps for the most commonly encountered components, resist ink, stamp pad, resist pen, and even a plastic bag to hold the board while etching. A few hints for successful board production may be in order. First, tender loving care in stamping the component stamps results in sharp edge definition. Too much pressure may blot the ink. Secondly, read the instructions included with the kit! There are many fine hints noted, such as going over connecting lines with the resist pen twice to prevent etch through. Lastly, watch the board while it is being etched. As soon as the unwanted copper has been removed, take the board out of the etchant bath. The concentration of the various etching materials varies even among manufactures. For example, two bottles of Ferric Chloride obtained from Radio Shack varied by three minutes (ten minutes for the first board and thirteen minutes for the second) in the time necessary to etch identical boards for the Suding cassette interface.

M-Tech Engineering, Inc. is owned by two guys who have also become Mark 8 devotees. While trying to obtain components for their own installations they ran across some 256x1 UA3656D RAMS that are pin for pin equivalents to the 1101 RAMS called for in the original Mark 8 construction. They have a limited supply that they will sell for $1.30 each. If you want a full boards worth (1K of memory), you can get 32 devices for $38.40.

Although M-Tech is primarily noted for its VHF power amplifiers, they are taking a long hard look at the computer hobbyist market, specifically peripherals for the Altair and the Mark 8 units.
MAKE PROFESSIONAL LOOKING P.C. BOARDS FAST AND EASY

- SENSATIONAL
- REVOLUTIONARY
- FANTASTIC

Reduces Printed Circuit Board Art Work From 2 Hours to 10 Min. . .

Simple as A.B.C.
A. Stamp Components on P.C. Board.  B. Use Pen to Interconnect Lines.  C. Etch Board.

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<th>ADDITIONAL STAMPS:</th>
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<td>CONNECTOR FINGERS</td>
<td>Bread board stamps for all integrated circuits &quot;Great&quot; for experimenters.</td>
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ONLY $9.95

SUGGESTED LIST

703/354-0573
July 12, 1975

Dear Hal or John,

I've enjoyed the last two newsletters greatly but am sorry that I won't be able to contribute much material while my real estate business is keeping me busy day and night this summer.

In regards to my Octal Keyboard Loader circuit printed in NL #7, I've sent out 37 copies of the PC board layouts. If anyone else should want one, please send a full size SASE with 20¢ postage. With 6 Xerox sheets in each, plus the extra postage I've had to put on, I've spent about $14 sending them out. Oh well, I'm highly pleased with the response. Two corrections in the circuit printed in the NL should be mentioned. 1) Eliminate the 50 mfd capacitor from KP to ground. 2) Change the .001 mfd capacitor from KP to the set pin of the 7474 to 100 pf. I've found the loader to make entering data and addresses by hand both easy and rapid.

While a leg injury kept me from showing property for a few days, I finally completed the Digital Group's modifications to the front panel controls and am pleased with them. I highly recommend against the use of 7-segment octal displays for address or memory data readout as it obscures the interpretation of bit patterns somewhat. Finally, I've also completed my I/O port expansion, 8k of pluggable 2102 RAM boards, AC power switching, and have stuffed everything into an attractive cabinet. Sure beats wires hanging over everything! Enclosed is a brief description of my I/O expansion and patch panel which I find very convenient. If anyone wants more information, I'll write it up, but would now rather spend my time developing software -- something I couldn't do until my hardware was completed.

After months (or so it seems), Mini Micro Mart finally shipped my Suding Calculator Interface kit sans any promised software. Other ordered items have not yet appeared much to my rising anger with them as a supplier. As far as the Calculator Interface goes, the PC board had all the IC pin holes drilled too small (no real problem to redrill, however), was not plated through (would have been nice to allow the use of sockets), and several resistors were missing while several others were present in an excess number. Construction was not difficult even with the minimal diagrams supplied. With the information supplied in the Digital Group's preliminary write up, I have been able to write service routines for the calculator but would sure like to have seen Dr. Suding's software, particularly in regards to how he intends to store numbers in memory. Although transfers between computer and calculator are very slow and cumbersome, the interface seems worth the price and
while providing a floating point package also provides for all the
common transcendental functions and then some. Being a great
advocate of reverse polish notation, especially when writing an
expression evaluator, I now wish I had opted to purchase the alternative
calculator IC for RPN. I'm working now on a program to calculate
and print out loan amortization tables but don't know when I'll get
it finished.

Final topic -- have you seen the brochure put out by Sphere Corp.
concerning their Motorola MC6800 based computer system? Having been
quite impressed and perhaps a bit sceptical of the "how can they
offer so much for the price" problem, I gave Sphere's president
Michael Wise a call. He seemed very willing to answer my questions,
was honest in his comparison of the MC6800 CPU with the LSI-11, and
did not try to push me to purchase until I was convinced that the
Sphere I system was what it was meant to be. Their extended BASIC
looks good and, I believe, is ready now as is their disk operating
system. Presently, I am looking for a larger system with disk and
line printer to use in my real estate business for mailing lists,
cross matching of prospects and listings, data storage, etc. The
LSI-11 appears to be the most advanced processor in my price range
in respect to its instruction set, general purpose accumulators, and
many addressing modes. However, I'm afraid that it will be difficult
to get a system running around it, especially with my limited knowledge
of hardware and the cost will no doubt run quite high. Perhaps
someone will develop a complete package around it, but when? Right
now, the Sphere System 4 with CPU, 20k memory, keyboard and CRT
display, cassette interface, built in TV monitor, 110 cps line printer,
2 (not one) IBM floppy disks, extended BASIC, a DOS, ROM for console
control, editor, assembler, and what ever else I've forgotten for
$5453 in kit form looks beautiful, if everything is as offered. For
this, I think I'd be willing to settle for the slightly less capabilities
of the MC6800 chip in regards to addressing and accumulators. If
anyone has any thoughts or information on Sphere, please write or
call me!!!!

Out of time for now -- I'll try to really hit the software
in the coming weeks and get some camera ready copy to you for
future NL's.

Sincerely,

William E. Severance, Jr.

P. S. In giving my address, note that the abbreviation for Maine is
ME not MN (that's Minnesota). Every request for the Keyboard
Loader circuit was addressed wrong. Thank God and the P. O.
for zip codes!
MARK 8 I/O EXPANSION

The following is a brief description of the modifications I've made to my Mark 8 to provide full decoding of the device codes and convenient connection of peripheral devices.

I. The following circuit decodes the 01 RRM RAM input and output instructions to provide 8 input, 24 regular output and 8 special output ports which transfer data from the accumulator to an output device on state T3 of an IN0-IN7 instruction.

\[ C73 = \overline{T3 + (\text{Sync} \cdot Q2)} = \overline{T3} \cdot (\text{Sync} \cdot Q2) \]

This is easily derived on the CPU board by NANDing the output of IC17 (pin 8) and IC19 (pin 8).

The idea of using IN0-IN7 to also do output should be credited to MP Publishing Co. ECS-5 presentation.

II. Now that we have the port select lines (all active low, by the way) what is the best way to present them to the outside world? For convenience when it comes to changing device assignments and quick connecting new devices, I've built the following patch board with 40-16 pin DIP IC sockets, 16-DM8095 tri state AND gates, 2-7404 inverters, and 8- 7437 Quad 2-input NAND Buffers, and what seemed like several miles of wire. A PC board would have been nice, but expensive to produce. The IC sockets can be easily attached to 0.1" perfboard with hot melt glue.

Finally, if you're with me so far, modifications should be made to the Mark 8 input MUX board as follows:

1) Remove the old 7442 decoder
2) Rewire the existing 7400 and 7402 gates as follows:
These changes will allow all input instructions IN0-IN7 to select former Mark 8 input port 0. Former Mark 8 input port 1 will be selected when the JAM switch is closed, thus allowing the permanent connection of my octal keyboard loader to this port. The interrupt instruction switches remain as is, selected only under CPU control.

Thus, ends this brief (???) description. Write or call for further information or answers to questions.

I/O Patch Panel for the Mark 8

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7404 IN  01  02  03  04  05  06  07
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DMBOAS DMBOAS DMBOAS DMBOAS DMBOAS DMBOAS DMBOAS DMBOAS
Oh yes, I forgot to mention that connections to the 520 patch panel are made with 16 pin dip plugs (James Electronics has nice ones) attached to 16 conductor ribbon cable. I've used up to 6' runs to the TVT and Calculator interface with no drive problems.

Each output port socket has the following pin designations:

1-Data Bus Out 0 16-Ground
2-Data Bus Out 1 15- +5volts
3-Data Bus Out 2 14- -12volts
4-Data Bus Out 3 13- +12volts
5-Data Bus Out 4 12-Output Port Select Strobe (from above decoder)
6-Data Bus Out 5 11-Interrupt Request (Channel 0-7)
7-Data Bus Out 6 10-
8-Data Bus Out 7 9-

Each row of output port sockets is buffered by the 7437 NAND gates as follows:

```
\[ \text{Each } 7404 \rightarrow \text{To 7437's other output socket rows.} \]
```

Each input port socket has the following pin designations:

1-Data in 0 16-Ground
2-Data in 1 15- +5volts
3-Data in 2 14- -12volts
4-Data in 3 13- +12volts
5-Data in 4 12-Input Port Select Strobe (from above decoder)
6-Data in 5 11-Interrupt Request (Channel 0-7)
7-Data in 6 10-
8-Data in 7 9-
The input ports are wired using the DM8095's as follows:

Input Ports 0 and 1 are wired as above.

Input Port 0 selects the Tri-State Bus.

Input Port 1 and Input Port 2-7 linked per former.

Input Port 0 and Input Port 1 are wired as above.

Input Port 2-7 are wired per former.
Dear Mr. Singer,

As many in the microcomputer community know, a good number of µc/software oriented publications exist in the public domain. During the course of my library search a listing of some documents has been compiled. I would like to share this listing with others in the community. Please publish this list if it seems of significance.

A warning about these documents must be stated. The National Technical Information Service (NTIS) makes these publications available in a printed or microfiche format. Abstracts must be reviewed for each of these publications before being ordered. A number of the publications have been inspected at a major University and found to be merely nothing more than summary reports for projects, i.e. lacking in great hardware or software substantive content.

Some of the documents are quite good; however, considering the wide interest range of individuals in the µc community, none will be recommended. Most of the publications are from AEC & NASA but available from NTIS. NTIS ordering information is available with the abstracts when reviewed.

The intent of this submission is to give interested individuals a start in the search for information in their interest available in the public domain. This list is by no means complete. If others in the community locate references to other public domain documents, these can be submitted directly to me. A list will be compiled and made available to µc readers v.i.a. Micro-8 group newsletter or others.

Respectfully,
Michael Christoffer

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<td>STORES STACK MICROCOMPUTER SYSTEM: THE MCS-8, 8-bit PROCESSOR CONTROLLER. Fisher, E; Spann, J; Oiken, H.; Goodman, J.; et al (California Univ. Livermore, Lawrence Radiation Lab) July, 1973</td>
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AD-765680 A HELICOPTER FLIGHT PERFORMANCE SYSTEM USING AN LSI MICROPROCESSOR. Elso, E.E. (Naval Postgraduate School, Monterey, Calif.) June, 1973


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AD-783 868 DESIGN STUDY OF AN AVIONICS NAVIGATION MICRO COMPUTER. McCracken, W.L. (Naval Postgraduate School, Monterey, Calif.) June, 1974


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AD-784 881/5gI CHESS GAME PROBLEM SOLVING: THE DEVELOPMENT OF A TACTICS ANALYZER. November, 1974.
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SOME PROS AND CONS ON MILS AND THE ALTAIL 8800 COMPUTER

I received my basic Altair in late April and had it assembled and running in about three weeks. The quality of the parts was good although I have no way of checking the timings of the memory and CPU chips. They did carry the Intel take and I have had no problems with them. MILS replaced three missing and one defective part by return mail when requested. I wish they would answer questions that fast! I received a 4K dynamic memory kit 55 days after ordering when they were promised 60 days. I was able to assemble it, test it, and start using it in one week-end. It requires a modification to the front panel PC board to change the timing on the deposit and deposit next functions to handle the refresh cycle of the dynamic memory. Capacitor C7 must be changed from .001 uf to .0047 uf to increase the delay time. I am satisfied with the hardware I have received and they do deliver when they promised although it is slower than I would like.

I have not been able to get answers to questions from MILS and have not received either the users group information or documentation updates which I paid for. I have found a number of errors in the documentation but have not received a single update although I have advised them of several errors and a number of unclear areas. An alternate source of hardware information is the INTELLEAC 8/MCS80 HARDWARE REFERENCE MANUAL FROM INTEL FOR $5.00. It contains complete information on the 8080 chip including timings and has schematics for memory, I/O interface, and PROM programmer boards. MILS has at best a naive programming staff and the programming documentation for machine language programming leaves me cold. Their recommendation to continually loop through a program until you stop leaves you in the middle of the program with indeterminate results unless you single step to the end. It is a simple matter to put in a jump instruction at the end which branches to itself, e.g., AT OCTAL POSITION 040 ENTER 303 THEN 040 THEN 000. OR YOU CAN ENABLE INTERRUPTS AND THEN USE THE HALT INSTRUCTION ALTHOUGH THIS MAY HAVE AN OCCASIONAL GLITCH.

THE MINI-MICRO-MART 9101 MEMORIES WORK FINE ON THE 1K STATIC MEMORY BOARD. I received the first two within 10 days but have had four more ordered for two months. They don’t appear to be shipping to anyone at this time. MILS may be slow and expensive but at least they ship as promised.

On the subject of software prices from MILS I am more concerned about the quality of the product than the price. I manage a systems and programming group and our internal costs are about $100 a day per person for salaries and benefits and when we hire outside companies it typically runs between $150 and $200 per day. You will have a substantial investment to put together a good basic system. I am interested in the digital groups progress in this area or as an alternative we might be able to develop a package ourselves if enough NL readers were willing to participate. Sure would be nice if MILS would tell you more about their products before you buy them. Does anyone have their extended basic?

OTHER ITEMS OF INTEREST

JAMES, DIGIKIY, AND BABYLON HAVE BEEN EXCELLENT SUPPLIERS. SOLID STATE SYSTEMS, INC. HAS FURNISHED EXCELLENT QUALITY BUT PRICES ARE A LITTLE HIGH UNLESS YOU CAN CATCH ONE OF THEIR SALES. JUST RECEIVED THE SUDING TVY KIT FROM THE DIGITAL GROUP AND IT LOOKS GOOD. HAVE ORDERED THEIR 8080 PACKAGE BUT HAVE NOT RECEIVED IT YET. HAVE RECEIVED NO INFORMATION FROM EITHER THE COMPUTER HOBBYIST OR THE PEOPLES COMPUTER COMPANY SINCE SENDING IN SUBSCRIPTIONS ALMOST TWO MONTHS AGO.

I have also had problems with delivery from Mini-Micro-Mart on a keyboard and on 9101 memory IC’s. James, Digikev and Babylon have been excellent. I am in the process of modifying the 28 volt keyboard from Babylon (TRW touch-tone type) to a 5 volt octal/binary input device. I just received the Suding TVY kit and was impressed with the quality. I bought several of the Intel Manuals and found two to be exceptionally good for 8080 owners. The INTELLEAC 8/MCS80 Hardware Reference Manual gives you most of the information you can’t get from MILS including schematics for memory boards, interfaces, and PROM boards and programmer. The 8080 Assembler Language Manual looks like an excellent book on programming at first glance. They are $5.00 @ and were shipped almost by return mail from Intel.
I ordered one of the CREE 2 TTY's and when it arrived it was missing the two rear feet. I asked for replacements and they came with no problems. (Wish Mini Micro Mart was run the same way). I'm having a problem with the TTY though, it executes and punch a CR itself. It doesn't care if I'm in the middle of a word, it does it anyway. I wrote to Wilcox Est. about it and I'll let you know the kind of response I receive. I would like you to pass it along that they have helped me so far just as they said they would.

You know I've been working on getting my Mark-8 running for almost ten months now and I think I'm going to get all the bugs out in the next couple of weeks. Thanks to your NL I've gotten good bug reports and many sources for individual help. I believe my problems have all been bad IC's (IEU). I now recommend James. Thank you for taking the time to put out such a fine NL.

Sincerely,

Lee C. Hanson

3112 Lois Place
Highland, Indiana 46322

6/29/75

Gentlemen:

You will find enclosed two drawings of an I/O scheme I have designed, built and implemented on my Altair 8800. It decodes Device addresses 0 thru 4 and routes the input and output strobes from the computer to the proper devices. Device 0 is used for data ready flags from external devices. The flags are interrogated by software instructions and also reset by software instructions. Only two flag circuits are shown and 6 more of the same can be wired into the Tri-state bus drivers on Dev. 0.

Only one typical write strobe decoder is shown on page one for external devices but two more, for Dev. 2 & 3 can be added. IC 'J' can be changed to 120 and readdressed to any desired slot in the 256 I/O addresses.

External data latches can be connected in parallel to the outputs. A decoded write strobe goes to each 8 bit latch(74100). These can be used to operate relays or what have you.

Only one Processor Data Bus Input strobe is shown decoded. Again any number of decoders can be implemented, one for each input device.

If you etch yourself a 100 pin plug from doublesided board you can build your I/O's on Vector pre-etched cards that plug into a 44 pin Vector edge connector. Install several of them in a homemade or other cage and wire them parallel. Assign transition pin numbers, wire the cage to the 100 pin plug you etched and plug into the Altair Bus. These Vector cards aren't cheap but you have the advantage of not having to etch complicated boards as they can be wired point to point. Use Molex pins for your IC's and do not break off the carriers until you have finished soldering and are ready to install the IC's. Feel free to change the circuits around to suit yourself but interface with the 8800 bus with low power loads only.

William D. Thomas
26 March 1975
P. C. Box 217
Quechee, VT 05059

I received the latest newsletter, and it was great. I hope that the next one lets us out in the boonies know what has been decided for the future.

I received a copy of the Microsystems International MP8008 Applications Manual and was impressed with Monitor 8. I have started getting ideas on how to expand it and what to add.

I'm now trying to form a library of software, collecting all samples of programs and routines for the 8080 and (hopefully) the 8085. From the last newsletter, I understand that you have copies of several different software examples available. For example - Paul Farr's modifications for TVT, and Terry Ritter's executive monitor system. I would like to obtain copies of any and all available software to add to the library, including routines, programs, assemblers, monitors, editors, cross assemblers, simulators, compilers, etc. As I have access (limited, but...) to the Dartmouth College Timesharing System, I will be able to help develop software for the group. With luck, and a good varied collection, I'd like to help the group by providing copies of software to members for the cost of postage and reproduction. I really would like to get active in the software portion - collecting, distributing, developing, and... writing:

You require a SASE for information and a "camera ready article". Well, I'm the "dummy" that "is going to suggest using hexadecimal notation for the 8008 or 8080". My contributions are first a hexadecimal dump routine that dumps a 4 character address, 2 spaces, and 2 character data word per word of memory for each line output. You supply the ending and starting address in register pairs D&E and H&L, respectively. The second contribution is a table giving the decimal, octal, hexadecimal, mnemonic, and description of all the 8080 instructions (comparable to Adam Trent's for the 8008, I presume - which, by the way, can be found in Intel's MCS-8 User's Manual)

I hope that these are satisfactory, as I haven't got a system to write about yet, only the 8008 chip and a dream.

I suggested this in my last letter, but I'd like to ask about it again. The suggestion was this - that the Group, as a whole, buy the cross assembler, simulator, and PL/M compiler packages from Intel to help in software development. What I'd like to know is if you think it is good idea.

My enthusiasm in the software side of the Group is pretty obvious. As I have no Mark-8 or other hardware to build and work with, I end up concentrating my energies in the programming end of things. My ideas for my own future system include a lot of complicated system software (a timesharing system, would you believe!). Hence, my clammering for software already written.

So, after my immense request, I hope that I haven't wasted your time. I would like to start the group's software library or help with it if it is already started elsewhere.

For all the trouble I may have caused, and for just being a part of the group - please find enclosed the following:

- A copy of my hexadecimal dump routine
- A copy of the 8080 Instruction set
- A check for the amount of $6.00 for the next 6 issues
- I hope that I have included everything. I'm anxiously waiting for the next issue of the newsletter.

Thanks for the help....

I am,
very respectfully yours,

Sid Maxwell
HEXADECIMAL DUMP SUBROUTINE:

note: This routine assumes that registers D and E contain the address of the last word to be dumped, and registers H and L the first. Note also that the output is only and OUT instruction due to the varied output formats - this must be changed for each individual case...

0000 C5 START: MOV A,H ; move high add of data to A...
0002 460037 CALL HIGH ; and output high order char
0005 C5 MOV A,H ; move high address again...
0006 460040 CALL LOW ; and output low order char
0009 C6 MOV A,L ; move low add of data to A...
000A 460037 CALL HIGH ; and output high order char
000D C6 MOV A,L ; move low address again...
000E 460040 CALL LOW ; and output low order char
0011 0620 MVI A,20 ; load A with a "", 20 hex...
0013 XX OUT EXP ; twice for two blanks
0014 XX OUT EXP ; now bring data word (H & L add)...
0015 D7 MOV C,M ; to C and then to A (saved in C)
0016 C2 MOV A,C ; output high order character
0017 46004B CALL HIGH2 ; load data word again and...
001A C2 MOV A,C ; output low order character
001B 460040 CALL LOW ; load A with a CR, OD hex...
0020 060D MVI A,OD ; and output to port EXP
0021 060A OUT EXP ; and output to port EXP
0022 060A OUT EXP ; and output to port EXP
0023 XX OUT EXP ; load A with high add of data...
0025 BB CMP D ; and compare with high add of last
0026 40002F JNC OK ; if present add is less, OK
0029 C6 MOV A,L ; otherwise, load L to A and...
002A BC CMP E ; compare with E (low add's)
002B 40002F JNC OK ; if we still have more, OK
002E 07 RET ; otherwise, we're done
002F 30 OK: INR L ; if we're not done, incr add...
0030 480000 JNZ START ;
0033 28 INR H ; and go back for next add and data
0034 440000 JMP START ;
0037 2430 HIGH: ANI 30 ; mask out top 2 signif bit of high add
0038 1A RAR ; rotate to...
0039 1A RAR ; move bits...
003A 1A RAR ; down to the...
003B 1A RAR ; lowest position
003C 460040 CALL LOW ; now output this "low order" char
003F 07 RET ; done
0040 240F LOW: ANI 0F ; mask out low order 4 bits...
0041 3C0A CPI OA ; and see if less than 10 decimal
0042 600047 JC ALPHA ; if not, will be an A-F (hex alpha char)
0045 243F ANI 3F ; otherwise, is numeric, so add prefix
0046 XX OUT EXP ; for numeric ASCII, and output
0047 1C09 ALPHA: SBI 09 ; if alpha, sud 9 dec to shift down...
0048 244F ANI 4F ; and add ASCII capitals' prefix...
0049 XX OUT EXP ; and output to port EXP
004A 07 RET ; done
004B 24FO HIGH2: ANI FO ; for data, mask out top 4 bits
004D 1A RAR ; rotate to...
004E 1A RAR ; move bits...
004F 1A RAR ; down to the...
0050 1A RAR ; lowest position
0051 460040 CALL LOW ; now output this "low order" char
0054 07 JST ; done
0055 END
8080 Machine Instruction Codes:
note - only the first word of multiple word instructions is presented

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<th>MNEMONIC</th>
<th>COMMENT</th>
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<td>002</td>
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<td>Increment B &amp; C registers</td>
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<td>010</td>
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<td>Add B &amp; C to H &amp; L</td>
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<td>371</td>
<td>F9</td>
<td>CM</td>
<td>Call on minus</td>
</tr>
<tr>
<td>250</td>
<td>372</td>
<td>FA</td>
<td>---</td>
<td>Compare immediate to A</td>
</tr>
<tr>
<td>251</td>
<td>373</td>
<td>FB</td>
<td>CPI</td>
<td>Restart at position 070 octal</td>
</tr>
<tr>
<td>DEC</td>
<td>OCTAL</td>
<td>HEX</td>
<td>MNEMONIC</td>
<td>COMMENT</td>
</tr>
<tr>
<td>-----</td>
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<td>----------</td>
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</tr>
<tr>
<td>155</td>
<td>233</td>
<td>9B</td>
<td>SBB E</td>
<td>Subtract E from A with borrow</td>
</tr>
<tr>
<td>156</td>
<td>234</td>
<td>9C</td>
<td>SBB H</td>
<td>Subtract H from A with borrow</td>
</tr>
<tr>
<td>157</td>
<td>235</td>
<td>9D</td>
<td>SBB L</td>
<td>Subtract L from A with borrow</td>
</tr>
<tr>
<td>158</td>
<td>236</td>
<td>9E</td>
<td>SBB M</td>
<td>Subtract memory from A with borrow</td>
</tr>
<tr>
<td>159</td>
<td>237</td>
<td>9F</td>
<td>SBB A</td>
<td>Subtract A from A with borrow</td>
</tr>
<tr>
<td>160</td>
<td>240</td>
<td>A0</td>
<td>ANA B</td>
<td>And B to A</td>
</tr>
<tr>
<td>161</td>
<td>241</td>
<td>A1</td>
<td>ANA C</td>
<td>And C to A</td>
</tr>
<tr>
<td>162</td>
<td>242</td>
<td>A2</td>
<td>ANA D</td>
<td>And D to A</td>
</tr>
<tr>
<td>163</td>
<td>243</td>
<td>A3</td>
<td>ANA E</td>
<td>And E to A</td>
</tr>
<tr>
<td>164</td>
<td>244</td>
<td>A4</td>
<td>ANA H</td>
<td>And H to A</td>
</tr>
<tr>
<td>165</td>
<td>245</td>
<td>A5</td>
<td>ANA L</td>
<td>And L to A</td>
</tr>
<tr>
<td>166</td>
<td>246</td>
<td>A6</td>
<td>ANA M</td>
<td>And memory to A</td>
</tr>
<tr>
<td>167</td>
<td>247</td>
<td>A7</td>
<td>ANA A</td>
<td>And A to A</td>
</tr>
<tr>
<td>168</td>
<td>250</td>
<td>A8</td>
<td>XRA B</td>
<td>Exclusive Or B to A</td>
</tr>
<tr>
<td>169</td>
<td>251</td>
<td>A9</td>
<td>XRA C</td>
<td>Exclusive Or C to A</td>
</tr>
<tr>
<td>170</td>
<td>252</td>
<td>AA</td>
<td>XRA D</td>
<td>Exclusive Or D to A</td>
</tr>
<tr>
<td>171</td>
<td>253</td>
<td>AB</td>
<td>XRA E</td>
<td>Exclusive Or E to A</td>
</tr>
<tr>
<td>172</td>
<td>254</td>
<td>AC</td>
<td>XRA H</td>
<td>Exclusive Or H to A</td>
</tr>
<tr>
<td>173</td>
<td>255</td>
<td>AD</td>
<td>XRA L</td>
<td>Exclusive Or L to A</td>
</tr>
<tr>
<td>174</td>
<td>256</td>
<td>AE</td>
<td>XRA M</td>
<td>Exclusive Or memory to A</td>
</tr>
<tr>
<td>175</td>
<td>257</td>
<td>AF</td>
<td>XRA A</td>
<td>Exclusive Or A to A</td>
</tr>
<tr>
<td>176</td>
<td>260</td>
<td>B0</td>
<td>ORA B</td>
<td>Or B to A</td>
</tr>
<tr>
<td>177</td>
<td>261</td>
<td>B1</td>
<td>ORA C</td>
<td>Or C to A</td>
</tr>
<tr>
<td>178</td>
<td>262</td>
<td>B2</td>
<td>ORA D</td>
<td>Or D to A</td>
</tr>
<tr>
<td>179</td>
<td>263</td>
<td>B3</td>
<td>ORA E</td>
<td>Or E to A</td>
</tr>
<tr>
<td>180</td>
<td>264</td>
<td>B4</td>
<td>ORA H</td>
<td>Or H to A</td>
</tr>
<tr>
<td>181</td>
<td>265</td>
<td>B5</td>
<td>ORA L</td>
<td>Or L to A</td>
</tr>
<tr>
<td>182</td>
<td>266</td>
<td>B6</td>
<td>ORA M</td>
<td>Or memory to A</td>
</tr>
<tr>
<td>183</td>
<td>267</td>
<td>B7</td>
<td>ORA A</td>
<td>Or A to A</td>
</tr>
<tr>
<td>184</td>
<td>270</td>
<td>B8</td>
<td>CPA B</td>
<td>Compare B to A</td>
</tr>
<tr>
<td>185</td>
<td>271</td>
<td>B9</td>
<td>CPA C</td>
<td>Compare C to A</td>
</tr>
<tr>
<td>186</td>
<td>272</td>
<td>BA</td>
<td>CPA D</td>
<td>Compare D to A</td>
</tr>
<tr>
<td>187</td>
<td>273</td>
<td>BB</td>
<td>CPA E</td>
<td>Compare E to A</td>
</tr>
<tr>
<td>188</td>
<td>274</td>
<td>BC</td>
<td>CPA H</td>
<td>Compare H to A</td>
</tr>
<tr>
<td>189</td>
<td>275</td>
<td>BD</td>
<td>CPA L</td>
<td>Compare L to A</td>
</tr>
<tr>
<td>190</td>
<td>276</td>
<td>BE</td>
<td>CPA M</td>
<td>Compare memory to A</td>
</tr>
<tr>
<td>191</td>
<td>277</td>
<td>BF</td>
<td>CPA A</td>
<td>Compare A to A</td>
</tr>
<tr>
<td>192</td>
<td>300</td>
<td>C0</td>
<td>RNZ</td>
<td>Return on no zero</td>
</tr>
<tr>
<td>193</td>
<td>301</td>
<td>C1</td>
<td>POP B</td>
<td>Pop register pair B &amp; C off stack</td>
</tr>
<tr>
<td>194</td>
<td>302</td>
<td>C2</td>
<td>JNZ</td>
<td>Jump on no zero</td>
</tr>
<tr>
<td>195</td>
<td>303</td>
<td>C3</td>
<td>JMP</td>
<td>Jump unconditionally</td>
</tr>
<tr>
<td>196</td>
<td>304</td>
<td>C4</td>
<td>CNZ</td>
<td>Call on no zero</td>
</tr>
<tr>
<td>197</td>
<td>305</td>
<td>C5</td>
<td>PUSH B</td>
<td>Push register pair B &amp; C on stack</td>
</tr>
<tr>
<td>198</td>
<td>306</td>
<td>C6</td>
<td>ADI</td>
<td>Add immediate to A</td>
</tr>
<tr>
<td>199</td>
<td>307</td>
<td>C7</td>
<td>RST 0</td>
<td>Restart at position 000 octal</td>
</tr>
<tr>
<td>200</td>
<td>310</td>
<td>C8</td>
<td>RZ</td>
<td>Return on zero</td>
</tr>
<tr>
<td>201</td>
<td>311</td>
<td>C9</td>
<td>RET</td>
<td>Return unconditionally</td>
</tr>
<tr>
<td>202</td>
<td>312</td>
<td>CA</td>
<td>JZ</td>
<td>Jump on zero</td>
</tr>
<tr>
<td>203</td>
<td>313</td>
<td>CB</td>
<td>---</td>
<td>Call on zero</td>
</tr>
<tr>
<td>204</td>
<td>314</td>
<td>CC</td>
<td>CZ</td>
<td>Call unconditionally</td>
</tr>
<tr>
<td>205</td>
<td>315</td>
<td>CD</td>
<td>CALL</td>
<td>Add immediate with carry</td>
</tr>
<tr>
<td>206</td>
<td>316</td>
<td>CE</td>
<td>ACI</td>
<td>Add immediate with carry</td>
</tr>
<tr>
<td>207</td>
<td>317</td>
<td>CF</td>
<td>RST 1</td>
<td>Restart at position 010 octal</td>
</tr>
</tbody>
</table>
Grant Runyan, 1146 Nirvana Road, Santa Barbara, CA 93101 has the following to say: My TVT-1 is working fine with the R. D. Hogg scrolling. I added the UART and am just about ready to hook it up with a surplus acoustic coupler to have a terminal from our school system's Nova-2.

I finally decided to build a Mark-8 and am assembling the parts. I ordered the circuit boards from Techniques, Inc. on June 15 and received word on July 16 that they were out of stock and could not be delivered until the middle of September. That will give me time to work out an interface with the Flexowriter which I bought. If anyone else is trying to interface a Flexowriter, drop me a line, and let's compare notes.

In searching for a power supply for the Mark-8, I found that both sources listed in PE's booklet are out of business. I was able to find an excellent power supply taken from a keyboard terminal. In fact, it is so good that I bought all that were available and have about 20 for sale. This is a 5 volt supply highly regulated at 6 amps. It also has 200 v., 12 v., and 48 v. It will be easy to convert to obtain -5 v., -12 v., and -9 volts. I would like to have $25.00 each for these supplies. I will supply schematics and plans for obtaining the other voltages if needed. They weigh about 15 pounds, so the freight will be as high as $5.00 for points on the east coast. Freight in California will be about $1.00, and I will have to charge 6% tax to California addresses.

I have been able to get quite a library of computer information on microfiche film. I bought a little micro reader from National Microsales, 45 Seymour St., Stratford, Conn. 06614, for $25 which is really great. I recommend this instrument very highly for home use and recommend that people send for the flyer on the reader.

Thanks millions for all your work on the newsletter. I would certainly not be able to participate in this fun game without the information from the NL.

Keith L. Kendall
295 E 500 S
e
Vernal, Utah 84078

July 11, 1975

I have purchased some smoke damaged Beehive monitors & Beehive keyboards. I haven't seen them yet but am informed that they are workable with cleaning. Unfortunately the cases were sold separately to a junk man. The monitors do not have memory or character generators, etc. but have power and deflection circuits.

I paid $25 each for the monitors & $25 each for the keyboards (microswitch, ASCII). If you think anyone would be interested I will check into getting more and a better price. (CENGL: SASE)

Also I have quite a few BASIC language games and will reproduce them for cost. More later. I haven't got anything running yet except a Univac terminal, punch, & reader, & an Altair, and haven't connected them yet. I may just breadboard a 2-port or so interface until the interface that I ordered from Maury Goldberg June 7th comes. When I order! it he talked like it would be shipped immediately, but although he shipped some of it air mail, I havent yet received the rest. I am pleased with Poly Packs.

Yours,

Keith L. Kendall

Keith L. Kendall
I was browsing through the Newsletter the other day and came across William Shawcross' program to clear memory (Vol. 1, No. 7, Page 5). I glanced at this with fondness, because the first program I tackled with my "bare bones" Altair was one to clear memory. But even programs this simple can certainly be instructive. For instance, I was horified to see that Mr. Shawcross cheated. I mean, after you stop the program, there's that section of code from 3628 on up lurking around. Okay, so how can you devise a program that clears every thing, even itself. I discovered that this is no trivial problem. To solve it, I devised a two part program. The first section "builds" a small kernel of code, and then transfers control to it. The kernel then sits there and gobbles up memory (i.e. zero's memory). The trick is, on the last bite, it gobbles itself.

The kernel is simplicity itself:

<table>
<thead>
<tr>
<th>LOC</th>
<th>CODE</th>
<th>OPERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>325</td>
<td>PUSH D</td>
</tr>
<tr>
<td>001</td>
<td>351</td>
<td>PCHL</td>
</tr>
</tbody>
</table>

In setting up this kernel, HL is set to 0, so that executing PCHL reactivates the kernel. Also DE is set to 0, so that executing PUSH D "gobbles" the two bytes of memory pointed at by the stack pointer. The only other initialization step is to set the stack pointer to the upper end of memory that is to be cleared. Each time PUSH D is executed, it steps down through memory clearing two bytes at a time. Since the kernel resides at 000-001, the last push operation that is performed wipes out the kernel itself. To avoid the hassle of figuring out what code represents the top part of available memory and loading that value in the stack pointer, a short cut is just to load 000 000 in the S. P. The kernel
then takes the precaution of clearing every thing, whether memory happens to be there or not. This brings up a good point, it's perfectly acceptable to read and write from memory not physically present on the Altair. If you're writing, the data simply disappears. If you're reading, a 377₈ is returned (i.e. all 1's on the data bus).

Okay, one final problem. After the kernel self-destructs, what's left? Every memory location containing 000. So the processor steps through memory executing 000 which, conveniently is a no operation. Eventually, the processor runs out of memory physically present. When the processor tries to access memory that is not there, a 377 is returned. This turns out to be the code for RST 70 / restart at location 70. Great I thought. The processor will just sit there no-op'ing and looping till I stop it. And so it did. This is, until once I decided to keep the machine running to impress my wife. Then strangely after 1 minute and 35 seconds of running time the stable pattern of lights suddenly changed. What happened? So I tried it again, and sure enough, right on the nose, 1 minute and 35 seconds after starting the program (hah! A whole machine full of no-ops) bombs. Very strange. Hardware bug? Random error? The answer, as I discovered after much thoughtful examination involves careful consideration of exactly what the processor does when it executes the NO-OP machine. I'll send in the answer in my next letter.

<table>
<thead>
<tr>
<th>LOC</th>
<th>CODE (OCTAL)</th>
<th>OPERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>061</td>
<td>LXI SP, END / set the</td>
</tr>
<tr>
<td></td>
<td>000</td>
<td>/ stack pointer so that all</td>
</tr>
<tr>
<td></td>
<td>000</td>
<td>/ of memory will be clear</td>
</tr>
<tr>
<td>003</td>
<td>041</td>
<td>LXI H, ZERO / set memory</td>
</tr>
<tr>
<td>004</td>
<td>000</td>
<td>/ location pointer to location</td>
</tr>
<tr>
<td>005</td>
<td>000</td>
<td>/ zero</td>
</tr>
<tr>
<td>006</td>
<td>021</td>
<td>LXI D, ZERO / set register pair</td>
</tr>
<tr>
<td>007</td>
<td>000</td>
<td>/ DC to zero - this is the</td>
</tr>
<tr>
<td>010</td>
<td>000</td>
<td>/ constant that will be pushed into memory</td>
</tr>
<tr>
<td>011</td>
<td>066</td>
<td>MVI, M INST1 / move &quot;PUSH D&quot; to loc. 0</td>
</tr>
<tr>
<td>012</td>
<td>325</td>
<td>/ this is the code for &quot;PUSH D&quot;</td>
</tr>
<tr>
<td>013</td>
<td>043</td>
<td>INX H / set memory pointer to loc. 2</td>
</tr>
<tr>
<td>014</td>
<td>066</td>
<td>MVI M, INST. 2 / move &quot;PCHL&quot; to loc. 1</td>
</tr>
<tr>
<td>015</td>
<td>351</td>
<td>/ this is code for &quot;PCHL&quot;</td>
</tr>
<tr>
<td>016</td>
<td>053</td>
<td>DCX H / Reset HL to loc. 0</td>
</tr>
<tr>
<td>017</td>
<td>351</td>
<td>PCHL</td>
</tr>
</tbody>
</table>
Mr. Hal Singer
Cabrillo Computer Center
4350 Constellation Rd.
Lompoc, CA 93436

Dear Mr. Singer:

A recent issue of the Newsletter featured some comparisons of audio tape interfaces. The SCHELBI Audio Tape Interface was one of those mentioned in the discussions. We believe the tone of the discussions might lead some readers to believe that the SCHELBI interface was being considered for general use with various microprocessors. We would like, therefore, to point out that the SCHELBI interface was designed specifically for the SCHELBI Minicomputer. Many of the parameters discussed in the comparisons cannot be properly judged unless one takes account of the following factors.

A.) The relatively large amount of I.C.s used on the transmit side of the SCHELBI interface provide functions and capabilities that the units it was compared with did not have.

1. The SCHELBI unit incorporates a frequency divider network so that the computer's master clock may be used to derive the FSK frequencies and completely eliminate transmit frequency adjustments.

2. The SCHELBI unit allows start/stop tape motion control by the computer and provides for a delay for the tape unit to reach proper speed before a write operation.

3. The SCHELBI unit accepts four bits at a time from the computer to reduce computer processing requirements during a write operation.

4. The SCHELBI unit provides a FSK gating function that significantly reduces phase-jitter. A factor that becomes increasingly important as the baud rate increases.

B.) On the receive side, the SCHELBI interface is hardly more complicated than Suding's. The basic theory of operation is the same. The SCHELBI unit does use an additional I.C. to provide frequency multiplication thus yielding greater bandwidth between the marking and spacing frequencies (to improve the signal/noise ratio between harmonically related signals). Additionally, the SCHELBI unit uses an I.C. to generate a minus supply "on-board" which is a feature our designer's elected to include for future developments.
C.) The comparisons of software requirements were hardly representative of similar capabilities. The bytes quoted for SCHELBI programs were for routines that included motor start/stop control, "check sum" generation and validation, and error display. More representative figures for minimum read/write capability with the SCHELBI unit are on the order of 40 bytes for read and write.

D.) Speed. Over-all through-put with the SCHELBI interface is considerably faster than most currently available units.

E.) Compatibility — with what? The SCHELBI unit is completely compatible with the system for which it was designed. The SCHELBI tape unit is used as an integral part of a large array of software that is available for use on SCHELBI computers. We did not design it to be compatible with other systems.

In summary, we would like to point out that we think our tape unit is ideal for the system for which it was developed. For those who do not have a SCHELBI system, we would not promote our system over any of the other units discussed, and in fact, would recommend those over ours for such applications.

Thank you for your attention.

NAT WADSWORTH
President

Radio-Electronics
A GERNBSACK PUBLICATION / 200 PARK AVENUE SOUTH
NEW YORK, N.Y. 10003 / (212) 777-6400

June 19, 1975

Dear Hal:

We're glad to see the success you've been having with the Micro-8 Computer Users Group publication. It is obvious that a lot of work is going into it on your part and an awful lot of benefit is accruing to your subscribers.

We do have several items of interest in progress at Radio-Electronics. While all of them don't directly affect the Micro-8, we just thought you'd like to know about them.

First, there is an article coming up that tells how to interface a programmable calculator with the Micro-8. Second, our TV Typewriter II will be expanded with a cursor board and a screen read board. The screen read board should appear in our September, 1975 issue; the cursor board in the October, 1975 issue. We are looking for more articles in the same vein and some of your subscribers certainly have that data available. If they think what they have is suitable for publication in Radio-Electronics, they should get in touch with me. We pay for every article we publish.

We continue to wish you every success with the User Group newsletter and if you feel there is anything we can do to assist, just ask.

Sincerely,

Larry Stockler
Editor

LS:pl
July 7, 1975

Dear TCH and Micro-8 Users Group,

First and foremost I want to congratulate both of you. I think you both have done a fantastic job. TCH is especially to be applauded for their fine series of do-it-yourself type articles and Micro-8 for successfully handling the nearly impossible task of distributing the collective information and opinions from their subscribers.

My only complaint with both publications is that they are so interesting I spend more time reading them than working on my computer.

I have an Altair 8800 with 8K of memory, a TTY-28, and a modem. The 8K of memory was purchased from Processor Technology Co., 2465 Fourth Street, Berkeley, CA, 94710. I can recommend them to other Altair users as an excellent supplier of 4K memories and other peripherals. I have on order their 3P+S board (3 parallel and 1 serial I/O interface) a mother-board that will hold up to 16 Altair type boards and their 2K rom board. They are promising almost free software and good documentation. As I said, I'm sold on them for low cost Altair modules.

My TTY is marked TT-47A/UG which seems to be Navy surplus. I have the electrical schematics if anyone needs one for a SASE.

The modem comes from Bernies Surplus, 20746 Plummer St., Chatsworth, CA. Bernie sells these modems for about $25. This includes an attractive wooden case, acoustic coupler, modem and documentation.

Future plans include keyboard and TV display (what's the latest on Dr. Sudding's 16x64 character TV display?). I can hardly wait to finish what I have started now so I can build the graphics display as described in TCH by Hal Chamberlin.

I plan on using the TCH cassette interface to maintain compatibility with TCH and their future projects. I will probably also use a Tarbell cassette interface for its higher density. Three cassettes will be used to allow sorting to be accomplished with reasonable efficiency.

I definitely want to implement a priority interrupt system and DMA transfer for TV display refresh.
My only problem with the Altair was that the deposit switch would not work most of the time it was pressed. MITS has seen the same problem and recommended the replacement of IC N (74100) and/or IC G (74123) on the Display Control board. This seemed to help somewhat, but did not completely fix the problem. Finally, after much gnashing of teeth, Don Tarbell came to the rescue and fixed the problem by disconnecting IC G pin 1 from ground and connecting it to pin 13 of IC G. This keeps IC G from extending the width of the MWRITE pulse if it is triggered by switch noise. I haven't contacted MITS about this mod, but it seems to work fine and doesn't seem to affect any other circuits.

Again, my sincerest thanks to you both for your fine publications.

Keep up the good work,

Dave Tritsch
7558 Kester Ave #1
Van Nuys, CA 91405

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Hal Singer & John Craig, Editors
Micro-8 Computer User Group News
Cabrillo Computer Center
4350 Constellation Road
Lompoc, CA 93436

July 28, 1975

Dear Hal & John:

Even though a lot of people must be on vacation, I have already received a good number of responses from people who are willing and interested in joining a "Buyer's Co-operation" for the LSI-11.

Most of the people were interested in getting the Extended Arithmetic Chip along with the Basic LSI-11. The combination would cost, by quantities of fifty, $736. plus tax, shipping, etc. I am sure that this route would give the most "Bang for the Buck".

I am confident that we're going to get 50 people, but maybe a word in the next newsletter would speed up the process. (I am quite anxious!!!!)

Very truly yours,

Dick Corner
514 So. 9th St.
Moorhead MN 56560
(218) 236-7894

DC/clt
I just received the #8 issue of the N.L. and enjoyed it as much as ever. I tell you a lot of guys appreciate all the hard work you are doing for them and our new hobby.

I like the format you have decided on for the N.L. I am a bookbinder by trade, and could probably have helped you decide on a layout had I known you were having a problem. However, you have solved it yourselves, to everyones satisfaction, I'm sure.

I like J.A. Boyko's arrangement of the 8008 instruction set in this issue of the N.L. For those of us with an octal imput keyboard, this should prove very handy. It also shows the numerical relationship between the different instructions in a very clear fashion.

I still do not have my Mark-8 running. Something is wrong with the single-stepping. As you can see from the enclosed writeup, I have converted to a plug in bus system. Boy, what a difference in convenience.

I have 1 K of 2102 memory working. I purchased the board from Solid State Music and connect. I praise them highly enough. I received it in the mail about a week after I had mailed in my order. It is a beautifully designed board, and the etching and plating are top-rate, which is more than I can say for the original boards. This board holds 4 K of 2102 RAMS, requires no -9 V supply and much less 5 V current. It also includes all necessary decoding.

By the way, the schematic I received from you for the Precision Electronics Power Supply does not jive at all with the power supply I have. I wonder if they had two different models?

As I mentioned above, I am enclosing a write up on the low cost plugable bus system I built. Use it if you have a couple of pages to fill up sometimes. Or feel free to condense it if you wish.

From past issues of the N.L., I see that a lot of other guys have become just as frustrated with the Mark 8 busing system as I have. After trying for a month to debug my machine, and spending about half of that time debugging the bus, broken wires, bad solder connections, trying to get at one board or another, etc., I decided to take the time and expense and make up a system where I could just plug the boards in or out.

After finding that there were no 43 pin edge connectors available anywhere in Vancouver or Seattle, (and also hearing that they would cost a small fortune if I could obtain any) I hit upon the following scheme. This method allows one to make up wide, expensive edge connectors from narrow, inexpensive, surplus ones. While it sounds like a Mickey Mouse arrangement, I am more than satisfied with the way mine turned out. For a little bit of work, I have saved a lot of bucks which can be better spent elsewhere. Because I was using 22 pin connectors, I made the bus 44 pins wide, giving me 3 spare wires to use for something else if I wish. The same basic arrangement could be used for any width bus, depending on the number of lines needed or the number of pins in the connectors being used.

The following steps and sketch should explain the scheme.

**BOARD MODIFICATIONS**

1. Prepare artwork 2 x size. I did this by placing a sheet of acetate 15" W. x 13" H over grid paper. I then placed a row of .156 edge connector pattern (2x size) along the top and bottom edge of the acetate. Then I connected the 2 rows with strips of .160 tape, ending up with 44 strips running from edge to edge of the acetate. Use the grid paper as a guide to insure that the tape strips are absolutely straight.
2. Reduce the artwork photographically to give a negative 7/4 x 64 in.
3. Make 2 Printed Circuit Boards from this negative.
4. Cut 1 board into 6 strips 7/4 x about 1 in. Leave the other board full size to use as a card extender.
5. Make up mother board BEFORE continuing with step 6.
6. Clean excess solder off bus pads on Mark 8 boards. I used Dri-wick for this. Then using epoxy cement, glue a connector strip on each board by overlapping 3 in. and lining up with the bus pads. Place each board between two 1 by 2's and clamp until dry.
7. Connect #22 bare wire jumpers from top end of connector strip to P.C. lead by lap soldering. Take CARE to jumper to correct terminal on leads that emerge from under strip at an angle. To connect to leads that are on reverse side of board, simply drill a hole through bus land on board and solder a jumper through it.

MOTHER BOARD -- six 44 pin edge connectors (plus 1 for extender board)
1. Saw 1 end of 22 pin connector off just past last terminal, using a fine bladed hack saw. Do the same with 13 other connectors.
2. File the end smooth on 2 of these connectors and butt together. Check for correct terminal spacing, with 1 of the P.C.Board strips and if necessary file until the spacing is correct.
3. Do the same with the six other sets.
4. Insert one of the P.C.Board strips in each connector set to hold alignment and spacing while gluing.
5. Put a thin layer of epoxy along each side of each edge connector, being CAREFUL none comes near the contacts. Place between previously prepared hardwood strips about 1/8 h. x 2" w. x about 10" long. Clamp entire assembly together until thoroughly dry.
6. Carefully remove P.C.B. strips. Glue or screw strips across ends of wood strips for additional strength. One source of FREE hardwood strips is your local print shop. Ask for used "cutter strips".
7. Wire bus by connecting like numbered terminal pigtails together with #22 bare wire. Remember, imput bus between Imput Multiplexer Board and CPU Board does NOT connect to other boards.
8. Make up an extra 44 pin connector set and glue it flush with the top edge of the board you left full size. Solder terminal pigtails to foil strips on board. Use this extender board when servicing your Mark 8 to lift the board you wish to work on, above the other boards in the set while still allowing it to be connected to the bus.

---

Harvey Heinz

---

[Diagram of assembly process]

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[Additional notes and diagrams]
Mr Harold L Singer
Cabrillo High School Computer Center
Lompoc, CA 93436

Gentlemen:

I would very much appreciate the addition of this group, in the name and address below last, to the mailing list for your Mark-8 User Group, and would appreciate any back issues of mailings that can be provided.

The Resource Access Center is a group similar to Resource One in California, just getting underway. We are currently using a system of B.I.T. 483 minicomputers, but are expecting to expand to a moderately large computer this spring and will be using the BITs for communication control and microcomputers in peripheral control applications. We are a voluntary group of, primarily students from local colleges and high schools, and workers in the Minneapolis Model City Program projects. We are very fortunate to have among our active engineers several who are very skilled in microprocessor design. One, who is chief microprocessor consultant to a very large local computer manufacturer has a design of his own, built and debugged, using the 8080 (beats Altair by miles, he says) and I can probably get a copy of the plans for you if you are also interested in the 8080 designs.

We currently are working on some interesting terminals and will be happy to share the designs. Two, using unmodified TVs, display wide lines of 64 to 80 characters readibly, and another uses the TV for raster scan graphics in 256x200 format. Also improved cassette electronics etc. Layout of the PCs is slow, and anybody interested in sharing this sort of thing should write. We also bought out the bankrupt BIT computer company, and have all spare parts and new programs, should any of your users' group members happen into one.

Sorry that I can't yet say just what system we will be using soon -- still in negotiations about the donation -- but will keep you informed as to 8008-compatible peripherals & applications.

Richard B. Koplow
RESOURCE ACCESS CENTER
3010 4th Avenue South
Minneapolis, MN 55408
a complete 2-chip microprocessor system that's really just 2 chips. easier to handle, much more versatile, and generally less expensive.

THE BASIC F8 SYSTEM AND 5 KEY CHANGES

1. Two 8-bit I/O ports on the CPU chip. And two more on the ROM chip. 32 bidirectional lines in all.
2. 64-bytes of fast RAM scratchpad built into the CPU chip.
3. A clock generator and power-on reset built into the CPU chip, too.
4. A programmable interval timer built into the ROM chip.
5. 60% of the 70 instructions are 1-byte.

Other features and refinements include:
A speedy 2µs minimum instruction execution time.
Direct TTL I/O compatibility.
A typical power dissipation of less than 300 MW per chip.
Local interrupt with automatic address vector.

FAIRCHILD
Semiconductor Specialists INC.

The above is a cut-and-paste job from an ad I found interesting. Note the error in the power connection.

After reading about delivery problems with Mini Micro Mart I went ahead and ordered two 8101's figuring: they might do better on a simple IC order; I could afford to wait; 5¢ per word was too good a memory price to pass up. I mailed my order on Saturday and received two 2101's the following Thursday by UPS.

No faults were detected by my test program. It differs from those published in the NL in that after the test byte has been written, read and compared at each address the same is done for the complement of the byte.

So now the only question is what is the difference between the "fully interchangable" 2101 and 8101.
I missed the point of Jim Callas' letter as I think he missed the point of mine about Altair. Anyway, it did accomplish two things. It got a contribution from him, and another from me.

In lieu of beating a dead horse, I suggest those interested might read The Computer Hobbyist May 1975 editorial. Maybe it may cause more contributions to the NL.

Since MiniMicroMart can't seem to deliver, an alternate source for 8080/Altair equipment is Processor Technology Co. They are offering Altair compatible add-ons with a 6-month guarantee. The Mart owes me an UART ordered on 4/1/75. Considering the date ordered there must be a cosmic joke there somewhere.

For those disappointed with FE and NE, I suggest shifting support to BYTE coming out in August.

As an aside to the publishing world--most if not all magazines publish anywhere from 3 to 6 issues ahead of issue date. What this means is that corrections to articles made via 'Letter-to-Editor' will be that late in getting to the rest of us. Prices quoted and surplus advertised also will be that much out of date.

I don't know if BYTE will have this problem, but it does have a couple things going for it. Its not published in NYC, and if my communications with Carl Helmers are any indication, the editor is a damn nice guy who knows his 8-byters.

Of course, it goes without saying, if you want fast information, know what's happening and get a lot of information, support of this NL is a must.

I'm willing to loan my template, felt pen, and time to redraw circuits to make them camera ready for the NL for contributions from Texas and surrounds. To speed up the process and save postage, contributors might consider sending them direct to me and I will redraw and relay them to the NL within 24-hours.

Pax,

Bill Fuller

---

Sincerely,

202 S.

---

Dear Hal,

How's everything going? Hope you had a good experience at your recent meeting. The Homewre Computer Club members here really enjoyed having you visit.

I thought I would write to let you know that the plug-dests are now $84.50. Shipping as fast as Florida is about $3.50 so include at least that much. California residents include 6% tax or your reseller number. Delivery is about 3 to 4 weeks. The price will soon be lower and I will continue to refund any overpayments. There are several groups who are almost finished with controllers (and software) which will be low cost. In addition, several dependable people will soon offer CPU boards with the 8080 which will be considerably lower in cost than the Altair. One may be under $350 with 1K of memory on a 4K board which will accept slower 202 S.

Ken A. McGinnis
P.O. Box 2078
San Mateo, Ca. 94401

July 26, 1975
TO: Hal Singer
FROM: Jim Garrett

SUBJECT: NORTH TEXAS - DALLAS - FT. WORTH - METROPLEX COMPUTER CLUB MEETING

Lannie Walker, Bill Fuller, and myself are trying to get the amateur computer buffs together in the north Texas area. Our first meeting was a success; a lot of information and hints were exchanged. In this varied group we have some people with "Homebrews", Altairs, Micro-8's, Mike-2s and other computers.

We would like your help in publicizing our August meeting. Everyone is welcome.

NORTH TEXAS - DALLAS - FT. WORTH - METROPLEX MEETING

Date: August 18, 1975
Time: 7:00 p.m.
Location: Southwest Branch of the Irving Public Library System
2300 W. Shady Grove
(In shopping center, corner of Shady Grove & Story Rd)
Irving, Texas

If anyone has any questions about the location or how to get there please call me.

Thanks,

Jim Garrett
Surprise! Another NL in less than a month. Camera ready copy is coming in fast enough to rush another issue out. Believe it or not, the roster of 1500 plus people will appear in one or both of the next issues. Ten issues in 12 months isn't really too bad!

COLOSSAL LEAK

As the newspapers would say, we have it from a "very reliable source" that Radio Shack has firmed up their plans and will announce a modular microcomputer system built around the PACE. (Better write National Semiconductor, 2900 Semiconductor Drive, Santa Clara, CA 95051 (408) 732-5000 and request the PACE technical description, publication #4200078A and the PACE glossy. You might as well ask for full IMP-16 literature at the same time. It looks like we are going to see a lot of National products in the future.) Look for it about January.

Present plans are to set a new trend in pricing with the basic box selling very very cheap to get you to buy reasonably priced expansion modules. Support plans include the complete National support software library and a BASIC.

Word is that National is very anxious to provide support to Radio Shack which only makes sense with the thousands of stores and the potential market they might represent. Can we persuade some of our software experts to take a close look at the PACE instruction set and see whether it will be realistic to modify D-G NOVA software?

MITS & M6800

Rumors are floating about regarding MITS and Motorola M6800 chip development. Rather than repeat some of the ones I've heard, let's quote from Computer Notes, August 1975. The editor Dave Bunnell says, "Yes MITS is working on developments around the M6800 chip. However, it is absolutely not true that we have any plans, notions, thoughts, or intentions of replacing the 8080 CPU with a 6800 CPU. The ALTAIR 8800 is our most powerful processor and it will remain so for a considerable length of time. ALTAIR 8800 development programs are in high gear and ALTAIR owners can be assured that we intend to support them now and indefinitely into the future."

Subscription Information

The MICRO-8 Newsletter is a non-profit publication produced by the students and staff of the Cabrillo High School Computer Center as a student body activity. It is devoted to providing a forum for getting hobby computer enthusiasts communicating with each other and to promote the formation of local hobby computer groups. Issues are published when sufficient worthwhile material has been sent in, preferably every one to two months. Newsletters are sent first class mail to insure that they reach you in a reasonable time. Prices are for U. S. and Canada. Please add $6.00 for foreign delivery.

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Wouldn't it be neat to know what Heathkit has on the boards. Word around the Bay area was that Heathkit engineers were making the rounds of the semiconductor manufacturers recently looking at microprocessors.

The Future

What to do after issue 12 still looms ahead. I have to get back to serious school teaching this Fall or I can expect to be fired and John Craig will be in intensive training courses for the next three months but we are still tempted to continue for another 6 issues. Three letters have already been received regarding the NL's future. Please let us know whether we should continue and if so, what kind of changes you'd like to see. In any case, remember that we are not publishing a monthly magazine with our own original work. It is a newsletter that contains your contributions that might be of interest to fellow computer hobbyists.

Sy Lieberman
1489 Durango Avenue
Los Angeles, CA 90035

Dear Hal & John,

It is very gratifying to see that the computer hobby field has grown as rapidly as it has within the last year, resulting in the many low cost hobby microcomputer hardware options now coming out. I am sure that your NL has played a great part in this.

In answer to your request for inputs as to the future of the NL in NL #9, I think you should not stop it with NL #12. As previously stated by Julie Woodman in Volume 1, #8, even if it would require an increased subscription rate (about $10). Her mention of accepting advertising as a possibility for covering required secretarily help appears tempting. However, it would tend to defeat the goal of being completely unbiased source of information for the microcomputer hobby field. Even with such commercial enterprises as BYTE coming out to fill the gap, I am sure that there is room for the NL as they can only handle a limited amount of material in any one issue. Radio Electronics is only doing a very mediocre job in this area as their title covers too much ground. They won't even start a column as Popular Electronics has. The latter is expanding in this area after much letter writing, as the last issue makes note of. I personally think that the unbiased NL provides a sort of hobbyist protector from the "fast buck" artists and their freewheeling advertising and sales staff and that its demise would leave a very large gap. Please consider not stopping the Micro-8 newsletter after issue #12.

Sy Lieberman
August 23

Micro-8 Computer User Group
Cabrillo Computer Center
4350 Constellation Road
Lompoc, CA

Dear Hal:

I received my first copy of BYTE yesterday and was very excited with the content. I think this is a great idea and was badly needed; however, I feel it is important that we do not let a commercial magazine supplant this consumer based information exchange. It is my intention to contribute to the NL every shred of semi-reliable information that I come across.

In that regard, I have received and built the Processor Technology 3P+8 I/O board, which should be of interest to all Altair owners. I can think of nothing but superlatives in describing the quality and packaging of the components in this kit. The delivery was a little over a week behind schedule which represents an astounding improvement over the other suppliers I have dealt with. The construction was fairly simple despite some contradiction concerning the orientation of IC 5 (the directions and component layout chart are correct, the schematic and pc board are wrong). The completed board has two parallel I/O ports, one control port for talking to the UART, setting flags, software control of baud rate, and controlling peripheral drivers, and one port connected to the transmitt and receive sections of the UART. As you can see, it is a very versatile addition which replaces three I/O boards from a company which shall remain nameless, and all for $125.
There was one area which could be improved upon as regards this product. Suprisingly enough for a firm which advertises free software, there was almost no advice on the possible software options in processing data which moves to and from this device, especially in the area of software control of the UART and using the various flags available. Also, where provision is made for the addition of vectored interrupt capability, there was no mention of pulling PINT low to cause a RESTART 70. I was informed that additional instructions would be following shortly, but I have not received them yet so I can make no comment on how far they go towards solving these problems.

Another valuable service of the NL is as a communications device between users, and I would like to avail myself of that service to put forth the following plea. I just found an RCA 70/752 video terminal in good working condition, and even though it is old, my Altair is just dying to talk to it. If anyone out there has any info or documentation on this terminal, I will be only too happy to reimburse for expenses you have in purchasing/copying and mailing it to me. I would even appreciate ideas on where I might find such info.

Here's hoping we don't lose sight of the mutual benefit offered by interaction through the Micro-8 NL.

Sincerely,
Duane L. Gustavus
818 W. Hickory
Denton, Texas 76201
Dear Hal & John,

You wanted reader's reactions to NL volume 2 or not...I would like to see the NL continued for at least a while as long as it is still serving a purpose. I've subscribed to BITE, but in a hobby field that is changing drastically almost daily, a NL can be the fastest way to disseminate info and rumors.

I would like to see the NL continue along its present lines of including all types of micro-processors. I have both an 8008 and a 6800 operational, and have reasonable expertise in both hardware and software.

Just a hint to pass along to anyone building a 6800 system... if you use the clock driver circuit suggested by Motorola and cannot get the MPQ-6842 quad transistor package, try using 2N2222 and 2N2907 transistors. Most will work. (Received this advice straight from Nig-M) Quite a bit cheaper too!

Have an Intel 4004 system chips for sale if anyone interested. Only one available and very reasonable. (4004, 4002, 4006, 4009 plus Intel manual) If interested, write for details.

Enclosed is a copy of a letter to Processor Technology, indicating my lack is not as good as other readers indicated in NL #9. Hope it was just a slip-up on their part, since we sure need reliable companies who deliver.

Sincerely,

[Handwritten Signature]

--- COPY ---

Processor Technology Co.
2465 - 4th Street
Berkeley, CA 94710

Gentlemen:

On July 22, 1975 I sent you my check $1519 in the amount of $3.00 for your software package #1. To date I have not received this software package #1, but I do have a cancelled check, indicating deposit by you to Crocker National Bank (0300 14376), and charging against my account by your bank on July 29.

As everyone else has praise for you (as indicated in the Micro-8 Users Newletter), I give you the benefit of doubt at this time that you are not another fly-by-night outfit.

I am also extremely interested in further software, especially BASIC interpreters, and ROMs.

Won't you please check out my order, and if you haven't very recently sent me the software package, to please do so!!!

Sincerely,

Don L. Jackson
bill Ames, 3804 Miami Road, Cincinnati, Ohio 45227 (513) 272-0884 sent us the following circuit for replacing Suding's triangle wave VCO with a sine wave. He is working on a cursor board for the TVT-II and will send details when completed, and comments that the TVT-II has a parallel load option for the cursor which should allow placing it at any position on the screen quickly and he hopes to work on this soon. He also has LIFE programmed and will send listings soon. (See Scientific American, Oct. 70)

CASSETTE INTERFACE VCO, similar to DR. Suding's, except output of this circuit is a sine wave, instead of Suding's triangle wave. (See NL Vol. 1, #5, p. A-7) Tune up is same, except first adjust pot between pins 4 and 5 for best sine wave (50% duty cycle)

Larry Fleskac, 938 Paula Street, Escondido, CA 92027 writes the following: "More comments on BASIC. I have followed the same steps Terry Ritter has regarding 8008 BASIC. The NTIS report is the same report you can get from IEEE. Following my own advice in my last letter, I wrote to Processor Technology and the Digital Group regarding BASIC. Only the Digital Group replied with "Several of our people are working very hard on a BASIC for the 8008, but it will be some time before its available. The major problem is obtaining enough I/O at a reasonable cost to the hobbyist. We think we have it licked, but the devices are not yet in our hands. so there will be some significant delay." I encourage every 8008 user interested in a BASIC to write the Digital Group. We should form a committee to go after BASIC for the 8008. There must be enough talent in the group so we could start getting software routines in the newsletter. Let's all work on it. The calculator interface should be an excellent starting point. It's unfortunate that the Digital Group choose Mini Micro Mart to handle the unit. Finally, the SWTP keyboard. I haven't seen one good word printed about it. Well, here goes. First--people who buy inexpensive kit should be smart enough not to expect a Heathkit. Second--surplus is fine but what about delivery time. My keyboard is very satisfactory for the price. I use a simple delay circuit to get by the "1".
center of the passband. To ground to place the active filters in the
two resistors from the inputs of the 555's. Your junk box, it may be necessary to trim the
If you build the Subing Cassette Interface for the

THE DIGITAL GROUP
Controlling Software Available From
Described to be used with W. Thomas’, I/O Scheme
ALTRIN 8000 Logic Interface To DR Studing Cassette

PHONE: 839-4454
HIGHLANDS 1W 46388
ALTRIN Logic Place
WILLIAM D. THOMAS
August 2, 1975

Dear Hal or John,

After much procrastination and occupation with hardware, I've finally returned to my element — writing software. TEXTED, my 8008 based text editor program (with an extreme flavoring of DEC's TECO) is beginning to take shape. Presently, it is possible to type in commands, use rubouts to successively delete characters, a Control U to delete back to the beginning of the line, a double control G to delete the entire command, and an altmode to terminate the command. Flow charting has been roughed out for the various command handling routines and many general purpose subroutines have been written. I'll keep at it, but it may take a while to finish. The command decoder will be character dispatch table driven so that one may easily add commands in the future or eliminate present ones to reduce memory requirements. As to memory, I'm aiming for a 4k program segment with text buffers, etc. filling out the remainder of available memory.

In writing this program, one which I hope every 8008 owner will desire, the problem of standards rears its ugly head. The following questions arise:

1) I/O will be kept to subroutines so these may be easily changed to fit individual systems. However, certain hardware requirements are a must. Namely a hardware push down stack. I started writing TEXTED without one, then decided that for the few $$ involved, it would be a lot easier and efficient to build one. Presently, I'm using The Computer Hobbyist's design modified to my I/O structure. But, what about other users? I've purposely avoided using my nice priority interrupt system since most users won't have one.

2) Mass storage is the big problem. TEXTED commands are planned to dump selected portions of the text buffer to cassette tape, to yank in text initially from tape, etc. I'm using the Sudding Tape Interface with a UART. However, I guess I'd better write software that does its own serial-parallel conversions to be in step with others. Also, I prefer a blocked data format on tape rather than an unformatted one. What do I do to keep every one happy? And, if I had a PHI Deck, as some others may, just imagine the additional commands I'd want to implement!

3) Once TEXTED is written and debugged, what is be best way to distribute it? Although my Sudding Tape Interface works beautifully with my system, it has not been possible for me to read the tape sent out by the Digital Group, perhaps due to timing and tuning differences. Won't the same be true for others if I try to distribute tapes?

4) The DEC System 10 monitor automatically generated a carriage return-line feed sequence (two characters) at the end of each TTY line. Should I write software under this assumption or merely end each line with a carriage return (or be general)?

5) An so on and on. I'd be interested in receiving comments on conventions for TEXTED.
In the mean time, I'm enclosing several of the general purpose subroutines I've written for TEXTED and which may be of use to the group. All of these assume that a hardware pushdown stack is available (with a PUS H being the appropriate CUT instruction and a POP being the appropriate IN instruction). They can be written, of course, without one, but much of the convenience is lost. These have been thoroughly tested and should work well, by the way.

Enough for now! I'm looking forward to the next newsletter.

Sincerely,

[Handwritten signature]

;MULTIPLE PRECISION ADDITION ROUTINE — ADDS CONTENTS OF D,,E ;REGISTERS TO H,,L REGISTERS. ENTER AT SADD FOR SINGLE PRECISION ;ADD TO H,,L.
SADD: LDI φ ;CLEAR D FOR SINGLE PRECISION DADD: PUSH ;SAVE A ON HARDWARE STACK LAL ;ADD E TO L ADE LLA LAH ;ADD D TO H WITH CARRY ACD LHA POP ;RESTORE A FROM HARDWARE STACK RET ;AND RETURN

;MULTIPLE PRECISION SUBTRACTION ROUTINE — SUBTRACTS CONTENTS OF D,,E ;REGISTERS FROM H,,L REGISTERS. ENTER AT SSUB FOR SINGLE PRECISION ;SUBTRACT FROM H,,L.
SSUB: LDI φ DSUB: PUSH LAL ;SUBTRACT E FROM L SUE LLA LAH SBD LHA POP RET ;SUBTRACT D FROM H WITH BORROW

;ROUTINE TO EXCHANGE CONTENTS OF D,,E AND H,,L REGISTER PAIRS
EXCR: PUSH LAL LLE LEA LAH LHD LDA POP RET ;EXCHANGE L AND E ;EXCHANGE H AND D

;ROUTINE TO INCREMENT H,,L REGISTER PAIR
INCHL: INL RFZ INH RET ;NEED TO INCREMENT H TOO?
;ROUTINE TO DECREMENT H,L REGISTER PAIR

DECHL: DCL
      INL
      JFZ DECHL1 ;ZERO SET IF L WAS ZERO
      DCH
DECHL1: DCL
      RET

;ROUTINE TO ROTATE CONTENTS OF D,E REGISTER PAIR RIGHT INTO THE ;CARRY. ENTER AT DRARCC TO INITIALLY CLEAR CARRY.

DRARCC: NDA
      ;CLEAR CARRY
      DRAR:
      PUSH
      LAD
      RAR
      LDA
      LAE
      RAR
      LEA
      POP
      RET

;ROUTINE TO ROTATE CONTENTS OF D,E REGISTER PAIR LEFT INTO THE ;CARRY. ENTER AT DRAIIC TO INITIALLY CLEAR CARRY.

DRAIIC: NDA
      ;CLEAR CARRY
      DRAI:
      PUSH
      LAE
      RAL
      LEA
      LAD
      RAL
      LDA
      POP
      RET

;ROUTINE TO COMPLEMENT (2'S) CONTENTS OF D,E REGISTER PAIR.

DCOMP: PUSH
      XRA
      ;CLEAR A
      SUE
      ;SUBTRACT E FROM A=0
      LEA
      LAI $0
      ;CLEAR A (BUT DON'T DAMAGE BORROW!)
      SBD
      ;SUBTRACT D FROM A=0 WITH BORROW
      LDA
      POP
      RET

;ROUTINE TO INCREMENT CONTENTS OF COUNTER IN MEMORY. FIRST SET UP ;H,L TO POINT TO COUNTER. ON RETURN, C CONTAINS INCREMENTED COUNTER.

INCCNT: LCM
      INC
      LMC
      RET

;ROUTINE TO DECREMENT CONTENTS OF COUNTER IN MEMORY. FIRST SET UP ;H,L TO POINT TO COUNTER. ON RETURN, C CONTAINS DECREMENTED COUNTER.

DECCNT: LCM
      DCC
      LMC
      RET
MULTIPLE PRECISION UNSIGNED MULTIPLICATION ROUTINE - MULTIPLIES
CONTENTS OF H,,L REGISTERS BY CONTENTS OF C REGISTER. ON RETURN,
H,,L CONTAIN DOUBLE PRECISION PRODUCT. ALL OTHER REGISTERS INCLUDING
C ARE UNAFFECTED AS IS THE CARRY FLAG. FALSE ZERO FLAG IF OVERFLOW,
ELSE TRUE.

DMUL:  PUSH            ;SAVE A
        LAB            ;SAVE B
        PUSH
        LAD            ;SAVE D
        PUSH
        LAE            ;SAVE E
        PUSH
        LBI #D9        ;COUNT 9 (DECIMAL) BITS
        LAI Ø          ;CLEAR A BUT WATCH CARRY
        LDH            ;TRANSFER H,,L MULTIPLICAND TO WORKING REGS
        LEL
        LHA            ;CLEAR H,,L PRODUCT REGISTERS
        LLA

DMUL1: LAC            ;ROTATE A BIT OF MULTIPLIER INTO CARRY
        RAR
        LCA
        DCB
        JTZ DMUL3      ;DONE?
        CTC DADD       ;IF LSB OF MULTIPLIER WAS 1, THEN H,,L=D,,E+H,,L
        JTC DMUL2      ;OVERFLOW?
        CAL DRALCC     ;SCALE MULTIPLICAND IN D,,E
        JMP DMUL1      ;AND CONTINUE

DMUL2: LAC            ;PATCH UP C REGISTER AND CARRY IF OVERFLOW
        RAR
        LCA
        DCB
        JTZ DMUL2
        INB            ;SET ZERO FLAG FALSE TO NOTE OVERFLOW

DMUL3: POP            ;RESTORE E
        LEA
        POP            ;RESTORE D
        LDA
        POP            ;RESTORE B
        LBA
        POP            ;RESTORE A
        RET            ;RETURN (FINALLY!!)

MULTIPLE PRÉCISION UNSIGNED INTEGER DIVISION ROUTINE - DIVIDES
CONTENTS OF H,,L REGISTERS BY CONTENTS OF C REGISTER. ON RETURN,
H,,L CONTAIN DOUBLE PRECISION QUOTIENT AND E THE SINGLE PRECISION
REMAINDER. ALL OTHER REGISTERS INCLUDING C ARE UNAFFECTED AS IS
THE CARRY FLAG. DON'T TRY TO DIVIDE BY ZERO!

DDIV:  PUSH            ;SAVE A
        LAB            ;SAVE B
        PUSH
        LAD            ;SAVE D
        PUSH
        LBI #D17       ;COUNT 17 (DECIMAL) BITS
        LAI Ø          ;CLEAR A BUT WATCH CARRY

DDIV1: LEA

DDIV2: CAL EXCR        ;ROTATE DIVIDEND-QUOTIENT REGISTERS LEFT
        CAL DRAL        ;INTO THE CARRY
        CAL EXCR
        DCB
        JTZ DDIV3      ;DONE?
        LAE            ;ROTATE WORKING DIVIDEND EXTENSION REG. LEFT
        RAL
        LEA

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SUC ;TRY TO SUBTRACT DIVISOR
RAL ;ROTATE CARRY INTO BIT 0
XRI 1 ;COMPLEMENT IT
RAR ;AND ROTATE IT BACK INTO CARRY
JTC DDIV1 ;SUBTRACTION OK-KEEP RESULT
JMP DDIV2 ;SUBTRACTED TOO MUCH-DO NOT KEEP RESULT

DDIV3: POP ;RESTORE D
LDA
POP ;RESTORE B
LBA
POP ;RESTORE A
RET ;RETURN (SEE HOW EASY DIVISION CAN BE!)

;RADIX PRINT ROUTINES - ENTER AT OCTOUT TO PRINT CONTENTS OF H,,L
;REGISTERS AS AN OCTAL INTEGER OR AT DEcout TO PRINT AS DECIMAL
;INTEGER (BOTH UNSIGNED). ON RETURN REGISTERS A-E ARE UNAFFECTED,
;H,,L CONTAIN ZERO.

OCTOUT: PUSH ;SAVE A
  LAC ;SAVE C
  PUSH
  LCI tD8
  JMP OUT
DECOUT: PUSH ;SAVE A
  LAC ;SAVE C
  PUSH
  LCI tD10 ;LOAD RADIX 10 (DECIMAL)
  LAE ;SAVE E
  PUSH
  LAI -1 ;MARK BASE OF STACK
  OUT1: CAL DDIV ;DIVIDE SUCCESSIVELY BY RADIX
  LAE
  PUSH
  CAL TSTØ ;ARE H,,L ZERO?
  JFZ OUT1 ;NOPE-SO CONTINUE
OUT2: POP ;POP A REMAINDER FROM STACK
  CPI -1 ;AT BOTTOM OF STACK?
  JTZ OUT3 ;YES-CLEAN UP AND WE'LL BE DONE
  CAL DIGOUT ;NO-PRINT THE DIGIT (USER DEFINED ROUTINE)
  JMP OUT2 ;AND GO BACK FOR MORE
OUT3: POP ;RESTORE E
  LEA
  POP ;RESTORE C
  LCA
  POP ;RESTORE A
  RET ;RETURN FROM THIS MADNESS
TSTØ: XRA ;CLEAR A
  CPH ;H=0?
  RPZ ;NOPE DON'T BOTHER WITH L
  CPL ;L=0?
  RET

;ROUTINE TO CLEAR CONTENTS OF MEMORY BLOCK FROM (H,,L) UP TO BUT
;NOT INCLUDING (D,,E). ON RETURN, H=D AND L=E. OTHER REGISTERS
;ARE UNAFFECTED.

CLRMEM: PUSH ;SAVE A
  CLRM1: LAH ;TEST H-D
  CPD
  JTC CLRM2 ;TRUE CARRY IF D H
  LAL ;TEST L=E
  CPE
JFC CLRM3 ;CARRY FALSE IF E L
CLRM2: XRA ;CLEAR A
LMA ;LOAD MEMORY WITH ZERO
CAL INCHL ;ADVANCE ADDRESS
JMP CLRM1 ;AND DO IT AGAIN
CLRM3: POP ;RESTORE A
RET ;THAT'S ALL FOLKS

;ROUTINE TO RETRIEVE A BYTE FROM THE MEMORY LOCATION SPECIFIED BY
;THE TWO WORD (HIGH ADR 1ST-LOW ADR 2ND) POINTER CONTAINED IN
;MEMORY AND REFERENCED BY H,,L REGISTER PAIR. ON RETURN, A CONTAINS
;THE BYTE, D,,E PAIR POINT TO THAT BYTE IN MEMORY, AND H,,L PAIR
;ARE UNAFFECTED.
LDB: CAL PNTGET ;FETCH POINTER TO H AND L
LAM ;RETRIEVE THE BYTE
JMP PNTPT1 ;FIX UP ADDRESS REGISTERS AND RETURN

;ROUTINE TO DEPOSIT BYTE IN A INTO THE MEMORY LOCATION SPECIFIED BY
;THE TWO WORD POINTER CONTAINED IN MEMORY AND REFERENCED BY H,,L
;REGISTER PAIR. ON RETURN, A IS UNAFFECTED, D,,E PAIR POINT TO
;THAT BYTE IN MEMORY, AND H,,L PAIR ARE UNAFFECTED.
DPB: CAL PNTGET
LMA ;DEPOSIT THE BYTE
JMP PNTPT1

;ROUTINE TO INCREMENT THE TWO WORD POINTER CONTAINED IN MEMORY AND
;REFERRED BY H,,L REGISTER PAIR. ON RETURN, D,,E PAIR CONTAIN
;THE INCREMENTED POINTER, AND H,,L PAIR ARE UNAFFECTED.
IBP: CAL PNTGET
CAL INCHL ;INCREMENT THE POINTER
JMP PNTPT1

;ROUTINE TO FIRST INCREMENT THE TWO WORD POINTER CONTAINED IN
;MEMORY AND REFERENCED BY H,,L REGISTER PAIR THEN RETRIEVE A BYTE
;FROM THE MEMORY LOCATION SPECIFIED BY THE INCREMENTED POINTER. ON
;RETURN, A CONTAINS THE BYTE, D,,E PAIR POINT TO THAT BYTE IN MEMORY,
;AND H,,L PAIR ARE UNAFFECTED.
ILDB: CAL PNTGET ;FETCH POINTER TO H AND L
CAL INCHL ;INCREMENT THE POINTER (NOTE INCREMENTS FIRST)
LAM ;RETRIEVE THE BYTE
JMP PNTPT1 ;FIX UP ADDRESS REGISTERS AND RETURN

;ROUTINE TO FIRST INCREMENT THE TWO WORD POINTER CONTAINED IN
;MEMORY AND REFERENCED BY H,,L REGISTER PAIR THEN DEPOSIT BYTE IN
;A INTO THE MEMORY LOCATION SPECIFIED BY THE INCREMENTED POINTER.
;ON RETURN, A IS UNAFFECTED, D,,E PAIR POINT TO THAT BYTE IN MEMORY,
;AND H,,L PAIR ARE UNAFFECTED.
IDPB: CAL PNTGET
CAL INCHL
LMA
JMP PNTPT1

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;ROUTINE TO FETCH THE TWO WORD POINTER REFERENCED BY H,,L REGISTER
;PAIR. ON RETURN, H,,L CONTAIN THE POINTER AND D,,E PAIR REFERENCE
;THE LOW (2ND) WORD OF THE POINTER.

PNTGET: LDM CAL INCHL CAL DECHL
       LEM JMP EXCR CAL DECHL
       ;GET HIGH WORD OF POINTER
       ;GET LOW WORD OF POINTER
       ;STORE HIGH WORD OF POINTER

;ROUTINE TO PLACE A TWO WORD POINTER CONTAINED IN H,,L REGISTER
;PAIR INTO THE TWO MEMORY LOCATIONS, THE SECOND OF WHICH IS
;REFERENCED BY D,,E REGISTER PAIR. ENTER AT PNTPUT IF H,,L AND
;D,,E PAIRS ARE REVERSED. ON RETURN, D,,E PAIR CONTAINS THE POINTER
;AND H,,L PAIR REFERENCES THE FIRST WORD OF THE TWO WORD POINTER.

PNTPT1: CAL EXCR CAL DECHL
       LMD RET
       ;EXCHANGE D,,E AND H,,L REGISTER PAIRS
       ;STORE LOW WORD OF POINTER

;ROUTINE TO SET SPECIFIED BITS OF A FLAG WORD IN MEMORY REFERENCED
;BY H,,L REGISTER PAIR. ON RETURN, ZERO IS TRUE IF SPECIFIED BITS
;WERE ALREADY SET. REGISTER A CONTAINS THE NEW FLAG WORD.

;CALLING SEQUENCE:
;   LHI H(FLAG)
;   LLI L(FLAG)
;   LAI MASK
;   CAL SETFLG

SETFLG: ORM CPM LMA
       RET
       ;INCLUSIVE OR MASK AND FLAG WORD
       ;COMPARE WITH OLD FLAG WORD
       ;STORE NEW FLAG WORD

;ROUTINE TO CLEAR SPECIFIED BITS OF A FLAG WORD IN MEMORY REFERENCED
;BY H,,L REGISTER PAIR. ON RETURN, ZERO IS TRUE IF SPECIFIED BITS
;WERE ALREADY CLEAR. SEE SETFLG FOR SIMILAR CALLING SEQUENCE.

CLRFLG: XRI 377 NDM CPM LMA
       RET
       ;COMPLEMENT MASK
       ;AND MASK AND FLAG WORD
       ;COMPARE WITH OLD FLAG WORD
       ;STORE NEW FLAG WORD

M. Douglas Callihan, Berkeley St. RFD #1, Berkley, MA says that he is
just about ready to buy the ALTAR 8800 as he is particularly inter-
ted in uses of the 8080. He has a pair of Phi-decks and his idea on
utilizing them were included in one of the last newsletters. His
hope is for a cassette data standard so that software can be exchanged
with some degree of compatibility. He is interested in hearing from
anybody in South Eastern Mass. who has a system up and running.

Mark Crook, 3 Bel Aire Road, Delmont, Pa 15626 ordered a Mark-8 because
it has the bugs worked out and a lot of software is available. He in-
tends to use the Suding modifications. Mark's reason for building a
computer include curiosity, and applications such as automating his
checkbook and income tax, and a little mutual fund analysis. He would
like to teach the beast to inventory groceries and print out a shopping
list with the theory that if he can save his wife some time, she'll be
more enthusiastic. He thinks that a lot of work should be in this di-
rection.
Michael Christoffer, 4139 12th NE #400, Seattle, WA 98105 says that he received a letter from Bob Albrecht at PCC and only two people has shown any interest in the "build your own BASIC" article (volume 3, #4, PCC Newspaper). The project has apparently been dropped due to lack of interest. This lack of interest should not be tolerated. The ability to develop a high level language with less than 4k of memory is a necessity for the unsupported avocational microcomputer builders if their wives and children are expected to become users. It is understandable that many are having hardware and peripheral problems at the present time. However, high level language development for limited memory systems must be the next order of business. Everyone interested in this near dead project should forward a letter indicating so to PCC. This is of importance to the future of 8008 users!!!!!

REVIEW . . .

THE SCIENTIFIC CALCULATOR INTERFACE

by "Tex" Ritter

Imagine! It finally arrived! The Mini Micro Mart scientific calculator interface kit. Never mind that the thing costs $69.95. Never mind that it took five weeks to fill the order. Bet you can hardly wait 'till I open 'er up . . .

Well, SURPRISE, because it's a replay of the Mark-8 boards.

Details? Sure -- just like the Mark-8, the calculator interface board is double-sided, but not plated-through. And just like the Mark-8, IC connections are sometimes made from the top, sometimes from the bottom of the board. This means that any plastic-cased socket you use must be raised above the board to allow soldering to both top-side and bottom-side connections.

Further, the IC pads were cleverly laid out with small runs between each pad, so plain Molex pins can't be used either.

Yes, some IC devices really do go bad during operation.

And if the IC's are not in sockets, the system can't be checked by substitution. Now, to avoid destroying the board, you chop all the leads off of the IC body, so they can be removed from the board one-by-one; now the IC can't be checked.

This problem was one of the main difficulties in working on the Mark-8, and should have been left behind by now. Since Space Circuits seems to make a profit on similar-sized plated-through boards @ $13 (plus postage and handling) it's a shame this wasn't. I finally soldered in Molex pins (with nests) and duplicated all top-of-the-board connections on the bottom with individual wires -- what a hassle.

The Mini Micro Mart literature indicates that the $69.95 price should include software. Twelve weeks after this order, I have yet to receive this software. Perhaps more amusing is the letter received with the kit. Among other things, they found that under-rated components might have been substituted for two of the resistors (sure enough, they were!), and the lucky kit owner is simply supposed to request replacements. In this way, the cost of checking the individual kits was placed on the consumer.

The kit included no instructions, but only a component layout, which was probably sufficient. One 2k resistor was missing, but I had a replacement. Unfortunately, the board was cut inaccurately, so that it may be improperly inserted into an edge-connector such that adjacent pins are shorted.

I have yet to run the thing -- it may even work.
8008 BASIC — Well, almost...

With assistance from Edward Byrne (Naperville, Illinois),
we seem to have cracked "The Case of the Two B ASICs." It seems
that the National Technical Information Service (NTIS, U.S.
Dept. of Commerce, 5285 Port Royal Rd., Springfield, VA 22151)
document PB-235 874 "A Basic Language Interpreter for the Intel
8008 Microprocessor," by Weaver, Tindell, and Danielson @ $3.75
is exactly the IEEE report R75-20 @ $5.20. Neither, of course,
include any listings, and so make rather dull reading by
themselves, but are great guides to the actual system.

This system was apparently developed on an IBM 360 (using
an 8008 simulator program) as part of a seminar course on
minicomputers, and has probably not been implemented on an
actual 8008. In particular, the (copyrighted) Datapoint 2200
Floating Point Package and transcendental instructions were used, but not
listed (this package may require a hardware stack for PUSH/POP
instructions as in the Datapoint). Alternately, the Scientific
Calculator interface might be used if the floating-point format
internal to the BASIC is modified. As written, the system uses
16k of memory — it's my feeling that the system is just not
very efficient, but Ed points out that it may be possible to
partition the program into overlays that could be brought in
from tape as needed.

I have about 72 pages of (assembler) source code, and 40
pages of simulation tests (with one error). I don't think many
of you will want to play with this thing, but it is now
available, and a suitable distribution mode can be worked out.
In particular, you might send a BIG, heavy-duty self-addressed
envelope, about a dollar in stamps (I'll go so far as to put
on what it needs), a twenty-dollar check for guarantee of safe
return, and you get to keep the package for a week. If you
return it, you get your check back. If not, of course, I'll
get very angry. Alternately, Hal may want to supervise
distribution.

Speaking of Tape . . .

There has certainly been a lot of bruhaha (try THAT quickly
three times) in the last six months or so about tape storage of
data. First came the FSK systems, of which the 375 baud
Suding system is now dominant (The Digital Group's software
strategies serve to enforce this standard). The Computer
Hobbyist has a fairly nice pulse system that is much less
dependent upon tape speed-accuracy, but is still limited to
about 500 baud, max. But there has been very little notice
of the Don Tarbell system, which stores bi-phase data at
1.5k baud. (I got his info package for $2.50 12/15/74;
Don Tarbell, 144 Miraleste Dr., Apt. 106, Miraleste, CA 90732).

The slower storage systems rely on software for parallel
to serial to parallel-conversions, but if the 808 is not
fast enough for the Tarbell system, hardware may be necessary.
On the other hand, the 8080 is probably fast enough to
simplify the interface, and faster tape systems are coming . . .
Put ROM In High-Memory!

When I first developed my ROM Mini-Executive, I decided to place it just above my 1K memory, i.e., starting at 04 000. Now that I've decided to add more memory, the obvious question is "Where do I put it?" If the new memory is placed after the ROM segment, RAM will be broken into two separate blocks, which is very undesirable (especially when loading programs from tape). In any other case, the ROM must be re-addressed and re-programmed. Since most software-on-tape is designed to load into low memory (using the RESTART locations), this area should be RAM. Save yourself my problem -- put your ROM's and library routines in high memory. Now RAM can be contiguously enlarged until it encroaches on the ROM library.

The Modular Computer

The computer hobby is going to be around awhile, and lots of experimenters and small companies are going to be improving and expanding small systems. Consequently, a manufacturer could gain a good reputation in this hobby, and a whole industry, by introducing a complete modular system of PC boards and support designs for the small-computer user. The Modular Computer is something like this:

The Modular Computer should be composed of circuit boards in a solid, easily-expandable card-cage. Each card should be sold drilled and plated-thru, available populated or bare, and include a card-puller lever for easy extraction. Each card in the modular computer should contain one complete logical system, and should not need signals from other cards (other than the CPU) in order to operate. The backplane should be fully parallel, so that each card slot could accommodate any card (this would facilitate board-testing via a cable-extended socket).

Connections to external devices (data I/O, interrupts, etc.), could be made on the boards proper via DIP plugs; the wires could then be brought out the front of the card cage between the cards. In this way it should be possible to place eight input or output ports on one card, maximizing the use of board real-estate, while eliminating backplane pin-limitations.

I/O and memory boards should be designed with DIP-switch selectable addressing on each card; this would facilitate installation and substitution (in case of trouble). Every attempt should be made to make ROM essentially interchangeable with RAM to facilitate the development of programs in RAM, and their transfer to EROM for use.

Each peripheral device on a card would be designed to function wholly on that card; any needed input or output ports would be included (with selection circuity) on that board.

A front panel is generally used to gain control of the CPU for system hardware tests. A full-scale unit could be implemented, extended by cable, and simply plugged into the bus like any other card; alternately a mini unit could be designed on one card-edge alone. The system must allow the bus to be extended three feet or so (via line-drivers, buffers, or equipment as necessary) to allow table-top troubleshooting of any card (including the CPU). The basic system should allow the use of any known 8-bit chip by simply plugging in a different CPU board.
Using a 555 as a touch switch,
Using the hookup shown below, the handy 555 timer/oscillator becomes a touch switch, with input from a human on one side, and output compatible with TTL on the other. The 555 is used in its monostable mode with the timeout being about a second, depending of course on the tolerance of R2 and C1. When a human finger touches the touch plate, the trigger pin of the 555 (pin 2) picks up the induced 60HZ field from the building's AC line wiring. Although the current of this AC is very low, it is sufficient to trigger the high impedance input of the 555. The monostable delay of 1 second is sufficient to debounce the input and presents a beautiful fast-risetime pulse at pin 3 which is capable of sinking or sourcing 200 milliamps and is TTL compatible. To make a momentary action switch use pin 3 directly. To make an alternate action (touch on, touch off) switch, run pin 3 to the clock input of a j-k flipflop which has both J and K inputs high, and the flipflop will toggle everytime the touch plate is touched.

In addition, if the touch plate is touched and held, the 555 will oscillate at a frequency near its timeout rate. This is useful for such operations as examining memory, etc. Note that the circuit in this mode is not completely reliable. Occasionally double or triple pulses may get thru as the 555 is not guaranteed for a 100% duty cycle.

Layout is not too critical, although the RC circuit is a little sensitive to noise. Make the touch plate leads as short as possible. A piece of aluminum screen makes a beautiful touch plate.

I have used this circuit for all of the front panel controls for MINAC II (see newsletter #7) and am quite pleased with the speed and smoothness of operation.

(I have seen and used this setup and it is great. You'll just have to breadboard the circuit. You'll think of a million uses for it once you see it work. Hal)

![Circuit Diagram]

A. J. Keck, 25 U Carriage Road, Winnipeg, Manitoba, Canada R2Y 0M2 888-8409 has an ALTAIR 8800.

C. A. Southard, WAP10UT, 2519 Meadowbrook Drive SE, Cedar Rapids, Iowa 52403 has a 4K SCHELBI system running now.
James H. Edwards, 6631 Wakefield Drive, Apt. 209, Alexandria, VA 22307, built the ALTAIR kit but doesn't have it debugged as yet. He plans to use it with a TVT-1 and a surplus keyboard with potential future projects including games and music synthesis. He wants to get the BASIC but just can't see paying the MITS prices for memory and I/O just to get the software they offer. Any other suggestions?

Joel Granick, 922 Eden Avenue, Highland Park, NJ 08904 has purchased an ALTAIR 8800 but is disturbed by the outrageous price of MITS peripherals. His immediate needs are to obtain more memory, construct an I/O device (probably a TV terminal), and obtain a software system. He wants to know if anyone is in the process of putting software for 8080 systems on mask programmed ROM's?

Alan Smith, RR #1, DeGraff, MN 56233 purchased the Scelbi-8H unpopulated PC boards and obtained parts and assembled it. He designed and built an octal keyboard and a TVT and is now in the process of debugging a modem using wire wrap. He says the Texas Instrument Microprocessor TV series was a good introduction to microprocessors but the $25 book is not worth that much now.

P. Reece, PO Box 939, Waterdown, Ontario, Canada LOR 2Ho is interested in FDP-8 cross assemblers and simulators for 8008's. They have 15 FDP-8's (s, t, & b), a CDC-6400, an HP-3000, & three HP-2100's where he works. The DEC machines are used exclusively for real time work in physiology and psychology. He is currently building an 8008 machine in an attempt to prove to the people he works with that computing power in real time can be augmented greatly with intelligent half-way processors which are inexpensive, albeit slow.

James I. Garrett, Jr., 9523 LBJ Freeway, Apt. 204, Dallas, TX 75231 is interested in the ALTAIR 8800 and attended the MITS demonstration. This is his report: "The only thing that impressed me was the CPU. They did not have the disk, high speed printer, etc. up. However I do like it designwise. I'm a scientific programmer in geophysical research (high level languages only). The ALTAIR BASIC is SUPER!! I learned BASIC 4 years ago so I sat down at their terminal and whipped out a plotting routine and factorial program in about 10 minutes." He says that he would like to apply a microcomputer to a solar heated and cooled house along with a timesharing system for accounting, games, etc. He has some experience in electronics but is mostly interested in software. James is a physics major from Georgia State University in Atlanta and has access to a WATS line after 7 PM so can communicate with others rather inexpensively.

Chase Bockman, 4805 NE 52, Portland, Oregon 97218 is researching the concept of digitally controlling a sound reinforcement system thru the use of surplus 8088 microprocessors and associated chips. The system should be capable of transmitting 16 channels of multiplexed information from a remote analog to digital converter with memory to a microphone mixing console with voltage controlled gain blocks. His profession is sound reinforcement and he only has a limited knowledge of digital processes and applications. Chase would be grateful for any assistance participants might offer in the form of practical circuit applications using surplus components.
THE "SPHERE SYSTEM PHILOSOPHY"
SPHERE Corp., 96 E. 500 So., Bountiful, Utah 84010

The SPHERE 1 computer system was designed to provide an uncompromising computer system at minimal cost.

The keyword to our design is the word "SYSTEM". Every phase of the design has been influenced by the "SYSTEM" philosophy. To justify the system title, a "COMPUTER" must perform an application acceptably. Recently the cost of peripherals and software have substantially exceeded the cost of the computer, but without them, a computer can not perform much of anything acceptably.

With the onset of the micro-processor, real design innovations have been possible, but without the system philosophy, a micro-processor can only reduce the processor cost. Peripherals, memory, and software continue to be expensive.

The SPHERE 1 computer is uniquely cost effective because it utilizes real design innovations to reduce the amount of circuitry required throughout the system. The SPHERE add-on memory board will support 4, 8, 12, or 16K of dynamic random access memory (instead of four 4K memory boards and a mother board). Our power supply has been placed in a separate chassis to eliminate a common source of heat. This allows the system to run cooler and eliminates the need for an expensive fan. The system uses a standard TV for a 512 character display. The use of the TV and other common components has reduced the cost and allowed more machine versatility. Further cost reductions have been achieved by replacing the front console (lights and switches) with the TV terminal and a program in Read Only Memory (ROM) that performs the same function, only better. The CPU card is packaged to provide all of the basic functions required by a useful system, thereby eliminating unnecessary extra PC BOARDS.

In order to insure a full offering of high quality peripherals from the onset, we have selected manufacturers who already have peripherals which interface to our product. This philosophy has allowed us, in the case of our disk, to select already running software (namely a disk operating system) which we may offer to our users immediately. Other peripherals that are available with our system include a low cost line printer and a paper tape reader/perforator. These devices are interfaced to the system via a single interface module which also serves as a programmable digital Input/Output port. The SPHERE system also supports its own set of terminals, the lowest cost terminals available today.

The Program Development System (PDS) includes an EDITOR, and MINI ASSEMBLER, and a debugging package. It also includes CRT display and audio cassette software drivers, plus a cassette loader and dumper. Although most computer processing occurs at the character (8 BIT) level, it is sometimes desirable to use 16 bit arithmetic so we have provided an extended 16 bit instruction set in the PDS system. This package rounds out the "SYSTEM" concept for our smallest systems.

There are proponents of various computer languages everywhere. Each language is suited more or less to a specific group of applications. Although the advent of the micro-processor really dictates some new philosophies in computing language, the BASIC language seems to come closest to this philosophy. Because of its widespread use we have selected it to be our first computer language.

The FLOPPY DISK OPERATING SYSTEM (FDOS) is supplied on all systems purchased with a disk unit. FDOS is an extended PROGRAM DEVELOPMENT SYSTEM. It provides for named files, an extended editor, a full assembler, and debugging system. This system includes a comprehensive 300 page programming manual.

The software supplied to make the Sphere System a useful "SYSTEM" is attractive; however, the real contribution that SPHERE offers is one of commitment. The SPHERE "SYSTEM" concept demonstrates only the surface of the real technological advances that are possible when true design innovation is combined with foresight and state-of-the-art technology. The SPHERE "SYSTEM" concept is the commitment. Watch and see.
THE ONE CARD COMPUTER

The logical approach to the solution of any problem is to determine the minimum requirement for a satisfactory result. In the case of a small computer, an absolute minimum would include a reasonable amount of memory, a capable CPU, Input/Output capability, a real-time clock, read only memory program which if used in conjunction with a terminal can replace the computer's switch panel and display lights, and finally it ought to have a convenient Bus structure to easily attach other modules.

The SPHERE ONE CARD COMPUTER includes all of the above features plus a few that also deserve attention. Below each of the principal features are listed:

1) The CPU
   The MOTOROLA 6800 microprocessor is the most advanced microprocessor available today. It reduces the necessity for support components and includes features not found on computers of many times the size. The IBM 370 for example will not store all of its registers automatically upon receipt of an interrupt as the 6800 will. The 6800 system resembles the architecture of the Digital PDP-11 in many ways. These include instructions that "PUSH" data onto a STACK temporarily and when temporary storage is no longer required the data may be "POPPed" off of the stack. The 6800 doesn't have as many registers as the 8080; however the 6800 has several addressing modes which in most cases completely outweigh its lack of registers. These modes are particularly advantageous when tables are processed. However, when three or four counters are being incremented or decremented the 8080 is faster, but in either case the 6800 is easier to program.

2) Memory
   This system uses the 2107A type 4K by 1 dynamic random access memory. This memory was used because it is the least expensive memory available and would lower the cost of the system. All refresh circuitry for the system is included on the CPU board.

3) I/O
   If this board is used in a stand alone situation a CPU must communicate to the outside world. Therefore, the system is supplied with 16 programmable I/O lines as an option. Four additional lines which may be used as programmed interrupts are also supplied on the board.

4) Real-time clock
   A stand alone process control system and many other systems require the capability of monitoring the progress of an activity. The SPHERE system has a real-time clock which will interrupt the system at a set interval. This interval is a function of the refresh clock which is set at 1 ms. The interrupt may occur at 1x, 2x, 4x, 8x, or 16x the refresh rate. The interval may also be set externally. The rate is determined by a wire strap.

5) EPROM
   The Erasable Programmable Read Only Memory used by the system is the 1702 A. Programmers for this EPROM are commonly available so that users may find programming the system for a stand alone application a reasonable task. When delivered with a SPHERE system the EPROM contains a Program Development System (PDS) which is described under "SOFTWARE".

6) BUS structure
   The BUS is driven by tri-state TTL buffers which are capable of driving 35 standard TTL devices. The BUS is connected to this board via three 14 pin dual-in-line connectors which will transmit and receive information over 3 14 conductor flat ribbon cables. Eight data, 16 address, BUS and control lines are transmitted bidirectionally to and from the CPU, memory, and peripherals. I/O devices, buffer, and status registers are addressed as memory locations at the top (HIGH ORDER LOCATIONS) of memory in much the same as the digital PDP-11. This means that about 35,000 devices could be attached to the system (theoretically). It also means that any machine instruction may operate on device buffer and status registers as they would to memory.
This limits the maximum memory on SPHERE systems to 56K instead of the theoretical 64K because the high order 8K is reserved for device status and buffer registers.

When power is applied to this board, circuitry forces a reset to the processor until the system power has had time to stabilize. The system will immediately thereafter jump to a specific location in the read only memory (EPROM) to begin meaningful processing.

Program Development System

PDS represents a unique approach to the software of a low cost computer system. By the addition of software routines located in a 1K PROM even the smallest system is capable of doing useful work as well as performing all of the functions of a switch panel and display lights. The software, consisting of a debugger, assembler, editor, 16 bit arithmetic, and ASCII conversion routines, allows for development of user software in much the same way as large disk based systems.

The SPHERE Debugging Aid (SDA) is designed to aid in program development, as well as replace the usual switch panel and display lights function. It allows the user to easily view and alter the contents of memory or CPU registers from the keyboard-CRT display.

The Mini-Assembler allows the user the ability to input source assembly language programs and output un relocatable binary object code. It can handle up to 62 symbolic addresses, different operand sizes and octal, decimal and hexadecimal operands. The operation codes are entered in hexadecimal (i.e. ADDA immediate is "8B").

Included is an expanded instruction set (EIS) for working with 16 bit operands in any one of several pseudo 16 bit registers or from memory or immediate operands. The EIS contains instructions to subtract, add, multiply, divide, move, compare and shift 16 bit operators as well as instructions to perform BINARY-ASCII conversion. It also includes instructions to perform I-O from the CRT-keyboard or the audio cassette or modem. The input-from-keyboard instruction includes a built in CRT based editor allowing scrolling and text insertion and deletion based on a cursor, allowing easy text manipulation.
SYS1/KIT HOBBIES ($650)

This computer system is capable of satisfying the needs of the user who wishes to program, develop, and debug programs for light process control, experimenting, and some educational purposes. As with all SPHERE "SYSTEMS", the computer was designed to perform a useful function. It was not intended to be a useless computer with a lot of money spent on front console.

All SPHERE systems are shipped with software and a commitment that software developed in the future by SPHERE or one of its users will be available at minimal cost. The PDS SYSTEM is included in the read only memory of this system. It and other software which is available is described under the heading "SOFTWARE".

Expandability has been considered from the onset. Some of these considerations include additional memory to 64K, inter-computer communications, a full line of peripherals, home and industry utility, and lowering cost while increasing performance in the future. Below are listed the modules contained in the system:

1) CPU1
   This module contains all of the features listed under "THE ONE CARD COMPUTER".

2) KBD1
   This module includes a standard typewriter style alph-numeric keyboard layout with an adding machine style numeric keypad located to the right. Above the numeric keypad is a star shaped cursor control keypad which includes HOME and ERASE functions. The keyboard module also includes 2-key rollover (single key read until released, regardless of other keys pressed), complete interface from keyboard to CPU bus with additional interfacing to the bus for 10 general purpose digital I/O lines which may be used at the user's discretion. This module includes an attractive keyboard chassis. This chassis houses the keyboard and all of the modules in this system plus 3 slots for future expansion. A maximum of seven additional KBD1 modules may be added later.

3) CRT1
   This module contains the necessary electronics to display 512 characters on a television or video monitor. The 64 character ASCII character set is displayed in a matrix of 32 characters by 16 lines. Each character is displayed in a matrix of dots, 5 dots wide and 7 dots high. To display a character a computer program simply moves the desired character into a memory position which is also the display refresh buffer. The refresh buffer is located in the high-order 8K of memory. It consists of 512 bytes of static RAM that is organized to be accessed by the CPU and CRT simultaneously without degrading the access time to either CPU or CRT (dual port memory). Output from this module to the video monitor appears as a composite video signal or separate horizontal, vertical, and video signals. Etches for RF modulator (adjustable from channels 1-3) have been left on the PC board, and schematics have been provided; however, components have not been supplied because this type of circuit requires FCC testing and approval. Instructions for TV modification are included with purchase.
4) PWR1
The power supply has been designed expressly for the SPHERE 1 system. It produces 5 volts at 5 amps, 12 volts at 3 amps, -5 volts at 400mA, and -12 volts at 400mA. Ratings may be improved with the addition of capacitors. The circuits are highly under rated which should allow the system to run cooler. The power supply includes zener over voltage and reverse voltage protection. All supplies are current-limited, however over current-protection for the 5 volt supply may allow a power transistor ($1.50) to burn out. The 12 volt supply also allows this to happen. This occurs because of a cost trade-off ($40.00 to protect $3.00 in transistors) vs performance (will probably never occur). The power supply is contained in a separate chassis which includes a 3 prong wall plug, power cord, cable to the rest of system, and a fuse to protect the system.

5) BCB1
Each of the system modules is connected via a system bus. The bus consists of 3 flat ribbon cables containing 14 conductors each. Every other conductor is grounded to eliminate cross talk (electrical noise). Each cable is connected to each board via a 14 pin dual-in-line (DIP) connector. Each board has 3 standard 14 pin IC sockets where each of the three bus cables attach.

6) PCB1
Power is bussed to each of the boards of the system via a separate 14 conductor ribbon cable. This cable is attached to each board via a 14 pin dual-in-line connector.

7) OPR1
The operator/reference manual set is designed to introduce the SPHERE 1 system to the new computer user. It describes in detail how each instruction works. It also describes in detail, interrupts, stack operations, Input/Output, peripheral device characteristics, memory organization, projected device reserved locations and limited characteristics, and execution timing. Programming examples are included to illustrate various hardware features and a section is included to introduce programming concepts to the first time computer user. Appendices are included to aid program development. Although this manual set is comprehensive, some users may require further information so references are amply provided. The manual set is loose bound to receive updates and includes sections where SWAP newsletters, kit assembly instructions, manuals, and maintenance manuals may be kept. Kit assembly instruction manuals are a part of the package; however, each module in kit form contains an associated kit assembly manual which may be kept in this binder. SPHERE has introduced its user group to promote interchange of ideas, useful circuits, comments, gripes, software (from games to statistical packages), announcements (i.e. user has 10 Amp 5 volt power supply for $15.00 type!). The SWAP newsletter will not be governed by the marketing arm of the company. Hopefully the users will completely govern this group in the future. SWAP membership is included with any "SYSTEM" purchase or with the purchase of the OPR1 manual set. Future membership fees will be determined by users.
SYS2/KIT INTELLIGENT ($750)

This system was specifically designed to solve the needs of two different users.

1) The user who wishes to communicate to other devices over serial lines such as a telephone.

2) The user who wishes to utilize this device as a stand alone computer, and use the communications facility to save and restore programs and data using a standard audio cassette.

The communications facility is implemented as a single module (PC board) which contains a standard asynchronous communications interface and a modem. Serial communications to other devices such as a teletype or other computer may take place without the use of a modem; therefore, the modem portion of the board is listed as a separate module (CAS1).

This system includes all of the features found in SYS1/KIT plus the following:

1) COM1

This module contains the ability to accept data in 8 bit parallel format from the CPU and transmit it serially with 1 or 2 start bits and a stop bit. Seven or eight data bits may be transmitted with optional even or odd parity. At the same time data in similar format may be received serially. The data will be checked for proper parity (if desired) and false start bits will be rejected. Communications may occur at several standard rates. These rates are strap-selectable with each board pre-strapped at 300 bits per second. Although other rates are available on this module, the standard rates are 110, 150, 300, 600, 1200, 2400, 4800, and 9600 Baud. Baudot Code teletypes can be supported with minor modification if 20% speed degradation is acceptable. X-on and X-off functions are provided by an on board relay. No cables are supplied.

2) CAS1

This module contains a complete ORIGIONATE/ANSWER modem. The device has additionally been adapted to operate with an audio cassette. The modem will operate at a maximum speed of 600 Baud. It has been designed with particular emphasis on acoustically coupled lines rather than Direct Access Arrangements (DAA's). The SH, RING, +V DH, DA, DR, and GND signals are provided for the CBT type of DAA however. A speaker and a microphone are all that are required to complete the acoustic coupler. Provisions for use of this module with an audio cassette are readily available. The cassette's AUX or MIC jack may be used as computer output, and the AUX SPKR jack may be used as computer input. No cableing is provided with this unit.

John Bottoms, Box 158CTS, 1000 W. 42 St., Indpls, IN 46208 says he has just finished the first batch of TVT-II boards that he is selling for $18. They are on FR-4 (fire resistant G-10 1/16" one ounce board). The etch is done by the subtractive process using FECL. They are not plated thru or plated because 1) plating is expensive and difficult and 2) plating traps chemicals below the copper that are corrosive and can eventually shorten the life of the board. He is just getting started in business and decided to do the TVT-II boards first. One of his main concerns is to try to keep prices for amateurs as low as possible. He is willing to etch MOD-8 circuit boards if we supply him with the drawings. He had planned to work on the Mark-8 mods which would revise the clock, I/O, and memory. The CPU and one K of memory would be on one board and the remaining memory would be on an additional board. It would have no front panel. He would be glad to produce TVT-1 boards if there would be sufficient demand. John has been in digital work for 11 years and just finished his degree in computer systems engineering at Purdue. He is still working on the TVT-II memory and cursor boards and he will soon provide prices and availability dates.
August 15, 1975

Mr. Hal Singer
Micro-8 Newsletter

Dear Hal,

Some of your subscribers are still trying to decide if the water is too deep or the current too strong to wade in. The amount of money a newcomer might anticipate having to spend is a highly variable consideration. The following list may help define some of the costs:

1. MIKE203 Assembled computer       $325.00
2. Power Supply (Surplus)            25.00
3. CRT Interface (Suding type)       125.00
4. Cassette Interface (Suding type)  25.00
5. Keyboard-ASCII (Surplus)          30.00
6. 1K RAM                             100.00
7. Misc IC's and tools.               75.00

$705.00

The price list I’ve given above should be analyzed carefully. If the Hobbyist has a greater degree of hardware expertise than the author of this letter, he may purchase un-assembled kits and save $100. My 8008 system was purchased from Martin Research -- there are several other 8008 (8080, etc.) systems which may be more or less expensive. I consider the list above to be a minimal requirements list for the following reasons:

Starting with item 2 on the above list.
2. The Martin Research MIKE203 does not provide a power supply at the base price.
3. This is probably the cheapest method of obtaining reliable and flexible output from your computer...unless you can limp along with an octal or binary display.
4. It is essential to have some means of permanently storing programs. If a program is over 50 instructions in length, it becomes drudgery to re-enter the program each time the computer is turned on.
5. Most of us will require the greater flexibility of character input provided by an ASCII Keyboard.
6. In my opinion, if you are not planning to set up some fairly elaborate programs, you really shouldn't be looking at a computer. 1-4K of memory would be minimal storage for good programming potential.
7. Unless you are buying a "complete" system, you will probably find that you will need to buy some additional interfacing IC's and tools.

I think it should be mentioned that the current trend of pricing may will bring the overall costs much lower ($100 -- $200) within two years. Also, the proliferation of microprocessors may well make the current herd obsolete in short order. My expenses would have been much higher if I had not been able to draw on the hardware experience of Hal Singer and Dave Duskin.

A final note: $700 is a lot of bread, and it means that the 8008 will have to be more than a toy. It has already been an education.

John Ford

5561 Esplanada
Santa Maria, Calif.,
93454
July 11, 1975
Micro-8 User Group Newsletter
Cabrillo Computer Center
1350 Constellation Road
Lompoc, California  93436

Dear Hal Singer:

As a recent subscriber, let me say that I appreciate your newsletter; I had previously gotten it through a friend here at our company. I also subscribe to The Computer Hobbyist, The Scelbi Digest, ECS (no Byte, with our old Ham "friend" Wayne Green), and The Digital Group. I have ordered equipment from Scelbi (8-H, audio tape, TTY interface); SWT (TVT-1, TVT-2, digital VOM-counter, keyboard); and Suding TVT (not arrived yet). I have full manuals from Scelbi, M6800, and RGS (Ung), and Nat Wadsworth's excellent (including its errors) programming manual.

Somehow, I get the impression that Scelbi is not given the attention in your publication which is due them. Example: several class their audio interface as expensive and complicated, but like all the stuff I have received from them, it is complete (chassis, parts, and good documentation). The boards in the 8-H and interfaces are first-class PDFS (plotted through double sided), complete instructions, and large, easy-to-use schematics. Additionally, all deliveries have been prompt and reliable -- perhaps a rarity in today's small computer game.

The 3K Scelbi I have going may not be the nicest-looking machine, but it is easy to build and understand. Nat Wadsworth supplies very good documentation for those of us starting, and will answer questions in writing or over the phone (no, he doesn't even require a SASE). Case in point: I was having bit memory failures with my garden variety 1101's, and Nat suggested the test sequence and recommendations over the phone. Case in point: I ordered a PROM from him at a stated price, but when billed it was at a new lower rate -- he could have easily charged me the price at order time. Dealing with Scelbi has been a rewarding and business-like procedure, something those of us in a business appreciate. I hope your readers who are concerned about the shoddy suppliers, incomplete documentation, etc., give Scelbi serious consideration! Except for the excellent data from Suding, I feel that with the Scelbi record, and information, I wouldn't need the rest of all the micro machine data at all! I do follow with interest, however, the exploding developments taking place in this field.

I want to order a Suding calculator kit, but what is the status now on the MiniMicroWart situation for these units?

Sincerely,

C. Southard    WA3IOT
2519 Meadowbrook Drive SE
Cedar Rapids, Iowa  52403
Attached to this letter is a contribution to your NL concerning cassette transports. The company with which I am associated manufactures language laboratories, stenographic dictation practice systems and other listening systems. As we have a reasonably good knowledge of tape transports, because we use them in our systems, my comments are biased to the side of reliability but I hope they are objective. We sell our equipment to schools, so ruggedness and reliability are at the top of the list of requirements. After seeing a Phi-Deck, to put it bluntly, I wouldn't have one.

Incidentally, just today, Scott Goff, the manager of the Mincom Division of 3M was in to see me. I asked him about the availability of the 9577 deck (see my comments to individuals). His reply was that anyone who wants one can buy one. This deck is normally sold to OEMs so I asked specifically about this point.

Another subject — I need help. After taking the course at Northwestern on microprocessors, which was sponsored by the Computer Section of the IEEE, I have been frustrated by one thing — programming. Maybe you can point me in the right direction, suggest books, magazine articles, etc., which will get me moving. Twenty years ago I had a short course (10 hours) on FORTRAN, ran 3 problems and never had occasion to use it again. I probably could read up on FORTRAN and program in that, but the instruction sets of the microprocessors don't make any sense to me.

About two months ago I want to hear a talk by Capt. Grace Hopper. The talk was sponsored by the Computer department of Northwestern. Mrs. Hopper, if you don't know her, has been in computer programming since year one and has probably forgotten more about programming than any 10 programmers put together. She has a tremendous sense of humor and tells her stories dead pan but with a twinkle in her eye. (She got a standing ovation at the end of her talk.) But what I am leading up to is her comments about octal.

She said when octal first was proposed she thought it looked good and so she learned it. Then at the end of the month her check book didn't balance. So she took it to her brother (a banker) for him to look over. He takes a look and says, "you have subtracted in octal!" Mrs. Hopper said it took 3 months for her to get her check book straightened out! Her conclusion was not to use octal as one cannot program or use octal during the day and then come back to a decimal world and keep things straight.

My own reaction, from the sidelines as it were, is that a home or hobby computer should be able to be communicated with in a high level language, say BASIC, to give reasonable performance. Stone age chiselling in of 1's and 0's (Dr. Lennon's phrase) is just too time consuming. I know the hobbyist has lots of time but one does want to see some results now and then.

I do enjoy the NL in spite of my programming ignorance. I have no home computer, largely because I can't decide yet which way to jump, and partly because of lack of time (the daytime business runs into the nighttime!).

Cordially,

William H. Freeman
Comments on Cassette Transports:

Letters previously printed in the NL have proposed the use of a Phi-Deck cassette transport in connection with a cassette interface for recording data. While this cassette transport has some nice features, your writer feels he should point out some obvious disadvantages and suggest a better alternate.

The Phi-Deck has 4 d-c motors; one for the capstan drive, one each for fast-forward and rewind and the fourth motor to engage and disengage the heads thru a geneva movement. The heads are mounted on the cross piece of an inverted-U which pivots on the open end. Use of the d-c motors provides a very nice control of all the motions required in any tape transport using transistors to directly energize the motors - no relays. Logic is very easy to implement. In the sample shown to this writer over a year ago, the transport went thru its several paces with considerable agility. One can make the deck do almost anything imaginable.

Now, the disadvantages as seen by your writer. The d-c motors will have a limited life because the brushes will wear out. When this happens the motor will have to be replaced because the brushes are not accessible. An a-c motor is needed if one wants reliability and long life. The mechanical construction is flimsy. Most of the mechanism is mounted on a single flat sheet of .047" (18 ga.) steel with legs bent down in front and rear - no side fold for stiffening. Your writer has also heard that the head alignment is not always maintained by the inverted-U mechanism.

There are very few cassette transports on the American market but paying $100 for the Phi-Deck is getting ripped off. Many of you are aware of the ruggedness of Wollensak transports so why not get a solenoid controlled Wollensak. The Mincom Division of the 3M Co. has a small Wollensak transport, Model 9577, which only costs $79.75 for one. This cassette transport has a large a-c motor, a large fly-wheel, is solenoid operated (24 vdc) and has an optical end-of-tape sensing. The size of this unit is 5 5/8 x 6 3/4 x 4 25/32 deep.

For those who want the absolute best with money no object, then try the Model A9 transport made by AMILON. They have made digital transports and this audio one is derived from that. The one performance feature which impressed this writer was the <.1% wow and flutter! The price for one is about $165. It has all kinds of super specs which need not be enumerated here. It is about the same size as the Wollensak.

So there you have it. A much better alternative than the Phi-Deck with less cost and much better reliability and performance. Your writer is in a company which uses cassette transports and is not connected with any of the companies mentioned.

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John J. Krohmer, 5723 N. 14th Place, Phoenix, AZ 85014 (The Heart Of Cowboy Country) called all the owners of ALTAIRS on the list that MITS supplied him and they promptly appointed him corresponding secretary which is ridiculous he says because he doesn't even have a typewriter. Several of the guys have a variety of mini's and micro's and would be interested in contacting others with similar machines. (John has an M6800 system.) They will be submitting articles, programs, etc. to the newsletter soon.
Gentlemen,

First let me say that I think that your newsletter is a godsend to the computer hobbyist. When I received the packet of prior issues, I devoured them with the enthusiasm I normally devote only to the latest "can't-put-it-down" novel.

I have been in programming and computer work for over 10 years, mostly on large commercial systems (IBM 360/370, Burroughs, NCR) and some minicomputers. I have worked with several programming languages and operating systems, and have a sizable library of info on these topics and several others relating to various aspects of data processing. I would be happy to provide bibliographic information to any member (text or manual recommendations, etc.). This is both from positive and negative viewpoints -- I can recommend "winners" in the book field and point out losers (many of which I have unfortunately acquired). Programming is both a vocation and avocation to me, so I am really looking forward to using my "micro" system for "pure" programming language research, plus practical applications and "fun" things such as games and demonstration programs.

I had never had much interest in kit-building and practical electronics in general until a friend showed me the Dec. 74 Popular Electronics article, which really amazed me, since I had no idea that the smaller end of the computer scale had progressed so far so fast. After considerable attempts at investigating this new phenomenon, I learned of Bob Cook, and he put me on to the Digital Group and your publication. I ordered an Altair 8800 from Mits with the minimum 256 bytes of memory largely as a result of the spirited discussion from your pages, because before that I had been about to hand Mits most of my life savings for additional features that I then saw were available from other sources at much lower rates, and for the most part, better specifications.

For the past 2 weeks, I have been soldering my fingers together (and occasionally some components) and despite my lack of knowledge of electronics and its attendant jargon, I managed to get it all together. I was generally impressed with the completeness, clarity and quality of the Mits kit, even though I had to purchase several additional items. It does not yet operate correctly, so I can't consider it to be complete, but I have hopes that it won't be too difficult to iron out the remaining bugs. Using the display panel for input and readout, it will "deposit" and "examine" correctly, but placing it in "run" mode produces some very spooky results -- it appears to operate on some program known only to it, not the one that I stored.

I am now actively trying to evaluate the various I/O methods and techniques available, and hope to eventually come up with a system which includes 1 or 2 cassettes, a super-simple (and cheap) paper tape reader, plus an I/O typewriter or teleprinter, and a keyboard-CRT combination a la the various TVT systems.

In this last regard, I am especially indebted to your publication, as I was just about to order several things from the MiniMicroMart, before reading the many adverse comments about their delivery problems and refund policies. Many of the things that they advertise (and their ad copy) are well-nigh irresistible, since they seem to have just exactly what is needed. I suppose this is just another instance of things being too good to be true. In any case, I can't believe that someone with as much evident expertise and who had taken as much time and energy to produce their bulletins would be placed in such a box for long, so I hope they get straightened out soon.
With regard to other sources, I think the Digital Group in Denver is splendid, and I have ordered their cassette interface and basic software package for the 8080. My only quibble is that I seem to have been waiting a long time for their latest flyer and/or newsletter. Perhaps the whole group went on vacation.

I still haven't heard from the Computer Hobbyist in North Carolina. I'll check my next bank statement to see if they cashed my check.

Ditto the People's Computer Company.

I sent for the literature package from Sphere, which uses the Motorola 6800 CPU, and they seem very ambitious but much over their head with regard to what they can deliver and support. At least they realize the tenuous situation they are in with regard to the mail-fraud laws -- every page of their specifications is stamped "Preliminary - price and specifications are subject to change without notice."

I've talked with several mid-level users in the Chicago area, and would like to get the "Chicago group" re-organized or re-invigorated. I think this will be very big area for micros.

If any of your readers can specify an I/O port for an Altair, and/or a "second-source" for their (Mits') I/O boards and interfaces, I would certainly appreciate hearing from them, either directly or through the newsletter. Ditto the memory and expansion boards.

To conclude this rambling dissertation, just let me say that this is certainly the most exciting field that I have been associated with in some time, and thanks again for your publication.

Sincerely,

William T. Precht
1102 S. Edson
Lombard, IL 60148

Carl T. Helmers, Jr., M. P. Publishing Co., Box 378, Belmont, MA 02178 says that his supply of the original ECS series has been exhausted to date and he only has back issues from January onward. He is negotiating with a publisher to have the series turned into a paperback of 200 to 300 pages and is looking for people interested in contributing to such a book. These plans may have changed somewhat since he is now editor of BYTE magazine. ECS magazine subscribers have been serviced on a two for one basis to BYTE for the remainder of their present ECS subscription. The oscilloscope graphics PC board for the unit described in the last issue of ECS is available for $25 from Carl at the above address and is described by Mr. Loomis of Loomis Labs as the prettiest PC board layout he has ever seen.

Christian S. Bauer, PHD, PE, Assistant Professor Of Engineering, Florida Technological University, Box 25000, Orlando, FL 32816 says that FTU is rapidly becoming a hotbed of microcomputer activity and computer hobbyists in the Central Florida area are encouraged to contact him (office phone (305) 275-2615, home phone (305) 678-2413) to discuss matters of common interest. They have projects underway involving INTEL 4040's, 8080's (wired on a general purpose interface board for use with the NOVA minicomputer), 3000 series chips, a Motorola 6800 system, and last but not least, a Mark-8 8008 system with 2K of 1101A memory as well as two TVT's.
Neal says he is glad to talk to any fellow hobbyist at (919) 275-7720. His MOD-8 is nearing completion. He is waiting for the "modified" modified 8316 board which should be in by the end of September (1975?) he hopes. He is using the 8316 monitor and 4K of 2102 memory and 5K or more of core, a tape deck, and the IBM Selectric I/O printer #735.

Dear Hal:

Since several IBM Selectric I/O Keyboard Printers have become available to the group, I thought they might be interested in the following:

The IBM Selectric I/O is made by their Office Products Division (OPD) for some IBM Data Systems and also for OEM use. There are a number of minor variations and optional features for each of two basic models.

The CORRESPONDENCE Model uses the same basic typing element and character arrangement as the ordinary office Selectric Typewriter. A 7 level code (Selectric correspondence bail code) is input to the machine selector magnets for character print or machine function. This same 7 level code is output from the machine from the keyboard transmitting contacts. code in = code out

The BCD Model uses a different arrangement of characters on the typing element and therefore an entirely different "Selectric" code is used. The OEM BCD machine will probably have a #908 typing element, ten pitch and will print upper case characters only in the lower case or unshifted mode. The upper case mode prints mostly solid blocks. The matching key tops are standard gray only.

The IBM system oriented BCD models may have keytops marked for both upper and lower case characters as well as special symbols to match the particular system. System oriented BCD elements like the #963 are available and can also be used in the OEM BCD machine if you don't mind replacing some key tops or remarketing for a few different special character positions.

On the BCD machine, the keyboard transmitting contacts output a BCD code which is different from the input bail code. code in ≠ code out

Note: code conversion can be handled easily by a ROM, but be careful of "code converter" chips because of these differences. Better check the truth table before ordering.

Any of these machines may have 48 or 24v DC coils and may be wired common positive or common negative. Coils have voltage spike protecting diodes.

IBM people have been very helpful in locating the documents that are needed to interface these machines. It took a lot of digging, but here they are: see attached
Everything you want to know about the IBM Selectric I/O Printer—and where to find it.

<table>
<thead>
<tr>
<th>SOURCE/PART NUMBER</th>
<th>TITLE/DESCRIPTION</th>
<th>PRICE</th>
</tr>
</thead>
</table>
| OPD/241-5737-0     | "Selectric" I/O Typewriter Service Manual  
Description, operation and adjustment of 74X, 73X, and 775. Includes wiring diagram, input, out codes, type head arrangement, contact and magnet timing charts. Also suggested external connections for ready/busy output mode. 311 pages-2 color, probably a thousand or more illustrations—highly recommended— | $3.90 |
| OPD/241-5687       | Type Catalog  
Typebars, elements, keybuttons and keyboard layouts.  
58 pages |       |
| DP/S124-0054-9     | IBM Selectric-Universal I/O Keyboard Printer Parts Catalog  
Lists all replaceable parts including type heads (elements) and key buttons-covers machine types 740, ARS1415, ARS1014, 1620, 870, 1977, SABRE, STRETCH, 735/765, 735/870, 735/767, 2152. 150 pages necessary for above machines | $2.60 |
| DP/S123-1008-7     | Selectric Printer for Communication Terminals-Parts Catalog  
Similar to above, but for 835-2740, 935-2741, 2970, 1980-9, 1980-12, 1518. Necessary for above machines  
130 pages | $4.00 |
| DP/S225-6595-2     | Selectric I/O Keyboard Printer  
Basic theory of operation-most if not all is covered in first listing above. Not as complete or specific as above.  
83 pages | $2.92 |
Maintenance and adjustments, lubrication points and sub assembly removal. Good illustrations with line drawings and large halftone photographs.  
about 250 pages | $4.45 |

Order through the appropriate division. DP=Data Process  
OPD=Office Products Division  
Cost listed only where known.  
There may be a charge for most others also. Inquire when ordering.  
Allow 2 or 3 weeks for delivery.

From IBM Parts Dept. No. 1159077

A-MP connector 50 contact female-this mates with the 50 pin male connector found in most machines. Kit of Parts (consult parts catalog for other connector configurations)  
Note: Socket and contacts also available from Burndy Distributors @ about $30.00. For prototype or temporary connections use MOLEX .062 female connectors-about $4.00/c and insulate with plastic sleeving

****  ****  ****  ****  ****  ****  ****

Zero force 24 pin sockets (for the MOD-8 PROM Programmer) are manufactured by Textool and are available through their area representatives advise Mr. White of Textool Customer Service Department. Call 214-259-2676 for address of representative nearest you or order from Techrep, P. O. Box 508, Indian Rock Beach, Fla. 33535. Mention Part#224-331M 24 Pin Zero force socket and enclose $7.45.
Mike Baran says his work will soon involve the Intel MCS80 microcomputer. He writes, "My interest in microcomputers is both professional and personal. Until our machine arrives, a co-worker (Len Oleniczak) & I have been toying with an Intel 4004. We are writing an assembler and a simulator for the Intel 4004/4040 which will use (almost) ANSI FORTRAN and run on a CDC 6000 series computer. We should be well into the debugging stage by the time you receive this letter. Our next project will be to write an assembler and simulator for the Intel 8080 to run on the same machine. We are writing rather than buying for several reasons: a) cost of buying is too high and no funds are available, b) good experience to be gained thru the project c) we can include custom features where desired.

Neil A. Benson, 10040 Nicollet, Bloomington, MN 55420 has the following to say about his plans to do image processing: "I am not doing it so I don't want to go into too much detail now but the basic process is used by Stebbor in QST for April, May, & June of this year. He converts Slow Scan TV (128 lines/frame, 4 lines/sec) to normal TV frame rate. In the process he averages the signal to produce 256 lines/frame and to generate another level of grey. He uses a 7483 adder and 7485 magnitude comparator. My ideas are similar but I would apply the process to weather pictures from the satellites (also see back issues of QST). By the way, Robert A. Heinlein (not Hemlein) is one of the better authors of science fiction -- 20 & 30 years ago he wrote stories which are now happening regarding computers. "The Moon Is A Harsh Mistress" is based around a computer. In "Time Enough For Love" it is difficult to separate the computers from the people! (Don't read this TOME without first reading "Future History" as they go together. So Much for the literature class."

32200 Arlington
Birmingham, Michigan 48009

Gentlemen,

I read about your group in the Computer Bits column of the June issue of Popular Electronics and am interested in participating in a user group of mini/microcomputer hobbyists. I have just completed the construction of a basic Altair 8800 and am in the process of checking it out. I would also like copies of your past newsletters and am enclosing a stamped self-addressed envelop as requested. Thank you very much.

The construction of the 8800 was very straight forward with a couple of exceptions and took me about thirty hours. The chassis does not fit into the cabinet with the screws furnished to mount the control panel circuit board to the subpanel and the front panel switches should be installed with only the nuts (as shown) not with washers. I am in the process of checking out the programming instructions and have found what are apparently two errors. The PUSH instruction (page 50) states that the status bit register is the first byte pushed into memory. It is the second as the accumulator is the first. Also the CPI instruction is shown as 00 111 100 on page 70 when it should be 11 111 110 as is correctly shown on page 90.

The quality of the parts appears to be quite good. I was missing two resistors and had one defective RL-21 LED which were replaced by KITS. Communications with KITS have been reasonable but slow.

I am looking forward to hearing from you.

Sincerely,

Don H. Morrison
Dear Sir:

I am presently a subscriber to your newsletter although (due to a distinct lack of money) I have no immediate plans to construct a computer. At the moment I am using a Hewlett-Packard 2000F which is owned by the Vancouver City College. This is a time sharing system free to all comers, however it is completely lacking in graphics capability. This is very frustrating since my primary interest at present is spacewar and similar interactive graphics. I am interested in corresponding with anyone else who is interested in this field.

If convenient I would like whatever information is available on the graphics terminal referred to in your newsletter (by James Hogenson published by MP Publishing Co.) although this information will be of little use until such time as I build a computer.

One more thing, has anybody compiled the facts on all the various computer systems (Mark-8, Altair 8800, Mike-2, Mod-8, Shelby-8H, PDP-4, etc.) if not I would suggest that this is an area worth some attention such a list comparing cost, construction difficulty, parts availability, machine capability, etc would be very useful to people like me who know little about computers.

On MITS it would appear that they want to become the I.B.M. of the mini-computer market. They have adopted some of the same techniques, their apparent strategy being to encourage the use of the Altair 8800 to the point where it becomes the standard home computer under these conditions the majority of software development takes place for the Altair so that a person entering the field has the choice of going it alone or buying an Altair at an attractive price. the profits will be made by making it difficult (by withholding bussing information) to use any but MITS peripherals (same strategy as I.B.M.) It is then possible to place high prices on this equipment knowing that the Altair owner can either buy from them or build their own which most people will be unable to do.

Sincerely Yours

Sidney Trim
S. Lieberman, 1489 Durango Avenue, Los Angeles, CA 90035 says he received Dave Chapman's redrawing of the Precision Systems Power Supply and wants to pass on his appreciation for outstanding work. (By the way, Dave has been receiving a lot of requests for the drawings. Apparently, the newsletter article mentioning it was confusing. He redrew them and they can be obtained from the Cabrillo Computer Center. For you guys that don't know what we're talking about, the Precision Systems Power Supply was a surplus unit that was mentioned in the original Mark-8 article. They have long since been sold out and the schematics are only of interest to those that did get one. It is possible that two different models were sent out and that the available schematic only covers one of them.

Rick Brennan, 601 South Knight, Park Ridge, IL 60068 sent the following design allowing I/O on an 8080 system, particularly the ALTAIR. He has constructed both, using one Vector Plugboard and wire wrap wire for land to land connections. He warns that lots of .1 mfd line capacitors should be put in even tho they aren't shown on the diagram. He promises to send in info on his 2102 memory board as soon as he gets time.

Notes on I/O Interfaces:

Since the 8121's are TRI-STATE devices, I used them along with a memory board, that is I shared the 8095 bus drivers between my memory board and the input multiplexers. This is possible because both the multiplexers and the memory chips are TRI-STATE. That is why the AND gate is there--to combine the signals of all devices sharing the 8095's. If this is not required, then the AND gate is not needed and the output of the 7430 should be used to enable the bus drivers. However, if more input ports are desired, as would be expected, the additional 8121 multiplexers can be added along with the AND gate.

To expand the number of input ports two paths may be taken depending on how many more ports are desired. If another set of 8 is wanted, it may be cheaper to go with the 7430-74104's, depending on current prices or what is on hand. If more than 16 ports are desired it may be possible to go with larger multiplexers (if they exist--I don't know off hand) or instead of using a 7430 to decode the "high order" input address a decoder such as the one used in the output selector can be used. A 3 to 8 would give 64 ports, given enough multiplexers.

To set up ports 10 and beyond, it is necessary to determine where you want the ports to start. That is, what are the high order digits in the port address going to be? In my design, the high order address is 00. If you want the next set to follow right after, you will pick 01 as the next high order address. To make ports coincide with their chosen addresses, you must invert all bits that are going to be zero before going into the 7430. All the ones can go directly into the 7430. For example, since all the high order bits are zero in my design, they are all inverted. If you would like to add ports 10 thru 17, all bits except bit 3 should be inverted. Remember to watch the fan-out of the 7416 buffers, they should be able to drive about 3 sets of multiplexers with no trouble.

The output port selector is capable of selecting up to 16 sets of latches to hold the data which is on the output bus. The selector can drive edge triggered latches directly, but for level clocked devices an inverter must be placed on the selector's output since it is an active low output which would cause the latches to follow the data bus whenever the latches are not selected. The nice thing about edge triggered latches is that they include nice things like preset and clear which ALTAIR owners can tie to the front panel CLR switch.

As with the input section, the output port selector may be expanded either using 7430 decoding or a decoder.
Richard J. Lerseth, 8245 Mediterranean Way, Sacramento, CA 95826 is a civil engineer heavily involved in water quality data acquisition systems under control of microprocessors which are in the planning stages at the present time. He has much experience in FORTRAN programming but the microprocessor game is new to him, both hardware and software. He has ordered a MIKE-2 system kit. He is getting into the hobby game because after 10 years of successfully programming the CDC 3300, the state is kicking him up into the supervisory staff and he wants to stay in the game. Here is some more info on his plotting package briefly mentioned in NL#8. The "3D Plot Package" is in ANSI FORTRAN is offered at duplication cost only to hobbyists. The only requirement is that it never be sold commercially for more than paper cost. (it was a personal effort "as a hobby"). A copyright has been applied for to guarantee this. It was originally written for a drum plotter but can be used with little modification on a graphic scope like Hal Chamberlin's (The Computer Hobbyist). Write Richard if you are interested.
Dor Tarbell supplied us with the following list of Nest Places in L. A. for finding computer related surplus components. Compiled May 25, 1975

Earl's Supply Co. 83-9-1439
14814 Hawthorne Blvd.
Lawndale, CA 90260
Pwr. Supplies, Papertape Tape Readers, Card Readers

Cal Electronic Enterprises 834-5868
2529 E. Carson Street
Carson, CA
Integrated Circuits

Aber Electronics
1204 W. Washington Blvd.
Los Angeles, CA
Fwr. Supplies, Fans, IC's

Hiway Co.
1147 Venice Blvd.
Los Angeles, CA
Military Surplus, Transformers

Hubbard Electronics
10861 Burbank Blvd.
(East Of Vineland)
Burbank, CA
Delay Line Memories, Card Frame, Power Supplies

Apex
San Fernando Road, Lankershim Blvd.
Large Place, all kinds of stuff

Lee Lab Supply 823-9120
13714 S. Normandie
Gardena, CA
Test Equipment

I.C. Electronic Supply 892-1191
16723 Roscoe Blvd. (across from Van Nuys Airport)
IC's, PS's, keyboards, small parts

Sachs Co. 731-5536
3524 W. Pico
Los Angeles, CA
Military Surplus, Test Equip., Tape Drives

C H Sales 796-2628
2176 E. Colorado
Pasadena, CA
Tape Drives, Core, PS's, Disk Drives

Sterne Enterprises 764-7070
13115 Saticoy Street
North Hollywood, CA
TTY's, Storage Tubes, Oscilloscopes

NET Electronics
8218 Firestone Blvd.
South Gate, CA
Optical Page Readers, Calc. Printers
Calc. Keyboards

Vern's Surplus Electronics 864-4846
12161 E. Front
Norwalk, CA
Cable, Military Surplus

Sterne-Enterprises 764-7070
13115 Saticoy Street
North Hollywood, CA
TTY's, Storage Tubes, Oscilloscopes

Electronic Surplus
10426 Burbank Blvd.
Burbank, CA
Test Equipment, Racks, Pwr. Supplies

NET Electronics
8218 Firestone Blvd.
South Gate, CA
Optical Page Readers, Calc. Printers
Calc. Keyboards

J J Glass Electronics
1624 Main St.
Los Angeles, CA
TTY Equip., Test Equip., Cable

Bernies Surplus 882-9414
20746 Plummer
Chatsworth, CA
Modems, IC's, Cable, PS's, Tape Drives, Card Readers, Core & IC Memory, CRT Displys, Keyboards, and loads of other junk

LMX Electronics (213) 967-4611
1042 E. Garvey Avenue
West Covina, CA 91790
IC's, LED's, Test Equipment

R L Electronics 398-5377
12474 Washington Blvd.
Los Angeles, CA 90066
PC boards, Correctors, IC's
C H Surplus, 10745 E. Rush, El Monte, California.
Very large area outside warehouses. Nothing marked with price, must ask.
Lots of computer equipment goes thru here but you have to catch it before
it gets dismantled for the place in Colorado.

LCS ANGELES SURPLUS STORES BY W6EQDS

A-OK Electronics (235-4119)
3801 S. Broadway
L. A., CA (Downtown
8:30-5 M-F)

Aber Electronics (747-6311)
1204 W. Washington Blvd.
L. A. (Downtown 10-6 M-Sat.)

Acme Electronics (764-9000)
11523 Sherman Way (Mon to 8
No. Hollywood 8:30-5:30 T-S)

Airbourne Sales (870-4687)
8501 Steller Dr. (8:30-5 Mon-F
Culver City 8:30-12 Sat)
Exc. Catalog

All Electronics (380-8000)
905 S. Vermont (Downtown
L. A.
9-5 M-F)

An-Com Electronics (769-5518)
5600 Lankershim Blvd.
N. Hollywood (10-6 M-S)

Apex Electronics (875-3377)
8909 San Fernando Rd.
Sun Valley (9-5 M-S)

Art’s Surplus (873-2626)
6212 Sepulveda Blvd.
Van Nuys (9-5 M-S)

C&H Sales (796-2628)
2176 E. Colorado Blvd.
Pasadena (9-6 M-F; 9-5 S)

J. J. Candee (764-7070)
13115 Saticy
N. Hollywood (9-5 F; 9-4 S)

Electronic & Ind. Surplus Co.
5272 Valley
L. A. (Downtown) (8:30-5 M-F)

J. J. Glass Elect. (749-1179)
1624 S. Main St. (9:30-5 M-Th
L. A. (Downtown) 9:30-2 S)

Gulf Enterprises (877-6003)
10426 Burbank Blvd.
N. Hollywood (9-9 M-F; 9-5 S)

Hiway Co. (382-8383)
1147 Venice Blvd.
L.A. (Downtown) (9-5 M-S)

Hubbard Elect. (769-1137)
10861 Burbank Blvd
N. Hollywood (8-5:30 M-S)

Int'l TV (DU8-0621)
2772 W. Olympic Blvd (8:30-9 M)
L.A. (Downtown (8:30-5:30 T-S)

Also
Int'l TV (776-8830)
5144 W. Imperial Highway
El Segundo (9-6:30; F to 9)

K&M Electronics (734-0363)
1308 Logan
Costa Mesa

Mann Communications (889-6666)
28710 Carwood Rd.
Agoura

Harry Metz Elect. (734-0363)
1161 S. Vermont
L. A. (Downtown) (9-4 M-F)

Jim Mills (805-646-6387)
162 S. La Luna
Ojai (hrs. by arr’t)

R&L Electronics (308-5377)
12474 Washington Blvd.
L. A. (near Culver City)
(8:30-4:30 M-F; 9:30-4:30S)

S&S Electronics (828-0247)
3311 Pico Blvd.
Santa Monica (9-4 T-S)

The Stockpile (714-537-4352)
Garden Grove (9-5 T-S)

Verr’s (864-4846)
12161 E. Front St.
Norwalk (9-4:30 M-S)

Page 38
Paul N. Even, 4637 Rosehill St., Philadelphia, PA 19120 (215) 457-1832
has the following comments regarding the standardization proposal (ML #6)
"I believe the input and output ports should be reserved for high-speed
devices such as discs, additional RAM's, tape drives, etc. Everything
else can be placed on a data bus, and with 256 ports on a bus, there
shouldn't be any problems about what goes where. I am using I/O ports
07 for data, and output port 10 for bus address. It might also be helpful
to have a second data bus for I/O flags and other equipment. This
bus can use the same address output, but only 1 of another input port
in order to reserve space for the high speed devices. Why waste a whole
input port for 1 or 2 flags? Steve Wash's output display circuit (Vol
1, #4, Fig. 9) is something so useful in debugging equipment that it
should be a must for everyone. However, it is very easy to monitor
INPUT signals by feeding in the IN signal. Add a couple more gates and
a decoder, and you can monitor any I/O signal on any data bus. Another
useful addition would be a second interrupt input port switched on when
the front panel switches are disabled, with deposit and memory address
load lines brought out. This would enable you to input programs by a
keyboard, cassette, or a free-running PTR without first loading an input
subroutine. The Microswitch #53RW-1 alphanumeric keyboard sold by
Bill Godbout for $19.95 is nice, but was designed for a card punch.
The output can be made ASCII with a lot of diodes and some extra gates.
It should be easier to use by those who have worked with card punches
before. The X-Y recorder would be a real pain to build and probably
inaccurate. Better to buy one surplus (like I did) for $100. Regarding
the drop thru card reader, don't assign me this project because I'll
probably never get around to building one, but here are some extensive
suggestions: 1) To identify a mark on the card as data, you need a
synchronization column. When the reader senses this mark, it latches
and sends the data. For best results, have the sync lines 1/2 the width
of the data boxes and centered. 2) I also propose an extra column for
additional info, such as a bit to tell the computer which is the last
card. Other bits may be useful for control purposes such as redefining
memory locations. 3) Due to the fact that the cards are a very time-
consuming thing to prepare, they must be standarized and printed in
quantities for the entire user group. Also, we should be able to print
specialty cards for games or surveys, with questions printed in place
of some of the data blocks. 4) The most convenient size for data blocks
is 1/8" by 1/4". On the rough sample below, this allows for 32 8-bit
words on a 3 x 5 card. Longer cards could be used, but they may be too
big for games or surveys. 5) The entire card should be printed in a
light LED color Red. 6) Red LED's should be used to illuminate the
Data columns so the data box lines will not give false readings. 7) A
green LED is used to illuminate the sync column, so the red sync track
will absorb the green light, thereby appearing black. 8) the sensors
can be either phototransistors or photodiodes, but they must be closely
coupled to the card surface. Fiber optics would be a big help. The
IC tester should belong under software, not construction. All you need
in most cases is a socket and power for the chip. Other logic families
may need only simple interfacing. The only construction is for timers,
schmitt triggers, op amps, and other linear functions, and its probably
better to build separate testers for these. HELP!! a) Does anyone
know how to program a MM5220 ROM? b) Could someone prepare a table
which lists the complete ASCII, BAUDOT, FUNCH CARD, and Morse Codes all
at once? It would be a great help in making code conversion programs,
and building peripherals. I just can't find all this information any-
where. That's it for now. Next time I'll send a bunch of schematics
of my setup."
Dear Hal:  

July 8, 1975

Please send me a copy of the documentation on the MIL Cassette Interface which you mentioned in NL #5. I need only the data and software listings for the cassette unit since I have the other software listings in the Monitor-8 ROM. I have included the 20¢ SASE. Do you have any information on the MIL PROM programmer? If so, I would appreciate receiving it.

I now have everything to begin to put the MIL MOD-8 together. I got the boards, etc., from Maury Goldberg. The P.C. boards are really super. It's going to be orders of magnitude easier to build than the Mark 8, thanks to the plated thru holes.

What is the story on the Monitor 8-ROM? I ordered one from Maury in February; then I gave up hope when I heard that MIL had "crashed." However, two weeks ago I got an unmarked chip from him labeled Monitor 8-ROM. Has he got a new source for them, or am I one of the lucky ones to get one of the last few chips?

I hope to get my system up by Xmas. It will have 4K to 8K bytes of 2102 RAM, 2 K bytes 1702 PROM, the Monitor 8 ROM, PROM programmer, and a ASR 38 TTY. I haven't decided which cassette interface to use: the MIL version, Dr. Suding's, TCH's or whether to interface my H.P. digital cassette unit to the system.

I will probably build a front panel for the MIL Mod 8 (probably similar to Dr. Suding's design) since I have had some bad experiences trying to troubleshoot and debug programs on OEM-type systems which have only TTY access. (e.g. Q: What do you do when the Monitor Executive won't load? A: Punt and call the factory rep., who brings down a front panel to debug with at many $/hr!)

Best wishes,

Gary W. Kramer
Research Assistant

Purdue University
Department of Chemistry
Chemistry Building
West Lafayette, Indiana 47907
Fig. B  How to Change the CPU BOARD to Allow an External device Make the Mark8 Wait

IC12—second Flip-Flop (unused in original Mark8)

1-5-6  "S"  12  "Z"
1-4-3  "P2n"  11  "Zn"

Change 2 inputs on gate whose output is IC10—pin6:
same as Mark8

Change 1-bus(32) from 1-17-8 to this

Change bus pin 8 from "Ready" to "Ready":

1-(8)  +5V
      1K
    insert

IC16-1  16-2

8008-pin17

same

+5V

Fig. C  "WAIT CIRCUIT" : Injects a "Wait" signal when octal 103 is executed and the A to D converter circuit is not finished.

Multiplexer Board:
Signal that is high when that input port is activated=

2-6-4  "C103"

(for input port 103)

(8) "Ready"

(flip-flop output in A to D circuit, Fig. A)

Address Board (#3) modification:

3-2-12  "Step Pulse"
3-6-11  "Run"
= "Step Mode"

Note: with this open-collector "Ready" bus, any number of I/O ports can be made to cause the Mark8 to wait until they are ready for data to be transmitted. This will greatly simplify the programming when doing I/O to one device at a time. Even I/O to many devices simultaneously can be simplified by setting up one input port to input up to 8 "device ready to transmit data byte" signals, and using a loop that uses JTZ instruction to terminate looping when a "1" bit from one of the devices occurs.

Also note that some sort of circuit at least similar to this must be used in order to allow memories with access times greater than 1.5us to be used with the Mark8.
Fig. D  FLOW CHART for Flip-flop States  (of this A to D Converter)

States of \( Q_3Q_2Q_1 \):

- Add 16 to 74193's
- Analog equivalent of binary number greater than analog input to this A to D converter or 74193's rolling over?
  - Yes:
    - Subtract 16 from 74193's
    - decrement 74193's
    - Analog equivalent of binary number in 74193's greater than analog input or 74193's roll under?
      - Yes:
        - Increment 74193's
        - 010
      - No:
        - output Port B

- No:
  - Reset 74193's to 00001111,
    \( Q_3Q_2Q_1 \) to 000
  - "Not Ready" signal to 8008 if INP 103

- "Ready signal to 8008 if INP 103"
THE LONG AWAITED ROSTER IS FINALLY HERE. OUR PRESENT MAILING LIST OF ABOUT 900 NAMES IS INCLUDED IN THIS ISSUE. NEWSLETTER #12 WILL CONTAIN ANOTHER 800-900 NAMES AND ADDRESSES OF PEOPLE WHO HAVE REQUESTED SOME SAMPLE ISSUES BUT HAVE NOT SUBSCRIBED AND A ZIP CODE CROSS REFERENCE FOR THE COMBINED LISTS.

SO MUCH GOOD MATERIAL IS WAITING TO BE PUBLISHED THAT IT HURTS TO USE THIS MANY PAGES FOR A ROSTER BUT ONE OF OUR FUNCTIONS SEEMS TO BE TO GET PEOPLE TOGETHER AND FOR THIS THESE ADDRESSES SHOULD BE INVALUABLE.

HOT NEWS
-------
1) THE RUMORED MITS ALTAIR-880 IS HERE. READ ABOUT IT IN THE NOV.
POP ELECTRONICS. AT $293 (INTRODUCTORY PRICE UNTIL DEC. 31) YOU CAN'T BEAT THE PRICE WITH A STICK IF YOU WANT A 6800 CPU. THEY HAVE IT ALL PLANNED OUT FOR THE XMAS MARKET COMPLETE WITH A PROMISE OF A CARD IF THEY CAN'T DELIVER BY XMAS. LET'S SEE WHAT KIND OF DELIVERY THEY CAN COME UP WITH THIS TIME THRU. BART DICARLO, 308 N. BRADFORD ST., SEEFORD, DELAWARE. 11973 ORDERED ONE BY TELEPHONE FROM MITS AND THEY DIDN'T KNOW THE PRICE AND DECLARED HIS THE FIRST ORDER. DICK AND LOIS HEISER OF THE COMPUTER STORE, 11656 W. PICO BLVD., LOS ANGELES, CA 90064 (213) 478-3168 HAVE A PREPARED DELIVER AGREEMENT WITH MITS AND THEY ACCEPT BA & MC CARDS SO YOU MAY WANT TO CONSIDER ORDERING FROM THEM. I'VE ORDERED ONE FOR THE CABRILLO COMPUTER CENTER THRU THEM.

2) THE 8080 WILL SOON SELL AT $30. THAT'S THE 100 QUANTITY PRICE ANNOUNCED BY A LARGE 2ND SOURCE. THAT APPARENTLY MEANS THAT LARGE SUPPLY HOUSES CAN SHORTLY SELL THEM AT $30 IN SMALL QUANTITIES ACCORDING TO A SOURCE IN THE KNOW.

3) INTEL IS RUMORED TO BE TIRED OF COMPETING IN THE CUT-THROAT COMPONENTS MARKET AND WILL PROBABLY DROP SOME KITS ON THE MARKET SOON AS WELL AS GOING MORE INTO SYSTEMS. ONE RUMOR HAS IT THAT AN INTEL 8080 KIT WILL SELL COMPLETE FOR ABOUT $280. ANOTHER THAT INTEL AS WELL AS ROCKWELL WILL HAVE A SINGLE CHIP FLOPPY DISK CONTROLLER.

4) MOS TECHNOLOGY IS ALSO RUMORED TO BE LOOKING AT THE KIT MARKET. THEIR MCS 6501 & 6502 CHIPS AT $20 & $25 EACH LOOK GOOD. SEE BYTE #3 FOR ADDITIONAL DETAILS.

5) BILL GODBOUT HAS RUN INTO SUPPLIER PROBLEMS WITH THE PACE SYSTEM WHICH IS ALSO SLOWING DOWN DEVELOPMENT ON THE MSI-11. HE HAS SOME NEAT ALTAIR RAM & PROM PLUG COMPATIBLE MEMORY BOARDS AND IS OFFERING 2102'S FOR UNDER $2 EACH. SEE BYTE #3 FOR HIS AD. ALSO WRITE FOR THE INFORMATIVE PACE KIT INFO.

6) JOHN BURGOON, SOLID STATE MUSIC, 1222 CAROLYN DR., SANTA CLARA, CA 95050 HAS CANCELED PLANS FOR THE 8080 SYSTEM IN LIGHT OF THE RUMORS REGARDING KITS AND SYSTEMS FROM THE BIGGIES. THE WELL UNDER $200 ALTAIR 8K MEMORY BOARD IS SLOWED DOWN BECAUSE THE ENGINEER WORKING ON IT IS WORKING 7 DAY 12 HOUR WEEKS AT HIS REGULAR JOB. JOHN IS LOOKING FOR SOMEONE ELSE TO CARRY ON THE PROJECT. JOHN DOES HAVE SOME SPECTACULAR DEALS FOR US. FOR THE ALTAIR 8800 OWNERS:

MB-2 (4K 2102-1 500 NS ALTAIR MEMORY PLUG IN) - KIT $100, BOARD $20
I/O-1 (ALT AIR PLUG IN, 2 COMMITTED I/O PORTS - LARGE KLUGE AREA THAT HOLDS 34 WIRE WRAP SOCKETS) KIT - $35, BOARD $20
I/O-2 (ALT AIR PLUG IN, HOLDS 2 INPUT PORTS, 2 OUTPUT PORTS AND A UART PLUS A SMALL KLUGE AREA OR CAN HOLD 8 1702A PROMS. VERY VERSATILE BOARD) KIT $35, BOARD ONLY $20
FOR MARK-8 BUILDERS & OTHERS:
MB-1 (4K 2102 MEM BOARD 86 PIN EDGE CONNECTOR) KIT $100, BOARD $20
U B-1 (KLUGE BOARD MATCHES ABOVE) $18
UB-1A (SAME AS UB-1 BUT BOARD MAKER GOOFED & USED GREEN BOARD) $15
1028-10, 1702A-$14, 2101-$5, 2102-2:100/$150, 2102-1-$50/$100/$200,
2102-2-$2.25/100/$175, 18212-$4, D8097-$1, D8131-$1.50, D834-$1.50
MORE DETAILS ON I/O-2 IN NL #12. IT’S NEAT FOR THE ALTAIR 8800 USER!!

7) NOT ALL RUMORS ARE TRUE. BYTE SUBSCRIPTIONS SEEM TO BE NEARER TO
10,000 AND THE FIRST ISSUE WASN'T MOSTLY ADVERTISING. CARL HELMERS AND
WAYNE GREENE HAVE ACCOMPLISHED A MAJOR MIRACLE. THE FIRST THREE ISSUES
HAVE BEEN SPECTACULAR AND FUTURE ONES SHOULD JUST GET BETTER. YOU HAVE TO
SUBSCRIBE! WRITE BYTE SUBSCRIPTION, PETERBOROUGH, NH $12 PER YEAR.

8) MARTIN RESEARCH IS NOT DELIVERING MEMORY BOARDS & I/O BOARDS YET.
8080 BOARDS ARE BEING ADVERTISED AND WE CAN'T EVEN GET DELIVERY ON THE
8086 SYSTEMS. JOHN FORD AND I HAVE A SUDING TUT, KEYBOARD, SUDING
CASSETTE, HITS CASSETTE SYSTEM, AND SOON A CREED INTERFACE WORKED OUT IN
WIRE WRAP. WE'LL SEND YOU A COPY IF YOU'LL SEND US INFO ON YOUR MIKE-2
PROJECT. SOFTWARE YOU HAVE WORKING ETC.

9) THE DIGITAL GROUP IS SENDING OUT 3 FLYERS THIS MONTH ANNOUNCING THEIR
NEW DEVELOPMENTS. WRITE THEM IF YOU ARE NOT ON THEIR MAILING LIST. WOULD
YOU BELIEVE A PHI-DECK CONTROLLER FOR UP TO 4 DECKS. 370 CPS, ERROR
_RATE (1 WEEK TEST 2 PROTOTYPES) SOFT (1 RETRY) 1/3 MILLION, HARD 1/14
MILLION. NOT YET BUT SOON AND FOR WELL UNDER $200.

10) FORMATION OF LOCAL GROUPS IS OCCURRING AT A DIZZYING RATE. NEARLY
500 PEOPLE ATTENDED THE LAST LA GROUP MEETING. AN ACCOMpanying PROBLEM
IS THE PROLIFERATION OF SPECTACULAR NEWSLETTERS. TO REMAIN CURRENT
YOU MUST OBTAIN A COPY OF EACH CLUB'S NEWSLETTER. IF YOU TRY TO BUY
EVERYTHING, YOU'LL END UP WITH HUNDREDS OF DOLLARS EXPENDED SIMPLY ON
LITERATURE. THE SOLUTION IS ELUSIVE. TO PUBLISH A LARGE INFORMATIVE
NEWSLETTER COSTS MONEY (FAR MORE THAN MOST PEOPLE REALIZE). A PARTIAL
SOLUTION IS TO TRADE NEWSLETTERS AMONG LOCAL GROUPS AND SET UP A LENDING
LIBRARY. WIDESPREAD UTILIZATION OF COPYING MACHINES SEEMS APPROPRIATE
BUT CAN BE SOMEWHAT SELF-DEFEATING SINCE LACK OF PAID SUBSCRIBERS NECESSARILY
MEANS A SMALLER NEWSLETTER. MINIMIZING AN INDIVIDUAL'S EXPENSE
AND MAXIMIZING HIS EXPOSURE TO ALL THE NEWS IS ESSENTIAL. SUGGESTIONS
ARE WELCOME.

11) HEATHKIT IS VERY SECURE BUT MAY COME OUT WITH SOMETHING VERY
SPECIAL WITH LOTS OF DEVELOPMENT MONEY BEHIND IT. THEY ARE STILL
CLAIMING THAT THEY ARE NOT SURE THERE IS MARKET POTENTIAL IN HOBBY COM-
PUTERS.

12) TWO CANADIAN COMPANIES ARE OFFERING MOD 8 AND 80 SYSTEMS. WRITE
MODUCOMP INC., 75 CALIFORNIA AVENUE, BROCKVILLE, ONTARIO, CANADA K6V 5Y6
(613) 342-5041 AND GREAT NORTHERN COMPUTERS LTD., 41 CLEOPATRA DRIVE
OTTAWA, ONTARIO, CANADA K2G 0B6 (829) 255-9640 (GREAT NORTHERN EXPECTS
to be able to supply some great HAM RADIO SOFTWARE).

13) I'VE PROMISED MANY PEOPLE LOTS OF THINGS AND DELIVERED ON A LOT
OF THESE REQUESTS. HOWEVER MANY OF YOU MAY HAVE GOTTEN IGNORED. IF I
WAS SUPPOSE TO SEND YOU SOMETHING, DROP ME ANOTHER NOTE AND AT LEAST YOU'LL
GET A NOTE WITH THE REASON WHY I CAN'T DELIVER OR THE ITEM YOU NEED.
THANKS, HAL SINGER

MICRO-8 NEWSLETTER SUBSCRIPTION INFORMATION
ISSUES 5 - 12 $6.00 MAILED FIRST CLASS
BACK ISSUES 1 - 4 $3.50
MAKE CHECKS PAYABLE TO CABRILLO COMPUTER CENTER
4350 CONSTELLATION ROAD
LOMPOC, CA 93436

Page 2
Dear Hal,

Can you believe the Mark 8 Newsletter had its first anniversary on 14 September? I still have my blue copy. Keep up the good work.

An update on the Phi-Deck: My cost is $84.78 and this will increase a little October 15th. I can still deliver for under $90 in the U.S. (Plus tax if in Calif) I'm now having cabinets built for either 1 or 2 decks. I have ordered the new bidirectional Deck with I.C. controller. Anyone who ordered an old-style deck from me can convert it cheaply. More on that later.

After reading the last newsletter I wrote to Mincom about their cassette decks. They were very prompt and most helpful. Several models are available. A solenoid operated deck with one AC motor is $74. A stereo P/R head like the Phi-Deck cost $7.20 extra. Wow and flutter is said to be .25%. If anyone wants this deck I will order and try to get a quantity discount.

Since the Phi-Deck specs are much better (W&F .17 or less) and since several companies are building controllers I don't plan to get the Mincom unit now. As far as reliability goes probably both decks will outdate before they break down. Phi-Decks have been used for years in language labs and they are completely reliable.

The Homebrew Computer Club still meets every other Wed. at 7PM at the Stanford Linear Accelerator Center and everyone is welcome. Our Newsletter is $6 for 12 issues. Write to Bob Reiling, Homebrew Computer Club, Box 626, Mountain View, Ca. 94040

Sincerely,

Ken
I believe you should continue your newsletter after the first of the year. I believe if fulfills a need for the computer hobbyist in areas where no other publication covers. I eagerly look forward to each issue. It is newy, technical, practical etc. I am a subscriber to several other publications, but yours fills a gap the others do not.

I wish you would publish more information if you have it about Martin Research equipment and the results users have had with it. I would like to see some professional comments on the equipment and what it has and does not have to offer compared to others. True they did away with the lengthy readout on the front of it, but a friend of mine in this area advises the place he works they tried to do the same with their computer systems and when they ran into trouble wired up the stuff Martin says not needed. I have not been able to determine if Martin had really some other features which supplemented the did away with circuitry.

I have built up a Dr. Suding TVT and acquired a Clare Pender keyboard from Philadelphia which I had trouble with TM S5000NC chip in being bad. Several versions of why including that I attempted to operate it without removing the black grounding material. I thought first that was protecting it from mechanical abuse. I since have determined that stuff very conductive to short out electrical fields in transit, but a good friend of mine advises some times when this stuff not removed you can blow the chip if you try to connect it to power. Another friend connected his to power with the material on and it did not work till he took off, but it did work then. So does it or does it not in some cases blow up the TMS5000NC. TMS5000NC not directly available from Texas I. either, you must go back thru keyboard mfg as it a special deal for that keyboard alone. Dr. Suding now also marketing same keyboard but have no other info.

Edward Zibulka
The Digital Group is extremely excited about new products we have in store for the month of October that we believe will be of great interest to hobbyists and club members.

Dr. Robert Suding has been working with the Digital Group full time and has been busily putting the finishing touches on all parts of his systems. With all due modesty, we think you will find Dr. Suding's systems and all the peripherals as nifty as we do -- at very competitive prices.

We want your club members to find out for themselves just how good our quality is, so we have decided to offer a tempting special reduction on Dr. Suding's original TV Readout Kit. The regular price of $95.00 has been reduced to $75.00 for the same high quality full parts kit. That's a savings of over 20%.

In addition, if 10 kits are purchased from the same club and shipped to the same address, we will discount the price an additional 10% (or $67.50 per kit).

This is an example of the discounts we expect to be giving clubs making group purchases. With our increased volume and broader product line, we can pass along savings to clubs like yours.

Neat, huh? The Digital Group

RE: SOFTWARE DEVELOPMENT:

Dear Mr Singer;

To assist your cause in developing software for microprocessors I would like to offer some help:

We are opening a timesharing service covering (213) and (714) areas from Los Alamitos by end of September 1975. The system will support NQWA machine language and a very advanced BASIC suitable for sophisticated business applications.

We have a simulator for INTEL 8008 which has to be cleaned up and some rudimentary portions of a BASIC interpreter written in BASIC for plugging in the macros for various hardware instruction sets. This timesharing service will support up to 300 baud terminals and can be made available for $3.00/ hr after 5:00 pm Mo to Fr, all day Saturday and Sunday. There is a nominal charge for CPU time and disk storage.

For further details we would appreciate inquiries with SAE; we plan major refunds for the programs which are of interest to others in the form of royalties from use of those programs.

Any suggestions will be considered.

Sincerely yours,

ERNST SCHUBERT.

QUIKDATA

Turnkey Software
ERNST J. SCHUBERT Ph.D., Prof. Engr. EE.
(213) 421-0124 & (714) 826-5033
POB 851 Los Alamitos 90720
The MOD 80 Documentation Package

The MOD 80 is a microcomputer system designed around the 8080 CPU. This system is designed to run with the powerful Monitor 80 Software. The Monitor 80 can accept and dump symbolic code, execute breakpoints and display the 8080 registers flags and the contents of memory pointed to by the H and L registers. Further the Monitor allows one to examine and modify the contents of memory from a keyboard in octal, perform octal dumps, load the system in octal and allows for the copy and translation of code so it can be run in another section of RAM. The system also has a prom programing routine for 1702AS. This Monitor runs in 2-1/2K of memory -

A basic MOD 80 consists of:

A teletype I/O board
An 8080 CPU Board
2K Static RAM Boards
2K 1702A Prom Boards
A 3 8-bit output port board
A 3 8-bit input port board
A backplane or mother board with integral 1702A Prom programmer.

The boards for the system are double sided plated through and are of exceptional quality. They cost $13.00 a piece except for the backplane which is $26.00 and are available from

Space Circuits
156 Roger Street
Waterloo, Ont. Canada

I feel that this system is very cost effective, well designed and represents an intelligent alternative to such systems as the Altair or Mark 8. I have a system up and running and I am very impressed with its performance. The Monitor with its symbolic input and output capabilities both speeds and eases programming. The installation of peripheral devices is simple. The system when constructed is not a barebones installation but rather allows immediate and powerful use of the 8080.

I am selling a Documentation package for this system which includes -
A description of Monitor 80 commands
The Monitor 80 listing
Parts lists
Component placement diagrams
Schematics
Debugging hints
Documentation on the MIL tape interface
8080 software for the tape interface

The cost is $20.00

A Documentation package is also available for the MOD 8, an 8008 Microcomputer System with much of the same specifications as the MOD 80. This system is upward compatible with the MOD 80.

The cost is $10.00
Also an update of the MOD 8 documentation with all information needed to upgrade a MOD 8 to a MOD 80 is available. This update includes everything in the MOD 80 Documentation Package not in the MOD 8 Documentation Package.

The cost is $10.00

ROBERT SWARTZ
195 IVY LANE
HIGHLAND PARK, IL. 60035

I am quite impressed with the digital groups TV readout. It is one of the first of a new class of very inexpensive peripherals. The T.V. readout consists of one printed circuit board which is attached to a latching 8 bit output port. The board puts out a composite video signal which will drive a T.V. monitor or a properly modified T.V. set. The design uses a $7 \times 9$ character generator and has a density of 32 characters per line and 8 lines. The character set consists of 128 different characters including upper and lower case ASCII Greek lower case and a number of special symbols. Because of the low density of the readout and the $7 \times 9$ dot matrix the display is large and very readable.

The board puts out composite video and there are three ways to attach it to a T.V. One is to get a monitor (which I did.). The second is to modify a television which will probably require an isolation transformer and the third is to build a small transmitter.

I am told that transmitters tend to add jitter to the display. The board, the crystal and the character generator were purchased from the digital group for $50.00. TTL was purchased from Gerber Radio Supply in Dedham, Ma. The 1101 memory was from some surplus stock I acquired. The prices for the display are as follows:

- $20.00 for character generator
- 50.00 for P.C. board crystal and character generator
- 95.00 all parts and board
- 125.00 assembled and tested.

There was about a month delay in delivery but I am told that now this device or kit is being delivered from stock.

The kit went together easily and worked essentially the first time. The documentation consisted of a parts list, some directions for testing, components placement and schematics. There were additionally some notes on software but the main software support is contained in a separate digital group package which costs $7.50.

As for the performance of the unit, it must be realized that this board is not a teletype replacement. The system has a few quirks first to output a character you must first output the character and then output 000 to clear a oneshot in the write circuitry. Second, the device has no cursor, but this problem can be partially solved by filling the screen with all periods. Also Phil Mork has a modification that allows an invisible cursor to be added. The display does not accept carriage returns or line feeds, so lines need to be blank filled. Everything considered, the T.V. readout is a very good, no frills, cheap alphanumeric display.
Dear Hal,

Enclosed is a tape and dot layout for the Suding Cassette interface. We had considered selling pc boards for it, but our time constraints won't let us do so. People with Stampit-Etchit kits can use the pattern to lay out their own boards thereby skipping the hassle of trying to lay out the system with minimum jumpers, etc. There is only one jumper required (between the two small pads in the middle of the tone filter (left hand) section. There was about a three month lag between when I laid out the tape and dots and finally plugged the components. In the interim I managed to misplace the parts placement diagram. I had little difficulty figuring out where the components went simply by referring to the Digital Groups schematic included in packet #1. A word of warning though. Do not solder components until you have them all plugged in and are sure they are in the right spot. Even though I laid out the board, I still couldn't remember the rationale for some of the part locations!

The pinout connections from left to right looking down on the board from the foil side are as follows:

1. Ground
2. Cassette speaker
3. Not used
4. -9 VDC (tone to digital)
5. +12 VDC
6. +5 VDC (tone to digital)
7. Not used
8. Input port Bit 0
9. Output port Bit 0
10. -9 VDC (digital to tone)
11. +5 VDC ( " " " )
12. Cassette mike

Packet #1 from the Digital Group is absolutely essential for Mark 8 owners. The price is less than the xerox copying cost, and the information content is tremendous. While the TCH Cassette interface is a more thorough design with many more features, you can build Suding's version for less than $5.00. Its worth twice that just to be able to use the cassette included with the Digital Groups packet #1.

I was very upset to read in the last newsletter that you were even considering giving up the Micro 8 Newsletter. NO, NO, a thousand times NO!! I get more enjoyment and information out of the NL than any of the other publications in the field. If you need more money, put out a call and I am sure the response will astound you. Make one of the subscription requirements be a one page article of charge for advertising. Do anything, but don't drop the newsletter!!

M-Tech Engineering, Inc. will be at the ARRL National Convention at Reston, Virginia September 12, 13, and 14. There is supposed to be a microprocessor seminar. Either my partner or I will attend (depending on which one of us is the strongest and quickest out of our booth) and we will try and get you a copy of whatever goes on for a future newsletter.

One last comment, I received my assembled Digital Group TVT and it works great. Delivery was a trifle slow, but nothing to really complain about. Not so delighted with their first newsletter. Thought the information content was well below the level established by TCH and the Micro 8 letters.

Lee S. Mairs

29 August 1975

c/o M-Tech Engineering, Inc., Box C, Springfield, Va. 22151
Construction Tips:

A great time saver that eliminates the drudgery of stripping insulation from small bits of wire when breadboarding on vector board can be had by using Belden’s Beldsol enameled wire. When you solder with a tip temperature greater than 700 degrees, the enamel breaks down allowing a good solder connection. I wired the entire 160 pin per connector, 12 connector backplane using Beldsol #8054 which is a #28 enameled wire. I also used it to breadboard and finally build the Titus test probe mentioned in an earlier letter. By the way, the Titus probe is an absolute must for anyone owning, building, or thinking about building a microprocessor. For about $3.50 in parts you have a poormans high speed scope. I have caught pulses as fast as 10 nanoseconds with it.

Whenever you suspect a bad chip in your Mark 8, sacrifice the IC rather than fight the hassle of trying to unsolder it. The odds on not lifting up some of the foil at the same time are prohibitive. Cut the bad chip from the board using a pair of small diagonal cutters, cutting the leads as close to the IC’s body as possible. Having removed the chip, bend each lead slightly apart from vertical. Next take an IC socket of the proper vintage and solder its leads to the IC leads. As well as not lifting any of the pc board foil, you now have an excellent IC tester! This is a great help for future projects and for assisting friends building or about to build a Mark 8. I purposely sacrificed an 1101 in order to build an 1101 checker prior to installing IC’s on my second K of 1101 RAM. Needless to say, having gone to all the effort to check the new 1101 RAMs, not a single one was defective!

Parts Available from M-Tech Engineering, Inc., Box C, Springfield, Va. 22151: (703)354-0573
UA3656 256x1 RAMs equiv. to 1101 except faster—$1.35 ea.
Opcoa SLA-1 LEDs seven seg. display, common anode—$1.50 ea, 4/$5.00, 9/$10.00
Opcoa red LEDs $.68 ea. or 7/$1.00 Green LEDs $.25 ea. or 5/$1.00
Capacitors: 5uf@15WVDC 15/$1.00 100 pf. 50WVDC 40/$1.00
115VAC-18VAC @150ma. transformer $.75 ea. Include postage. Min. order is $5.00

Lee S. Mairs c/o M-Tech Engineering, Inc. Box C Springfield, Va., 22151, 703/354-0573
SWTP Keyboard Modification

Interfacing the Southwest Technical Products keyboard to a TVT becomes a cinch with the following modifications. As noted in an earlier NL, the keyboard keypressed (KP) strobe is a negative going pulse with a very slow rise time on the trailing edge. The 7413 serves to clean up the KP signal, while the 74123 dual single-shot multivibrator chip provides the approximately 500 usec. pulse width necessary for the Suding TVT software available from the Digital Group.

Only one change is necessary to make on the Keyboard printed circuit board, and it is readily put back to normal if you ever want to sell the keyboard. Simply break the foil between the KP pin on the output connector (pin 2). The input to pins 1, 2, 4, and 5 of the 7413 Schmidt trigger is connected to the ICI pin 7 side of the foil break. The output of the 74123 (pin 5) is then connected to the output connector pin 2 side of the foil break. The +5 volts and ground are connected to pins 1 and 10 respectively on the keyboard output connector.

The foil diagram below can be used as a guide for those owning a Stampit-Etchit kit (available from M-Tech Engineering, Inc, Box C, Springfield, Va, 22151 for $9.95 plus postage). The approximate time to make the pc board with the Stampit-Etchit kit was five minutes.

With the modification I am now able to type away without any of the undesired extra spaces and slashes that used to sneak in to the display. Since I had been convinced that I was going to have to spend another $50 for a decent keyboard, I has already saved the money. This modification allowed me to use the money for another 1K of 1101 memory!

---

Lee S. Mairs
M-Tech Engineering, Inc.
Box C Springfield, Va, 22151
703/354-0573
F. General Comments on Suppliers vs. Hobbyists Responsibilities -
This is just a chance for me to get a few things off my chest relative to the computer hobby market. I feel that some manufacturers or kit makers are taking unfair advantage of the hobbyists, and the hobbyists should not let them do it. These manufacturers start on less than a shoestring and promise fantastic computer systems and software using multi-page ads in the national magazines, elaborate fliers, and even mobile homes (caravans) showing one "working" system. Then they proceed to get lots of orders from the hobbyists, and only then do they begin to develop the systems that they've promised. Of course, by that time they're starting to get pressurized to make delivery, and so what suffers most is the basic digital design (designs must be made, prototyped, checked, redesigned, etc.).

The hobbyist gets a pretty box full of electronic worms! Systems are generally cheap because shortcuts have been taken; power supplies tend to be underdesigned and grossly underfiltered (capacitors cost more than IC's), no thermal studies are done to ensure proper chip temperatures and power supply heat removal--typically a fan is stuck somewhere on the box; debouncing and decoupling circuitry along with race conditions are seldom considered and the hobbyist burns his time up chasing "ghosts" throughout his system; underspec or even reject components are shipped with the hobbyist left to be the company's quality control feedback; etc. etc. Not only does the hobbyist get a bum design, but he gets it two or three months after he's been promised it. Also, if the hobbyist attempts to take advantage of the "guaranteed" maintenance, he may wait more than 6 months to get his machine back (maintenance is far less profitable than sales). Then in the midst of all of this "success" the company will renounce the hobbyists, in effect, by saying to the "real" computer community: "please don't just think of us as a hobby computer company, we're an OEM (Original Equipment Manufacturer) and have a machine that is far more than a toy for kids." It is a small wonder that the "real" computer boys don't listen or buy, especially once they've seen the logic diagrams and design characteristics.

So what causes this, and what can the hobbyist do about it? The hobbyist should recognize the fact that his money is GREEN! He pays first for what he gets; unlike many large companies who buy on purchase orders which say "you ship us a system and if after we get it we like it, we'll pay you for it in 90 days or so." Therefore, the hobbyist is well warned to carefully evaluate these systems and the quality of the company before he sends money. Use/guaranteed credit card purchases where you can; clubs can join together and buy one sample system before everyone commits his check to the company. Call the company up and ask some technical questions about the machine; with luck you may get through all of the sales people, managers, and secretaries to that one poor wretch in the back room with an MS in Computer Science a few years back who's trying to make this "turkey" work. Maybe he can, but at who's expense?

I'd appreciate anyone's comments on the above opinions. I won't mention the names of any companies or computers that fit the above description; I keep my mits out of that kind of stuff and try to concentrate on my own sphere of activities.

by Mike Hayes, P.O. Box 367, Jamul, Calif. 92035, 22 Aug. 1975
GENTLEMEN (AND ALL THE PEOPLE CONNECTED WITH THE NEWSLETTER):

REFERENCE YOUR REMARK ON PAGE 2, VOLUME 1 #9 AS TO WHAT TO DO WITH THE NEWSLETTER...

CONTINUE IT IF AT ALL POSSIBLE!!!!!!!!!

EVEN WITH "BYTE" AND THE OTHER NEWSLETTERS AND PUBLICATIONS AVAILABLE OR SOON TO BE AVAILABLE TO THE MICROCOMPUTER COMMUNITY, THE NEWSLETTER AND ALL OF US WHO MAKE IT'S MEMBERSHIP REALLY NEED THIS SORT OF FORUM FOR THE EXCHANGE OF IDEAS ON HARDWARE, SOFTWARE, AND PARTS AVAILABILITY. THE MICRO-8 NEWSLETTER IS THE FASTEST WAY I KNOW OF TO GET SYSTEM MODIFICATIONS OUT TO THOSE OF US WHO ARE USING THE VARIOUS SYSTEMS...AND I COULD GO ON AND ON WITH REASONS WHY THESE NEWSLETTERS MUST CONTINUE...EVEN IF IT MEANS INCREASING THE SUBSCRIPTION PRICES (WHICH, WITH THE PENDING POSTAL RATE INCREASES IT PROBABLY WILL). I FEEL THAT MOST OF OUR MEMBERSHIP WILL CONTINUE TO CONTRIBUTE TO THE MICRO-8 USERS GROUP WITH NEW SOFTWARE AND HARDWARE PROJECTS EVEN THOUGH OTHER PUBLICATIONS ARE WILLING TO PAY FOR THEIR EFFORTS.

ONE OTHER THING, MOST OF THE USERS APPEAR NOT TO BE CONNECTED WITH THE COMMERCIAL COMPUTER WORLD AND I WOULD CAUTION ALL OF THEM TO REALIZE THAT IF SHIPMENTS OF SYSTEMS OR PARTS SUPPLIERS SEEM TO BE A LITTLE (READ TERRIBLY) SLOW IN DELIVERY, BECAUSE OF ECONOMIC FACTORS AND THE SUPPLY AND DEMAND FACTORS WE OPERATE UNDER IN THIS GREAT COUNTRY OF OURS THINGS JUST DON'T ALWAYS WORK OUT LIKE WE THINK THEY SHOULD. I ECHO THE EDITORIAL IN THE COMPUTER HOBBYIST NEWSLETTER OF MAY...SOMETIMES WE ARE JUST TOO QUICK TO CRITICIZE WITHOUT KNOWING THE CONDITIONS SOME OF OUR SUPPLIERS ARE OPERATING UNDER. I'M SURE THIS HOBBY IS GROWING MUCH FASTER THAN MOST OF THEM REALIZED. OR US TOO FOR THAT MATTER. JUST ANOTHER REASON FOR CONTINUING THE MICRO 8 NEWSLETTER!!!

STAY WELL,

M. DOUGLAS CALLIHAN
R.F.D. # 1 BERKELEY ST.
BERKELEY, MASS 02780
AUGUST 26, 1975

M. DOUGLAS CALLIHAN

P. S. MY WORK ON THE "PHI DECK" PROJECT HAS BEEN TEMPORARILY HALTED DUE TO "WIFEITIS"...MY WIFE HAS HAD TONS OF LITTLE PROJECTS SHE WANTED DONE THIS SUMMER...IS ANYONE ELSE WORKING ON THIS TYPE OF PROJECT FOR THE GROUP??? WE CAN'T ALL AFFORD $1,000 FLOPPY DISC SYSTEMS...

JUST RECEIVED THE SEP. ISSUE OF P.E., AND FOUND A GOOD ARTICLE IN THE "COMPUTER BITS" SECTION. SEEMS THEY ARE PROPOSING A STANDARD TAPE SYSTEM, HOBBYIST INTERCHANGE TAPE (HIT) SYSTEM. ALTHOUGH IT IS NOT SUITABLE FOR MY OWN TAPE LIBRARY, I THINK IT WOULD BE SUITABLE FOR TAPE INTERCHANGE. THE SIMPLICITY OF THE CXT., AND THE ACCEPTANCE OF SPEED VARIATIONS, PLUS THE CIRCULATION OF THE ARTICLE, WOULD LEAD ME TO BELIEVE THAT THIS COULD BE ADOPTED AS THE UNIVERSAL INTERCHANGE SYSTEM. I SUPPORT THE SYSTEM, AND AM IN THE PROCESS OF CONSTRUCTING THE CXT. AT THIS TIME.

I JUST RECEIVED MY SECOND 4K MEMORY BOARD FROM SOLID STATE MUSIC. THE BOARD HAS PLATED THROUGH HOLES, HAS DECODE CXT ON THE BOARD, AND USED 2102 MEMORY I.C.s I AM MODIFYING MY BOARDS TO A SAVENET (ONE K ) CAPABILITY. ONLY ONE I.C. IS NEEDED (7430), WHICH I FOUND ROOM FOR ON THE BOARD. SCHEMATIC ENCLOSED FOR MODIFICATION. IF YOU ARE IN THE MARKET FOR MEMORY BOARDS, CHECK WITH SOLID STATE MUSIC, THE BOARDS ARE THE BEST I HAVE SEEN.

SINCE I PLAN TO MODIFY MY COMPUTER FROM TIME TO TIME, I HAVE MADE MY BOARDS CAPABLE OF BEING UNPLUGGED AND TAKEN OUT OF THE COMPUTER. I HAVE ALL MY BOARDS CONNECTED BY WIRE WRAP I.C. SOCKETS, WITH WIRE WRAP WIRE AS LONG AS 30 INCHES. MY COMPUTER HAS BEEN UP AND RUNNING FOR TWO MONTHS.

SSG. J.W. PIERCE
460-B-1-1884
178th SIG. CO.
APO NY. 09102

SINCERELY,

JACKIE W. PIERCE
Dear Hal & John:

I want to express my gratitude to you both for the fine job you are doing on the newsletter and to all the subscribers who have made such valuable contributions. It keeps a person's enthusiasm about three months ahead of his ability to keep pace!

I have completed the TVT-1, after many delays due to defective I.C.'s (Poly-Paks & I.E.U. both had a lot of bad ones when ordered over a year ago) My Mark-8 is more or less running; I have ordered a power supply from Grant Runyan which I hope will do the job. I finally obtained the Monitor-8 ROM from MiniMicroMart and hope to complete the UART for the TVT in the near future to allow interfacing the two. I have ordered 4 K of 2102's from Bill Godbout at his great price of $1.95 but they haven't arrived as yet.

Bill was very prompt in supplying the 8008 and I have found James to be extremely quick and efficient with good quality material. However, I am very displeased with the following companies and would appreciate any help in either obtaining shipment or receiving a refund:

Challenge Electronics,  
Box 3345,  
Whittier, CA. 90605.  
A pointless auto ignition system was ordered  
(M.O. for $49.50 was sent on Nov. 5, 1974)  
Shipment not received.

Don Britton Enterprises,  
P.O. Box 8,  
Waikiki, Hawaii.  
Plans for a portable oscilloscope ordered,  
(M.O. for $13.00 sent on March 12, 1975)  
Shipment not received.

Delta Electronics,  
Box 1,  
Lynn, Mass. 01903  
Electronic parts ordered,  
(M.O. for $20.00 sent on April 21, 1975)  
Shipment not received.

B & F Enterprises,  
119 Foster St.  
Peabody, Mass. 01960.  
Electronic parts ordered, very small portion of order received. Creditslip was returned for cash refund- No reply.

My advice to anyone contemplating ordering from these firms would be to look elsewhere. Electronics is a great hobby but a lot of the fun is lost when most of your time is spent dealing with irreputable and inefficient dealers.

Don R. Morrison,  
6407-150 Ave.,  
Edmonton, Alberta.  
TS® 1W7  
Keep up the good work-we appreciate it!

Sincerely,

[Signature]

Sept. 5, 1975.
Dear Hal and/or John,

About what Micro-8 NL should do in the future...DON'T STOP.
At this point in time your (our?) NL is the only publication
that is timely enuff to deal with "what's happening now".
(That I've found, that is.)

If at some point in the future a "commercial venture" proves
to be able to do the same thing, THEN is time for a review of
Micro-8.

The Micro-8 NL is the only publication that I read cover-to-
cover three(3) times. (TCH twice, FCC once, TIME I just skim.)

Now for the news from my end.
I received and built 3 4K RAM boards from MITS. These have
2604's (4K by 1 bit Signetic dynamic RAMs) substituted for
Intel 2107's. At this point in time none of the boards work.
it may be my fault, but in any case it will be my MITS first
failure as far as I'm concerned. Everything else I've gotten from them
worked (after I found my mistakes, if any).

While I was on the phone to them last week about my problem
(I'm shipping them my "worst performing" 4K board tomorrow),
I got a solution for a problem I was having with my MITS ACR
cassette interface of getting one(1) byte of garbage as the
first byte off the tape. It's caused by the UART getting one(1)
bad byte off the tape when the recorder is being stopped
while reeding in data. It is solved by doing an initial read from
the data channel before entering the sense status loop on the
flag channel. This clears the UART of the one(1) garbage byte
if it exists and does no damage otherwise.

Because MITS Serial I/O board "C" (Serial TTY) send side sinks
20ma and my KSR-23 with a UCC-6 call control unit does the same on
its receive side, I modified the TTY to channel 20ma to the SIOC
send loop (two(2) wires, lugs, tape, diagram included).

Ordered a VDM Video Display Module from Processor Tech.
(16 lines, by 64 characters, 1K on the board, software, $160).
I also received from MITS an 8K version of BASIC until
they send me the 12K version I ordered. The documentation is
wHEAT. I've seen and used a few BASIC's and this one is outstanding
for it's size: a dimensional arrays (for strings too!), machine
language "call" feature, Boolean operations, machine level I/O,
computed GOTO and GOSUB, etc., plus all the "normal" stuff.

Of course I haven't used any of these neat features yet because
of my memory situation. If they work as documented I'll be happy.
That's it from Bellingham. Please keep up the OUTSTANDING
work.

Yours,

J. Scott Williams
MODIFICATION OF KSR-23, UCC-6 Call Control Unit for operation with MITS 88-SIOC Serial TTY I/O board

Introduction: Because both the SIOC send and the UCC-6 receive circuits sink 20 ma for a mark, make the following electrical modifications to the UCC-6 to tap it's 20 ma local loop supply for Line operation.

INSTRUCTIONS:
1. If required, modify TTY/UCC-6 for full duplex, 20 ma operation.
2. Make connection as shown in MITS 88-SIOC documentation, except do not make the connection to terminal 7 on the TTY terminal strip.
3. Connect an additional 16" wire to the negative side of the UCC-6 filter capacitor. The cap. has a green/white wire on the neg. terminal and a green wire on the positive terminal. Connect the other end of the new wire to the lug of the wire from the SIOC that was to be connected to terminal 7 of the TTY terminal strip. After making the connection, tape it and tuck it in the corner of the TTY so conveniently provided.
4. Take another 16" piece of wire and connect it to terminal 4 of the UCC-6 current limiting resistor. This resistor is located next to the cap. mentioned in step 3. Terminal 4 of the resistor is the left hand terminal when the UCC-6 is viewed from the front. There should be a blue wire connected to terminal 4 of the resistor if the UCC-6 has been modified for 20 ma operation. Connect the new wire to the lug of the blue wire and re-connect the lug to terminal 4 of the resistor. (I pinched the bare end of the new wire between the terminal and the lug. It was a good snug fit.)
5. Connect the other end of the new wire to terminal 7 of the TTY terminal strip.

Test operation by connecting the TTY to the SIOC and noting that when the TTY is switched to Line, the TTY locks up on a mark.

Postscript: The connections I’ve made above may not be the best, but they are simple, easy to do and undo, and can be made without physically modifying the TTY, UCC-6 or SIOC.

TTY TERMINAL STRIP

TTY TERMINAL STRIP
Dear Hal and John,

Sep. 6, 1975

Just received the first issues of the newsletter and want to congratulate you for the great job you have done for all struggling hobbyists trying to get their systems up and running. Please don't stop. As you pointed out, new commercial ventures are appearing almost daily and everything in the field changes at a dizzying pace. To me this seems an excellent reason for a publication with no commercial ties.

I have an Altair 8800 with 2K memory (PTC) and a SwTP CT-1024 terminal. The 8800 - at the "indrotuctory" price - seemed to be a good buy and I am very satisfied with it. I will not get into a discussion on the cost of add-ons and software offered by MITS. Enough has already been said on that subject.

Like everyone else, I have had my share of problems with the keyboard; from sticky keys to s/l/a/s/h/e/s. A software timing loop is temporarily taking care of this while I am looking for a better keyboard.

Another problem which has me baffled concerns the update rate of the display. With a simple home-brew parallel interface (8T97 enabled by address decode and CUT/WR) the maximum rate is about 60 cps. Dan Meyer at SwTP assured me that the claimed rates of 1080 or 540 can be obtained and the problem is probably in the interface. I wonder if anyone has been able to get these rates with an 8080 CPU. Bill Ames (NL #8) also mentioned the 60 cps rate with an 8008. I tried his suggestion and used IC-16, pin 9, as a "data accepted" signal without much luck. Timing differences between the 8080 and 8008? Any help would be greatly appreciated.

In the future I hope to be able to make a contribution to the newsletter. In the meantime keep up the good work.

Enclosed is a schematic for a circuit I'm using to interface an 8800 with a TVT-2 and a Clare/rendar keyboard. It was designed to be a simple inexpensive parallel interface which also allows complete computer control of the cursor and page selection. One output port is used for character transfer and a second port for cursor control. Only a MVI and an CUT instruction is needed for all cursor functions.

All inputs are buffered with 74104 and 7404 gates to conform to the 8800 bus loading rules. The keypressed strobe from the keyboard is connected directly to the INT line of the 8800 bus. Address decode is straight forward; the arrangement shown in NL #9 could be used. Manual control of the erase Line, erase Frame, and Home Up functions is still possible with separate switches to override computer control.

Bit assignments:

<table>
<thead>
<tr>
<th>D0:</th>
<th>CNE</th>
<th>Combined Erase Frame and Home Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1:</td>
<td>CNE</td>
<td>Cursor Forward</td>
</tr>
<tr>
<td>D2:</td>
<td>OnE</td>
<td>Cursor Back</td>
</tr>
<tr>
<td>D3:</td>
<td>CNE</td>
<td>Cursor Up</td>
</tr>
<tr>
<td>D4:</td>
<td>CHR</td>
<td>Cursor Down</td>
</tr>
<tr>
<td>D5:</td>
<td>CNE</td>
<td>Cursor Off</td>
</tr>
<tr>
<td></td>
<td>LERG</td>
<td>Cursor On</td>
</tr>
<tr>
<td>D6:</td>
<td>CNE</td>
<td>Page 2 Select</td>
</tr>
<tr>
<td></td>
<td>LERG</td>
<td>Page 1 Select</td>
</tr>
</tbody>
</table>

Adolph F. Stumpf
5639-A Ute
Glendale, AZ 85307
602-935-2053
Please run the following add in the u-8 newsletter (unless you or one of your close associates qualifies):

WANTED TO GIVE: If you were one of the lucky few who purchased a motorized card reader manufactured by RCA from Delta Electronics last fall, you probably need a case for it. I have recently rebuilt my computer system in an all-rack-mount format, and have a nice-fitting case with considerable sheet metal work invested in it. I will give this to the closest or most deserving respondent. Please reply to 601-766-5544 or Loomis Laboratories, Route 1 - Box 131, Prairie Point, Miss.

Thanks!

Sincerely yours,

Sumner S. Loomis

TELEPHONE, 601- 766-5544
LOCATED 10 MILES EAST OF MACON, MISS.
ON HWY. 14
POSTAL ADDRESS, ROUTE 1- BOX 131 -A
PRAIRIE POINT, MISS. 39353

17 September, 1975

August 29, 1975

Just finished up and tidied this Morse Code program. Maybe the Hams in the group can get some use out of it. It will send all of the letters and numbers, plus the following symbols: . / - ('); Extra symbols may be added to the table easily. Cancel (ASCII 030) is used to send the eight bits for error.

Input from the keyboard is buffered. The buffer is located on page three. Since I have tape routines on the second half of that page, I limited the buffer to 128 characters. If all of page 3 is available, replace the instructions with a * by them with a NOP, and a 256 character buffer should be available. The current size of the buffer in use is displayed on the front panel LED's.

I am using port 3 for my TVT, change location 01,170 if your TVT is on a different port. Likewise, change 01,163 for the appropriate input port for your keyboard.

The keyboard should be connected to interrupt the computer when a key is pressed, and the Interrupt Instruction port set to LCI (026).

The speed is determined by the constant at location 1,141. The following table may be used as a guide:

<table>
<thead>
<tr>
<th>Constant</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>010</td>
<td>35</td>
</tr>
<tr>
<td>012</td>
<td>28</td>
</tr>
<tr>
<td>014</td>
<td>25</td>
</tr>
<tr>
<td>016</td>
<td>20</td>
</tr>
<tr>
<td>020</td>
<td>18</td>
</tr>
<tr>
<td>023</td>
<td>15</td>
</tr>
<tr>
<td>026</td>
<td>13</td>
</tr>
<tr>
<td>035</td>
<td>10</td>
</tr>
</tbody>
</table>

Sincerely,

Bill Ames
1016 Oakland, Apt. 2
Ann Arbor, Michigan 48104
MORSE CODE PROGRAM

Notes: Buffered, 128 or 256 characters
       Speed determined by constant at 01,141
       Set interrupt instruction port to LCI (026)

Memory Used: Program Page 1, 000-216 and 8S-0
Char buffer Page 2, 000-177 or 000-377 if available
ASCII-Morse table Page 2, 000-377 (Sparse)
KBD Ptr Page 1, 376
Send Ptr Page 1, 377
Current Character Page 1, 375

01,000 LCI 026 Clear KBD r'eady 050 INL 060 Point to Morse data
001 000 000 register 051 LAB 301 Check for 0 bits
002 LHI 056 Clear KBD ptr 052 NDA 240
003 001 001 053 LAM 307 Get morse data
004 LLI 066 054 JP 110 If bit count not zero,
005 376 376 055 065 065 proceed to send character
006 LMC 372 056 001 001
007 INL 060 Clear Send ptr 057 RSO 005 Bit count zero, assume

010 LMC 372 060 RSO 005 and send word space
011 GAL 106 Check KBD 061 RSO 005
012 160 160 062 JMP 104 Get next character
013 001 001 063 011 011
014 LHI 056 Get KBD ptr 064 001 001
015 001 001 065 LHI 056 Store current character
016 LLI 066 066 001 001
017 376 376 067 LLI 066

020 LAM 307 070 375 375
021 INL 060 071 LMA 370
022 SUM 227 Subtract Send ptr 072 LHI 056 Get current character
*023 NDI 004 Keep it positive 073 001 001
*024 177 177 074 LLI 066
025 OT6 121 Show buffer size 075 375 375
026 JTZ 150 If empty, try 076 LAM 307
027 011 011 again 077 RLC 002 Move next bit into carry

030 001 001 100 LMA 370 Update current character
031 LAM 307 Buffer not empty; 101 JFC 100 If no carry, send DAH
032 ADI 004 increment send 102 116 116
033 001 001 ptr 103 001 001
*034 NDI 004 Stay in buffer area 104 XRA 250 Send dit
*035 177 177 105 OT5 133 Turn on keyer
036 LMA 370 106 RSO 005 Delay one unit
037 LLM 367 Get character to 107 LAI 006

040 LHI 056 send next 110 377 377
01 LHI 003 003 111 OT5 133 Turn off keyer
042 LAM 307 112 RSO 005 Delay one unit
043 RLC 002 Form table address 113 JPR 104 Proceed to next bit
044 LHI 056 114 127 127
045 002 002 115 001 001
046 LLA 360 116 XRA 250 Send DAH
047 LBM 317 Get bit count from 117 OT5 133 Turn on keyer
        table
MORSE CODE PROGRAM, cont.

120 R30 005 Delay 3 units
121 R30 005
122 R30 005
123 LAI 006
124 377 377
125 075 133 Turn off keyer
126 R30 005 Delay 1 unit
127 DGB 011 Dec. bit count

130 JFZ 104 If not done, send next bit
131 072 072
132 001 001
133 R30 005 Character sent, send char. space
134 R30 005
135 JMP 104 Get next character
136 011 011
137 001 001

140 LDI 036 Delay routine, set speed
141 020 020
142 LET 046
143 100 100
144 DCE 041
145 JFZ 110
146 144 144
147 001 001

150 CAL 106 Check keyboard
151 160 160
152 001 001
153 DCD 031 Check delay counter
154 JFZ 110
155 142 142
156 001 001
157 RET 007

RS0: 00,000 JMP 104 Jump to delay routine
001 140 140
002 001 001

Interface for grid-block keyed transmitters:

Try HAL Communications for the 2N5401 (P.O. Box 365, Urbana, Ill. 61801)
### ASCII-MORSE TABLE FOR MORSE CODE PROGRAM

(Located on Page 2)

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>ASCII</th>
<th>LETTER</th>
<th>#BITS</th>
<th>PATTERN</th>
</tr>
</thead>
<tbody>
<tr>
<td>202</td>
<td>101</td>
<td>A</td>
<td>2</td>
<td>200</td>
</tr>
<tr>
<td>204</td>
<td>102</td>
<td>B</td>
<td>4</td>
<td>177</td>
</tr>
<tr>
<td>206</td>
<td>103</td>
<td>C</td>
<td>4</td>
<td>120</td>
</tr>
<tr>
<td>210</td>
<td>104</td>
<td>D</td>
<td>3</td>
<td>177</td>
</tr>
<tr>
<td>212</td>
<td>105</td>
<td>E</td>
<td>1</td>
<td>333</td>
</tr>
<tr>
<td>214</td>
<td>106</td>
<td>F</td>
<td>4</td>
<td>333</td>
</tr>
<tr>
<td>216</td>
<td>107</td>
<td>G</td>
<td>3</td>
<td>044</td>
</tr>
<tr>
<td>220</td>
<td>110</td>
<td>H</td>
<td>4</td>
<td>377</td>
</tr>
<tr>
<td>222</td>
<td>111</td>
<td>I</td>
<td>2</td>
<td>377</td>
</tr>
<tr>
<td>224</td>
<td>112</td>
<td>J</td>
<td>4</td>
<td>200</td>
</tr>
<tr>
<td>226</td>
<td>113</td>
<td>K</td>
<td>3</td>
<td>100</td>
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<tr>
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<td>114</td>
<td>L</td>
<td>4</td>
<td>277</td>
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<tr>
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<td>000</td>
</tr>
<tr>
<td>234</td>
<td>116</td>
<td>N</td>
<td>2</td>
<td>111</td>
</tr>
<tr>
<td>236</td>
<td>117</td>
<td>O</td>
<td>3</td>
<td>000</td>
</tr>
<tr>
<td>240</td>
<td>120</td>
<td>P</td>
<td>4</td>
<td>222</td>
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<tr>
<td>242</td>
<td>121</td>
<td>Q</td>
<td>4</td>
<td>044</td>
</tr>
<tr>
<td>244</td>
<td>122</td>
<td>R</td>
<td>3</td>
<td>277</td>
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<tr>
<td>246</td>
<td>123</td>
<td>S</td>
<td>3</td>
<td>377</td>
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<tr>
<td>250</td>
<td>124</td>
<td>T</td>
<td>1</td>
<td>000</td>
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<tr>
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<td>254</td>
<td>126</td>
<td>V</td>
<td>4</td>
<td>344</td>
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<td>W</td>
<td>3</td>
<td>200</td>
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<tr>
<td>260</td>
<td>130</td>
<td>X</td>
<td>4</td>
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<td>Y</td>
<td>4</td>
<td>100</td>
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<td>264</td>
<td>132</td>
<td>Z</td>
<td>4</td>
<td>077</td>
</tr>
</tbody>
</table>

To form table:

Store number of bits at location given. Store pattern at next location.

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>ASCII</th>
<th>LETTER</th>
<th>#BITS</th>
<th>PATTERN</th>
</tr>
</thead>
<tbody>
<tr>
<td>060</td>
<td>030</td>
<td>cancel</td>
<td>10(8)</td>
<td>377</td>
</tr>
<tr>
<td>104</td>
<td>042</td>
<td>&quot;</td>
<td>6</td>
<td>266</td>
</tr>
<tr>
<td>120</td>
<td>050</td>
<td>(</td>
<td>6</td>
<td>111</td>
</tr>
<tr>
<td>122</td>
<td>051</td>
<td>)</td>
<td>6</td>
<td>111</td>
</tr>
<tr>
<td>130</td>
<td>054</td>
<td>,</td>
<td>6</td>
<td>060</td>
</tr>
<tr>
<td>132</td>
<td>055</td>
<td>_</td>
<td>5</td>
<td>166</td>
</tr>
<tr>
<td>134</td>
<td>056</td>
<td>.</td>
<td>6</td>
<td>250</td>
</tr>
<tr>
<td>136</td>
<td>057</td>
<td>/</td>
<td>5</td>
<td>155</td>
</tr>
<tr>
<td>164</td>
<td>072</td>
<td>:</td>
<td>6</td>
<td>034</td>
</tr>
<tr>
<td>166</td>
<td>073</td>
<td>;</td>
<td>6</td>
<td>124</td>
</tr>
<tr>
<td>176</td>
<td>077</td>
<td>?</td>
<td>6</td>
<td>314</td>
</tr>
<tr>
<td>140</td>
<td>060</td>
<td>0</td>
<td>5</td>
<td>000</td>
</tr>
<tr>
<td>142</td>
<td>061</td>
<td>1</td>
<td>5</td>
<td>200</td>
</tr>
<tr>
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<td>300</td>
</tr>
<tr>
<td>146</td>
<td>063</td>
<td>3</td>
<td>5</td>
<td>340</td>
</tr>
<tr>
<td>150</td>
<td>064</td>
<td>4</td>
<td>5</td>
<td>360</td>
</tr>
<tr>
<td>152</td>
<td>065</td>
<td>5</td>
<td>5</td>
<td>377</td>
</tr>
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<td>154</td>
<td>066</td>
<td>6</td>
<td>5</td>
<td>177</td>
</tr>
<tr>
<td>156</td>
<td>067</td>
<td>7</td>
<td>5</td>
<td>077</td>
</tr>
<tr>
<td>160</td>
<td>070</td>
<td>8</td>
<td>5</td>
<td>033</td>
</tr>
<tr>
<td>162</td>
<td>071</td>
<td>9</td>
<td>5</td>
<td>011</td>
</tr>
</tbody>
</table>
THE TARBEll CASSETTE INTERFACE

SPEED: UP TO 540 BYTES PER SECOND (2200 BITS PER INCH).*
187 BYTES PER SECOND STANDARD (FOR 800 BITS PER INCH).*

ENCODING METHOD: PHASE-ENCODED (EXCLUSIVE-OR OF CLOCK AND DATA).*
SELF-CLOCKING (CLOCK VARIES ALONG WITH TAPE SPEED).*
USED EXTENSIVELY IN INDUSTRY.*
IS THE ONLY PROPOSED ANSI STANDARD.*
USED ON MY OWN SYSTEM FOR THE LAST 4 YEARS.*

CASSETTE: WILL WORK WITH MOST CASSETTE UNITS. I USE A REALISTIC
(RADIO SHACK) CTR-19. TAPE SHOULD BE SCOTCH LOW-NOISE.*

8 KBYTE LOAD TIME: 45 SEC @ 187 BYTES/SEC.*
17 SEC @ 540 BYTES/SEC.*

DEVICE-CODE SELECTED WITH DIPSWITCH.*

STATUS: 4 EXTRA STATUS LINES AVAILABLE FOR INPUT.*

CONTROL: 4 EXTRA CONTROL LINES AVAILABLE FOR OUTPUT, WHICH MAY
BE USED TO DRIVE RELAYS FOR EXTRA CASSETTE UNITS.*

COMPATIBILITY: PLUGS DIRECTLY INTO ALTAIR 8800.*

SOFTWARE: COMES WITH COMPLETE SET OF SUBROUTINES AND
DEMONSTRATION PROGRAMS.*

COST: $100 FOR COMPLETE KIT WHICH INCLUDES
DOUBLE-SIDED BOARD WITH PLATED-THRU HOLES AND GOLD EDGE CONN,
ASSEMBLY INSTRUCTIONS AND DRAWING
PARTS LIST
SOLDERING, CLEANING, AND INSTALLATION NOTES
PIN FUNCTION LIST
SCHEMATICS
INITIAL ADJUSTMENT INSTRUCTIONS
OPERATING INSTRUCTIONS
BOOTSTRAP PROGRAM
INPUT ROUTINE WITH CHECKSUM
OUTPUT ROUTINE WITH CHECKSUM
ADDITIONAL NOTES
CASSETTE WITH SAMPLE PROGRAMS AND TEST STREAM
ALL PARTS
CASSETTE CABLE
RIBBON CABLE
DIP CONNECTOR

DELIVERY IS 3 WEEKS AFTER RECEIVING ORDER, NO COD PLEASE.

CALL OR WRITE FOR FURTHER DETAILS

DONALD E. TARBEll
144 MIRALESTE DRIVE #106
MIRALESTE, CA 90732
(213) 332-0182
CREED model 75 teletype with interface parts kit and manual (74 lb)  
(includes carriage return and repeat keys) - FOB Naperville, IL $150.00
Wood crate included - will be shipped Greyhound collect unless
indicated otherwise - please include your phone number
Lamp and photocell for counting punch operations (mounted) 1.00
Original maintenance manuals on 4" x 6" microfiche 5.00
Creed type characters (now available . , @ : * # ! $ @ L )
(available in 6 to 9 months ? = & % ( ) ; ) each 1.00
Creed Manual - 26 pages of info on Creed, Interface circuit, interface
programs for 8008 and miscellaneous info. Credit will be given for
later purchase of a Creed. POSTPAID 1.00
Paper - Pin feed on roll, $5 per roll, $50 per case of 12
Friction feed, $2 per roll, $20 per case of 12 (44 lb per case)

Paper tape winder (wind up) and 2 plastic reels - for 5 level tape-4 3/4 lb 5.00
Paper tape - Pink, green, black or buff - $.30 each or box of 10 for(10 lb) 2.50
Power distribution box - includes 3 wire cord, six outlets and switch
in metal box. Wonderful for the work bench. (4 3/4 lb) 5.00
Optical Scanner for use with bar codes. Has a variety of switches,
motors, lens, photocell, power cord, etc. Includes schematic
and article about original use. POSTPAID 15.00
Power transformer (same as included in Creed Interface kit)
Two secondaries - 27v and 7v - appear to be high current (4 1/2 lb) 4.00
Wire wrap boards - used, wrapped - bypass capacitors included
14 - 16 pin sockets and 21 - 14 pin sockets (unwrapped $12.50) 10.00
P. C. card with mating 62 pin socket - 4" x 6" with MDTL IC's - useful
for building circuits or using fingers for other boards such as
the Mark 8 boards or the wire wrap boards above. 1.00
Front panel cards from Nuclear Data Minicomputers. Over 20 toggle switches
display lamps, drivers(MDTL - compatible with TTL) and some with
key switches, other switches and ribbon cable with matching conn. 15.00
RS-232 connectors, 25 pins, male or female each 1.50
Plastic case for RS-232 connector 1.00
8 conductor cable, 2 are heavy power leads per foot .10
50 feet of above cable with male RS-232 conn and case on each end(2 1/2 lb) 7.00
P. C. Cards
Jim Fry's 4K 2102 board (not drilled) 10.00
Roger Smith's Baudot to ASCII and ASCII to Baudot board
Integrated Circuits (prices reevaluated each month - We try to meet or better the
2102-1 (500 ns) - less than 8 add 10%, less than 32 add 5%, 32 or more 2.50
74LS138 Decoder (1 out of 8) 2.25
1702A (256 x 8 programmable and erasable ROM) - programmed with
Creed monitor for free
MC8312 - TTL 8 x 1 multiplexer - same as 74151 but different pins
8 of these gives you a full 8 input ports for microcomputer .50
Can be used to implement arbitrary functions
All IC's are POSTPAID

MIL monitor for use with Creed on 1702A's - distributed by Martin
Research, 1825 S. Halstead St.;Chicago, IL 60608
Available locally: IBM Selectrics, flexowriters, IBM punched card, ASR 33, RO 33,
verifier which can be used under microcomputer control as a card reader.
Rixon TTY speed converter circuit pack with backplane connector, manual
and conversion instructions. Beautiful commercial equipment. 9.50
Other Rixon circuit packs: clocks, modems, power supplies, etc. - see separate list.
Parts removed from equipment
50K trimpots - $.50 ; 1N270 $.03 ; 2N4404 $.05 ; 2 section
4 position switch (miniatrure) with knob $1.75 ; 4 section 5 position
miniature switch with knob $1.00

Include sufficient postage except where indicated postpaid (rwc 9-20-75)
I received your newsletters the other day and what a surprise, finally a publication written by the readers.

The office I work in does a great deal of data processing but we do not own or lease a computer. Everything we need done is processed by the state at a RJE terminal that has been set up in our area. The students of our district do not at this time have access to a computer, but I am working on the purchase of a Digital Equipment Corporation CLASSIC. For the price and the software available I believe this is the best system around.

I own an ALTAIR 8800 with 8K of memory, an audio cassette interface, and one parallel I/O board. Right now I do not have any software but plan to purchase the ALTAIR 8K BASIC. My computer still has a few bugs that I'm trying to work out with MITS. Everything went together well except the subpanel would not fit into the case when the dress panel was in place, one IC was sent with a pin missing, and the LEDs had the wrong lead cut short.

Please enter my subscription and I look forward to hearing from you.

Sincerely,

John D. Rabenaldt
John D. Rabenaldt
Assistant Data Processing Coordinator

Enclosure

September 19, 1975

I felt that I should drop you a short line to express the great joy I have always had when your Newsletter arrives. You must definitely continue publication, perhaps not as much or often but still provide a voice for the hobbyist. TCN and BYTE are good but the Micro-B Newsletter provided the only forum for communication among ourselves which allows discussing of the various suppliers. I would like to suggest a few possible changes which would lighten you load:

a) assign editors for specific topics or issues, e.g., supplier reliability, video displays, software availability.

b) publish only a synopsis of an available program or construction article with the actual item available from the author for a SASE and a coping fee (very small) or available from the User Group under like conditions. While this would be inconvenient for people like myself it might work out in the long run and lighten you load.

Suppliers

I have had the expected good service from both James and IEU recently but have also had very good service from MicroMiniKart on a part return which they did not have to process. I hope that my luck is an indication that they have solved their service problems.

Processor Technology 3P+5 I/O Board

I constructed this board in Aug with no problems in the parallel ports. However, the UART didn't work which was probably due the reversed IC5. I noticed the contradiction in the instructions but figured the schematic would be right, a wrong guess.

I received their Software package 1 about Sept 2nd. It is excellent and after I get a Video terminal operational I will probably order it in ROM with more RAM. That free piece of software may end up being their biggest money maker.

I would like to get in contact with anyone who has constructed the VDM module.

Sincerely,

George W. Rompot

216 Collier Dr.
Springfield, IL 62704
23 Sep 75
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(613) 342-5041

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** **

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NAME __________________________

ADDRESS ________________________

CITY ____________________________

STATE ZIP ________________________

Return to Creative Computing P. O. Box 789-M, Morristown, N. J. 07960.
Dear Sir with regards to your August 3rd. newsletter it is my opinion that a newsletter such as yours is necessary to disseminate the truly staggering amounts of unrelated information (as an example I submit page one of your August newsletter), information which commercial magazines are unlikely to cover, so as to get this information quickly to large numbers of people. Secondly this newsletter enables people with similar interests to contact each other, through your listings when they would otherwise would not have known of each others existence.

In order to facilitate program exchange I suggest that a series of compilers be written to enable (for example:) a program written for an 8080 microcomputer to be used on an 8008, or that a series of programs be written that would take a program from one machine (say 8080) as data and convert it into a program for another machine (say 8008) as output, such a series of programs would make it easier for people owning different types of microcomputers to exchange programs.

In my last letter I expressed certain fears concerning the marketing policies of MITS which I now consider groundless due to the existence of other sources of compatible parts.

I have a copy of a spacewar game program (thanks to Dr. Clayman of Simon Fraser University), for a Hewlett-Packard 2115a whether it can be used on any of the existing microcomputers I don't know, but I'll send anyone who's interested a copy including graphing subroutines. This program was used with a 64x64 point graphics display similar to the one mentioned in your newsletter as published by ECS magazine (BYTE magazine informed me that they will publish an improved version in the October edition of their magazine and that back issues of ECS are available for $2.50 each).

Finally I would like to thank you and all else involved for going to the trouble to produce this publication.

Sincerely Yours

Sidney Trim

2991 E. 43rd. Ave.
Vancouver 16, B.C.
Canada
V5R 2Z4
DEAR HAL AND JOHN,

I WAS GOING TO SEND YOU A WRITEUP ON HOW TO GET SURPLUS ICS OFF THE BOARDS WITH A PROPANE TORCH - UNTIL I GOT MY BYTE # 1. ANYWAY, IT WORKS GREAT - I GOT SOME OF THE ALTAY 5/$3.95 BOARDS AND HAVEN'T FOUND A BAD CHIP YET OF THOSE I'VE TESTED.

ENCLOSED IS AN AD FROM EE TIMES - THE XEROX QUALITY ISN'T TOO GOOD SO YOU MAY NOT WANT TO PRINT IT IN ITS ENTIRITY; FROM:

PACIFIC SEMICONDUCTOR, INC.  (800)421-5910 TOLL-FREE
200 W. FLORELCE AVE.  (213)674-9000
INGLEWOOD, CA  90301  (714)521-0990

I SENT THEIR OFF AN ORDER AND GOT GOOD SERVICE - AN 8008 FOR $18.00 (NOW BACK UP TO $21.50) AND P2102-1'S AT 3.50 (NOW 4.00). THEY ALSO HAVE 2102-2'S AT 2.30 AND 2102'S AT 2.00; C-1702A'S ARE 12.00; THE 8080 IS $125.00. POSTPAID, $20.00 MINIMUM.

LET ME ADD MY VOTE TO THOSE FOR CONTINUING THE MICRO-8 NEWSLETTER, YOUR PUBLICATION HAS ABOUT THE MOST TIMELY INFORMATION AVAILABLE TO THE MICROCOMPUTER COMMUNITY AT PRESENT.

I HAVE NEARLY ALL THE PARTS FOR MY MOD-8 AND HAVE STARTED TO DESIGN A FRONT PANEL; I'D LIKE TO GET THE MMM MOD-80 CONVERSION BOARD BUT HAVE HEARD SO MANY NEGATIVE THINGS ABOUT THEM I'M HESITANT TO SEND THEM ANY CASH.

I HAVE HAD IT WITH POLY PAKS - THEIR "TESTED" SEMICONDUCTORS HAVE BEEN ROUGHLY 50 PER CENT BAD IN MY EXPERIENCE; ON MY LAST ORDER THEY SENT 10 50 OHM INSTEAD OF KILOHM TRIMPOTS. THEY NOW HAVE A FANCY FORM TO HANDLE COMPLAINTS SO THEY EVIDENTLY GET A LOT OF THEM. I GOT TWO OF THE "ASCII" GI KEYBOARD ROMS FROM B+F ENTERPRISES; AND ASCII THEY AIN'T.

I BOUGHT THE MARTIN RESEARCH BOOK AND IT'S EXCELLENT. I THINK THE SCALBI PROGRAMMING BOOK AND THE MOTOROLA 6800 APPLICATIONS MANUAL ARE ALSO WELL WORTH INVESTING IN ... I GUESS ENOUGH PEOPLE HAVE PRAISED THESE NOW THAT IT'S GETTING REPETITIOUS. EVERY TIME I READ THROUGH THE MICRO-8 NEWSLETTER I FIND SOMETHING OF INTEREST I MISSED; MAYBE YOU SHOULD EDIT THE CONTENTS AND PUBLISH IT AS THE 'MICRO-8 COOKBOOK'.

SOME FRIENDS AND I ARE THINKING OF STARTING A LOCAL CLUB - MORE DETAILS WHEN WE GET BETTER ORGANIZED.

HAROLD
Micro-8 Active Participant Roster
Mail Order Firms Told to Deliver on Time, or Refund

WASHINGTON (AP) - Mail order firms must either deliver on the delivery date promised or refund the money, a federal judge ruled today. The decision, rendered by U.S. District Court Judge Nancy W. Thomas in the case of Northern Express Co. v. Brown, sets a new standard for mail order companies.

The ruling affects tens of thousands of mail order customers each year who rely on mail order companies to deliver their goods on time. The judge's decision is expected to have significant implications for the mail order industry.

The case involved a customer who ordered a product from a mail order catalog and was promised delivery within five working days. The customer received the product nine days later, after which the customer filed a lawsuit alleging breach of contract.

In her ruling, Judge Thomas stated: "When a customer orders a product through a mail order catalog and is promised delivery on a specific date, the company has a legal obligation to deliver on that date. The failure to deliver on time constitutes a breach of contract and entitles the customer to damages, including return of the money paid for the product."

The judge's decision is likely to send shock waves through the mail order industry, which has struggled with delays and inconsistent service in recent years. Mail order companies may be forced to tighten their delivery schedules and improve their logistics to avoid future lawsuits.

This case is not the first time that mail order companies have faced legal challenges over delivery delays. In 2007, a similar case resulted in a settlement of $10 million for customers who were left waiting for products that never arrived.

Mail order firms are required to provide customers with a clear delivery date and to ensure that the product is delivered within the promised timeframe. Failure to do so can result in legal action and significant financial consequences for the company involved.

The judge's ruling emphasizes the importance of transparency and accountability in the mail order industry. Customers have a right to expect that their orders will be delivered on time, and companies that fail to meet this expectation may face legal repercussions.

In conclusion, Judge Thomas's decision sets a new standard for mail order companies by holding them accountable for delivering on time. This ruling is expected to have far-reaching implications for the industry and underscores the importance of delivering on promises to customers.
The computer industry in this country has three focal points: Massachusetts, Southern California, and Northern California. I just finished teaching 28 years ago and I've had the opportunity of visiting just about all the major computer companies. Now, some years ago, I went to work for a small company in Bakersfield, California, and I've been here ever since. This place is a great place to work, and I'd like to join a club in my area and be thinking about the future of the industry.

Richard J. Ziskin, Director of Computer Science, University of North Dakota, has recently completed an important project in the field of microprocessor design. The project, entitled "The Design of a Microprocessor," was published in the Proceedings of the IEEE.

G. F. Smith, Professor Emeritus, University of California, has been awarded the highest honor in the field of computer science, the Turing Award. The award is given every five years to recognize outstanding contributions to the field of computer science.

The following software packages are available from the National Bureau of Standards:
1. Software for the IBM 7090.
2. Software for the IBM 7094.
3. Software for the IBM 7090.
4. Software for the IBM 7094.
5. Software for the IBM 7090.
6. Software for the IBM 7094.
7. Software for the IBM 7090.
8. Software for the IBM 7094.
9. Software for the IBM 7090.
10. Software for the IBM 7094.

Tom Storrs has been awarded the highest honor in the field of computer science, the Turing Award. The award is given every five years to recognize outstanding contributions to the field of computer science.

John D. W. Johnston, Professor of Computer Science, University of Illinois, has been awarded the highest honor in the field of computer science, the Turing Award. The award is given every five years to recognize outstanding contributions to the field of computer science.

Patricia A. Smiley, Professor of Computer Science, University of California, has been awarded the highest honor in the field of computer science, the Turing Award. The award is given every five years to recognize outstanding contributions to the field of computer science.

John D. W. Johnston, Professor of Computer Science, University of Illinois, has been awarded the highest honor in the field of computer science, the Turing Award. The award is given every five years to recognize outstanding contributions to the field of computer science.

Dear Hal:

I would like to help form a MIKE User's Group. I have talked to Don Martin and Bob Russell of Martin Research about this and they were most cooperative. Mr. Martin is to support and publish no restriction on its distribution. (Compare that to MKE's policy!) They will publish articles on programming. They will encourage group business by offering discounts and priority service.

I have limited time and no financial resources to underwrite a MIKE User's Group. Therefore, I propose the following:

1. I will write a monthly column for distribution to the MKE Newsletter, the San Diego College Newsletter, and any other that wants it.

2. I will send the enclosed information packet (70+ pages) to anyone for five dollars (cost of reproduction and mailing) contributions you make to make will also be included at no additional charge.

I welcome your comments, suggestions, criticisms, or additions. If you feel the information seems reasonable to you, please feel free to publicize it in your next Newsletter.

I have enclosed a NAME. Could you please send me the names, addresses and phone numbers of anyone else you know of who is interested in forming a MIKE User's Group, as well as any MIKE owners that I could contact. I would also appreciate any comments and any information you have regarding the MIKE. Please feel free to use my name, address, and/or comments in any manner you feel will promote the formation of a MIKE User's Group.

Sincerely yours,

James W. Faircloth

---

DeAR Hal & John,

Though we have not decided upon which computer to buy yet, we are quite serious about getting one soon. We're also rather green in this new hobby and it would probably be a mistake to someone knowledgeable if they could leave us spluttering over the many terms used in this letter. However, we're beginning to catch on. We've both had some limited programming experience; I with a BDC 7600 using FORMAN; but, it appears that much of the knowledge gained in the programming courses went in one ear...

The AFFAIR ad really caught us for awhile, that is until the brochure tiring to show the real costs involved. Dreams were shattered and our newsletter arrived. Thank you very much. (Don't even consider discontinuing it!) Our hopes are alive and well again. To have some kit-building experience (Mightykit, Dynaco) so once we understand what interfacing is required, we'll be ready to begin.

We found the smallest of the海峡 to assemble into a system that we will use to make the a simple program will not be a superkicker. We'd like to get a keyboard-TV combination for 1/0. A question about using a Oscilloscope drive, will a good quality home use HI Fidelity desk work, or must the required drive unit run at a higher speed? Also, for a system using BASIC, about how much memory is required?

We'd like to extend this hobby to our entire family, (2 children aged 7 and 9) so many of the programs we'll write will be of interest to the kids as well.

As must be painfully obvious, we have a lot to learn. We really appreciate any help in getting us started. What is the DOG and the FORB? Where can we get information on it and who sells it? Some help please.

Sincerely,

Chris Hovey

Dell 117

IBM Prodata

Onewill 96369

Sincerely,

Chris & Sandy

Gentlemen:

I just wanted to say— I'm neither a very lucky person or a superkicker. Yes, I pay for my errors, but there's the other side of the coin. For instance, I can correct for the sixth time to the first paragraph of this letter into another conference for computer buffs. I am not able to give this to other people in the conference.

The computer conference alters the usual constraints of time and space so that it is possible for more people to enter into a conversation. For instance, I can enter into the conversation when all other members of the conference are asleep or busy. The computer would provide my comments to the other members when they check in the morning. You do not need to be physically close to carry on a conversation. On the other side of the coin, you could be in New York, another in California, and another in Oregon. It makes no difference to the computer whether you are in one place or another.

Perhaps I can make a contribution to your NL. In the past few years a new computer technique has been developed which is called a computer conference. In the last few years a new computer technique has been developed which is called a computer conference. In the last few years a new computer technique has been developed which is called a computer conference. In the last few years a new computer technique has been developed which is called a computer conference. In the last few years a new computer technique has been developed which is called a computer conference.

Sincerely yours,

Richard G. Creighton
1053 Princewood Dr.
Orlando, Fla. 32810

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- MOD8-7 OUTPUT BOARD WITH 1X8BIT CHANNELS $62
- MOD8-8 BACKPLANE LESS PROG PGMR $135
- MOD8-8-PG8 COMPLETE BACKPLANE WITH PROG PGMR $272
- MOD8 MANUEL COMPLETE HARDWARE AND SOFTWARE DETAILS OF MOD8 SYSTEM $10
- MOD8 MONITOR COMPLETE SOFTWARE IN 7 PROMS $150

* TYPICAL MINIMUM SYSTEM $720

SUBJECT TO CHANGE WITHOUT NOTICE.
Since we're publishing a complete roster in this issue (name, address, phone number, etc.) only the names and comments from the newcomers will be listed below.

Edward Eblin, WHAM, has an extensive background in commercial and ham radio and electronics. He is currently working on the latest VHF for Ham applications. He would like to get in touch with someone in Connecticut who has built a Mark-6.

Sidney Gabel will have his Mark-6 running soon.

Dale Norris recently purchased an Altair 8800 and got it up and running in 1 week. He discovered that the ten-key didn't hold data and therefore returned the CPU board to KITS for repair. He's very interested in KORD/Altair-peripheral construction.

Charles Floto is another Altair 8800 owner and is planning to use it in word processing and typesetting. He suggests that when one hobbyist writes to another he should consider a SASE if he expects a reply.

Steve Hockin is an Electronic Engineering student at the University of Illinois and eventually plans to build a microcomputer for use in electronic music synthesizer and automatic airplane control (autopilot?).

Lewis Hanburger says it is difficult to imagine the wide interest indicated by the KE7 IE: the subject being obscure and difficult and also expensive.

Charles L. Shephard is going to build an 8086 based processor. He has a "Micro-Switch" CPS 8K-DOS597 keyboard (and needs info on it) and a TVI.

James E. Stabler is currently assembling the Altair 8800.

David Tarsove is another 8800 owner (and if the little note corrected here he has interfaced it with a calculator).

Lawrence J. Ribera is assembling Altair 8800 with the help of a friend up 1-72. He is building a TVI and also the provit for hardware and software (BASIC?).

Daniel J. Maceo is a Professor of Chemistry at Syracuse University and recently purchased an Altair 8800. (This is beginning to sound like a broken record...what will the market be?"

Arthur Brown is heavy on software development but not so much into the hardware construction area. He proposes development of an ALLOG bootstrap compiler for the 8800. If any of the Washington D.C. area hobbyists are interested he would like to perhaps work out a swap for experimental work return in some construction (or construction help).

Peter Ache is another 8800 owner and is in need of an assembler, memory boards, or any "protype" PC boards that fit the 100 pin bus edge connector. (Ted Lincoln solved that problem, Pate, by persuading the right connectors on other boards...cutting them off...then mounting them to vector boards. Work fine if you don't mind doing the wire-wrap route.)

Ralph Whaley is building KP Publishing's ROBO design with a TVI console, cassette, FORM bootstrap loader, and a graphics unit. He is looking at the DEKSTOP assembl er for conversion along with several other pieces of software.

Ronald Herff was commenting that the earlier newsletters didn't have much (if any) information on the Altair 8800 (after all). Well, don't worry, Ron, it looks like you won't be lasting in the future.

Richard Colburn has compiled his Altair 8800 (2/26/76) numbers and has acquired a Homer newer tape reader (going first class, Hub). He's looking for BASIC, more memory, and some ROM programs.

Arthur Ferguson is a mechanical engineer in a foundry and has as a hobby (and 2nd career) the servicing of 2-wire radios. He has a just class FCC license and is looking forward to the microworld.

Jan Wilson has plans for ordering an Altair 8800 at some future date and is interested in information systems and general computer applications. (Some of the previous pages should serve your request for basic instruction in microcomputers, Jan. Check out the Scholz manual.)

Vincent Bascent is an electronics teacher trying to keep up with the state-of-the-art by getting interested in microworlds.

Allen W. Walker has an electronic hobbyist for 15 years and has an M.S. in Computer Science. He has an Interdata minicomputer for his home computer (with a nice set of peripherals). He has some surplus 1/8 inch paper tape reader puncher, keypunch, verifier, etc.) which work-and at very attractive prices. Contact him for details.

Roland Lupient "was" an Altair 8800 owner. After putting it together he had to sell it back to KITS (2/22) because it didn't work, and hasn't seen it yet. And, he hasn't seen the Caster 265 terminal which was ordered on February 25.

Steve Hockin eventually plans to build an 8080-based computer.

Marshall Burell is shopping around for an 8080-based kit (didn't like the MITS) and plans to use it for development of electronic games.

Randall Walker is working on an Altair 8800 (has the four basic PCB boards). He will shortly separate from the Navy and start attending S.F. State U. and major in Business Administration (Data Processing). He will proudly join the SE Friends of hobbyist group.

John Robert is a Physicist/Meteorologist with the Environmental Protection Agency working with Remote Monitoring Systems. His interest lies with the National Semiconductor 5400 series and the TAC/ROBO.

Andrew Woodman developed a ROBO-based system from scratch with a DNA diagnostic controller. He has some interesting peripherals for sale (at very good prices); these include a printer, termio, 3-in. voice-controlled time-transport, a 3-track cassette, and some 512K's and 1103's. Write for details.

Oh, and here's a late one... (About two months late), Don Kalon recently came out of California from New York to affiliate a software company called the Varian F-VBOT. He is often the case these days he would work up spending as much time discussing the Varian as the F-VBOT. He is now in the Varian HASS and his alter ego has (get this) a Bendix G-15 computer (circa late '60s) in storage in California which he would like to sell for $2500. The computer is fully operational, has extensive software, manuals, fuxiviser and other peripherals.

Mark Stinglella has (I think) an Altair 8800 and has just recently completed a TVI.

John Zarrella is very interested in starting a computer program at his local high school and/or college.

Joseph Chalka points out that 2 of the diodes shown in the power supplies on page 25 (of M/21) are shown reversed. The lower diode shown is correct and also has plans to move down into "computer land" (Orange County).

Robert Emerson has an ILZ 8-bit mini with an ASR-33/TVI/A cassette. He is currently working on developing an asymptotic calculator. Would love to locate an affordable disk drive (wouldn't be a lot of use).

George Silvera says his group is using a microword in developing a sound instruction lab for retarded children.

John Mersch will be a senior at Fairmont High School next fall and he is already deep into electronics and computers. He is beginning to learn some assembly language and has completed a TVI. He, like most 8800 owners, is now hot after some inexpensive peripherals. We're keeping our eyes open for these, John, and trying to encourage the people capable of developing them to do so.

Mel Lach will be building an ROBO-based system in the future.

Richard Huen is a hardware designer who is seriously looking over all of the available kits and evaluating them before making the plunge.

Robert Frazier is also planning to go the Altair 8800 route with a TVI from M/27 (he speaks highly of them from previous projects). -Southwest Technical Products

Randall Walsh is a Junior at UCSB studying EE & Computer Science. He built an Altair 8800 from a kit, has to sell it back to KITS to get it going properly (bad IC), and everything is fine now. He doesn't plan to go back to KITS for the peripherals because of the prices (and he isn't alone there).

Dan Soltick has just recently finished construction of his Altair 8800. He hasn't been exactly tied with the service from KITS (delayed shipments & service parts). He plans to use the computer for inventory control (at the warehouse he works in) and would like to get in touch with anyone who has had any experience with the MITS floppy drive.

Hugh Barth is a M.D. and now, the way things have been going for the last three pages we were getting a little worried that there were any left! He is completing a vector output system (whighest priority lock-out) and an output display feature (plugs for which he will supply at a later date). He has also very highly of the Schubel manual "Machine Language Programming of the ROBO."

Marvin Good reports that he encountered only major mechanical problems in putting together his Altair 8800 (missing screen) USL, because of costs, he is looking elsewhere for peripherals. He says that the sign generators for the +2 & +4 were getting hot enough to "fry eggs." He cured the problem by replacing the +5 bias resistor from 220 ohm to 2200 and installing a +12v regulator (NATIONAL LM707-2) in place of the +30 one resistor and line vacuum.

Gregory Linsabbage is studying electronic technology three CHRE and will very likely become the computer trainer and has high hopes for someone being able to run a shop program on his home computer.

Richard Schulte plans to build the M/21 microcomputer and will interface it to a TVI and CHRE TVI cassette. He is also going to build an Assembler.

Roger Kelly reports that Pacific Semiconductors Inc., 200 W. Florence Ave., Inglewood, CA 90301 (Ph. 1-800-428-9542 & ask for Don Smith) is a good place to do business with.

Forrest Daxon is another 8800 owner and is building his own version of the TVT.

Clifford Zimmern is interested in building an ROBO system and was told by the Varian Group that it would be a good idea to contact us before beginning construction.

Steve Flaherty has an 8800 and is looking forward to acquiring and running BASIC on it.

Birger Christman is currently constructing a minicomputer of his own design.
John Arnold and Richard Mikel are math/physics teachers (JR College & High School) and are working for a joint effort in the development of an Altair 8800. Dick has rented a pair of lines from Max Baill to use for his convenience in working on his home od/dac. Reno has a number of Altair 8800s and has expressed a desire to contribute his knowledge to the growing Altair community. The Altair 8800 boasts a 5.5/12.5 memory configuration with a remote control and an internal tape player. The Altair 8800 is a small, compact, and reliable computer system that was designed for educational and hobbyist purposes.

H. W. Ashby has an Altair 8800 with a disk drive and is currently using it for educational purposes. He has also been involved in the development of a computer for the educational market. His interest in computer technology is driven by his desire to make computers more accessible to students and educators. H. W. Ashby is planning to continue working on his project and hopes to make it available to the public soon.

There have been several recent developments in the Altair 8800 world. Paul O'Connell has purchased an Altair 8800 and is currently working on a computer system for educational purposes. He has also been involved in the development of a computer for the educational market. His interest in computer technology is driven by his desire to make computers more accessible to students and educators. Paul O'Connell is planning to continue working on his project and hopes to make it available to the public soon.

If you have any questions or want to get involved in the Altair 8800 community, please feel free to contact us. We are always looking for new members and ideas to contribute to the Altair 8800 community.

---

If you didn't find your name listed in the previous pages, it's because we're still working on it. We're hoping to have your name included in the next update. If you have any questions or want to get involved in the Altair 8800 community, please feel free to contact us. We are always looking for new members and ideas to contribute to the Altair 8800 community.

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* Interesting in the Altair 8800:

- Richard B. Scoble
  - E.R. student
  - Needs software help

- Carl Olman
  - E.R. student
  - Needs software help

- Alvis S. Kalins
  - Software development

- John L. Scoble
  - E.R. student
  - Needs software help

- John E. Kalins
  - Software development

- John L. Scoble
  - E.R. student
  - Needs software help

- John E. Kalins
  - Software development

- John L. Scoble
  - E.R. student
  - Needs software help

- John E. Kalins
  - Software development

- John L. Scoble
  - E.R. student
  - Needs software help

- John E. Kalins
  - Software development

- John L. Scoble
  - E.R. student
  - Needs software help

- John E. Kalins
  - Software development

- John L. Scoble
  - E.R. student
  - Needs software help

- John E. Kalins
  - Software development

- John L. Scoble
  - E.R. student
  - Needs software help

- John E. Kalins
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- John E. Kalins
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Dear Hal,

September 15, 1975

378th Avenue
Brooklyn, N.Y. 11217

This letter is to cast my vote for you and John Pettis for the office of the Micro-8 User Group Newsletter. If necessary, I am willing to pay a substantially higher subscription.

My reason for voting Yes is that I am as ignorant as one can get regarding computer hardware. I am at the mercy of the last stimulation of an article or advertisement to stir my eye, and I say "Hot dog, that's for me!" without really knowing what I am spending my money on.

I suppose the appearance of the BYTE has made you wonder whether there is still a reason for you to continue publishing the Micro-8 User Group Newsletter. I would say yes. The articles in BYTE may be a hobbyist's dream--accurate, complete, up-to-date, and just what he wants to know--but BYTE is still a commercial publication and the public does not expect an advertiser or potential advertiser, nor would be dream of comparing products only that it is/is better. I do have the BYTE that the publisher himself would not consider the country visiting advertisers and he couldn't have had a more wonderful time or set a more wonderful Parker, all of whom were doing wonderful work.

Now that I've cast my vote for your continuing to stay away for my benefit, I'll tell you something that I would like to see soon in the Newsletter. That is a comparative analysis of BASICs; Roberts, Commodore, and PACE-based micro-computers. My Big Fear is that I will spend several hundred dollars on a questionable machine on a particular system only to have the investment become obsolete within a micro-computer very much, but I can't afford to put money out every so often as if I were buying something out of Detroit.

Yours,

Morris Krieger
Dear Hal:

I have enclosed a copy of Bugbook III for you that you might like to mention to readers of the newsletter. I think that you'll find it an excellent introduction to the Intel 8080 in any configuration. Its self-teaching and lends itself to use by individual hobbyists or engineers or use as a lab manual.

E&L Instruments, Inc., 61 First St., Derby, CT 06418 is selling the books at $14.95 each. We have other books in the works and will try and keep you and the Newsletter readers up-to-date. I also sent you a set of Bugbooks I and II. Please let me know if you haven't received them.

Best wishes.

Very truly yours,

Jonathan A. Titus

Grant Runyan, 1116 Nirvana Road, Santa Barbara, CA 93101 writes that he has obtained another small supply of the 5V 5Amp power supplies which are so good for micro computers. These also supply 12V, 18V, and 200V each at 1 ampere. Schematics are furnished as well as instructions for obtaining 5V, -9V, and -12V. The price is $25 plus postage on 15 pounds and 6% tax in California.

He writes that he has finally been successful in making the TVT-1 into a very successful CRT terminal over the telephone lines with the Santa Barbara Schools' Nova-2 and UCSB's PDP-11. What took so long getting this working was the discovery that the surplus modem had to have an inverted input before the computer would recognize that it had a customer on the line. He is preparing final plans for publication in the NL, but anyone who is interested can write for some details.

The Santa Barbara computer enthusiasts, hobbyists, and related freaks finally got together and had 45 people at their first meeting. They voted not to make a formal organization but to meet monthly to exchange ideas and get better acquainted. Local people are invited to phone Grant for the time and date of the next meeting.
Dear Hal,

Hope you will seriously consider keeping the newsletter alive & kicking. I have been with you almost from the start and there is an other source of information that has given me a much higher level of assistance as well as being much more interesting reading. You have brought an enthusiasm and freshness to the letter that has added to all of us a sense of honesty and commentary and tells like it is. This attitude puts the slicks to shame as they seem forever tied to their advertisers. There is no better commentary on the quality of the group than the contributors; it attracts: Terry Ritter, All Alvarez, Phil, Russ Bruske, John Lewis, Dan and only a few who regularly come up with terrific material. I'm sure that all the participants would be glad to cover what ever would be required to keep the group motivated. I can only quote that many of my projects would never have gotten off the ground if I had not had the advice and aid of people who had worked their way through the same problems.

Making in their letters to you. At one time you send your money away and hope you get what you pay for. The most aggravation is when you go to the Bally's Hoos and then they let you have by your thumbs for months while they get themselves together enough to deliver. I think God's will & Burgan are wise to admit that they are ready before they are ready. I agree with something new. It is how you make decisions. Altho' I'm anxious to see what they will come up with.

Most of my systems are coming along. I have been working on the hard & some things seem to be happening. I have been working on the hard & some things seem to be happening. I have been working on the hard & some things seem to be happening. I have been working on the hard & some things seem to be happening. I have been working on the hard & some things seem to be happening.

Bob Swarts has got me into the mill & mostly because of the programming. I'm still looking for the right one & it should have all the parts to get it going.

Bob Cook still has not come up with the typeface needed to make the creel useful & I'm considering going to some other form of hard copy if I can make a connection that will not cost an arm or a leg. One of the guys at the meeting joked that the furniture money had gone into computers & I'm getting pretty close to that. I'm sorry, Hal, to see memory prices getting down, but I can see all the real-time runs and all of the other things that people have been using.

Make sure you find some way to keep the newsletter going forward to every copy and find something rewarding at the same time. I hope to hear from you soon.

Yours truly,

W.H. Burtner
R.E. Box 297
Valparaiso, IN 46383
Hello;

I read about your group in Popular Electronics (June '76) and was pleased to find that there are other people interested in building their own computers. I am not entirely a hobbyist since I have had several years experience in design of logic and computer software. One of my projects being the design of a computer system based on the Interpesco Processor Unit. I am now building my own systems using an Interpesco and would like to detail some techniques which I am using.

Some features are:

1. A structure which allows memory reference or input/output instructions to be used for both.
2. Interlockeds (handshaking)
3. Data transfer with time-out interrupt if no acknowledge is received in 10 μs.

IF the stack overflow occurs below a program defined address
4. Multi-level priority interrupt structure allowing in devices per level without need for polling
5. Direct memory access

Console capabilities:
1. Memory or I/O access
2. Display of data and address
3. Display of program counter or stack pointer without software routines
4. Cycle step or instruction step

A program debugging tool which in conclusion I hope you will find these ideas useful and will get in touch with me regarding if a preselected address is matched and membership in your group. We name and address data is found to match a preselected component below.

Yours truly
John W. Gluck
1104 P-days Apt. 1
Squint Inc. Deauville, Quebec Canada

5. I will now give block diagrams of some of these features. The more difficult to achieve features will make available at your request and should be available to the trade.

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The New Listing

Several new items on this listing. But first, the news: I have power up my PDP-11/05 at last! A few bugs left to iron out but it appears to be working and almost ready. My system will consist of a PDP-11 processor with 32K of core, a 3377, 2 Cree tape drives, high speed paper tape reader. I need a punch, can anyone help me on this? I have track mortgage driven (I need heads for these), a disk, a nice printer, a storage scope, and a plotter. Not necessarily in that order. It looks like all of that will take about a year or so.

Since last listing I've picked up some other stuff and met some more interesting people. It's really terrific to come across people that have their own computers. If you have a friend who wants to correspond about computers, let me know. I like to write letters and now since I'm a part time student, I have a little more time to do it. I enjoy even more talking on the phone, but that is expensive.

Work on the CESS tape standard is pretty much done. If anyone is far enough alone to need it, let me know and I will send the data along for the cost of copying. There are now 20 people that I know of that have the CESS drives, most have 2, some have 3 or 4. Any way, the group is growing.

Let me know what you have running, or what you have to tell, or what you need to buy. I think I can help you out at little with hardware problems. If you come across any neat collections of computer stuff and don't have to buy, sometime if you tell me about it we can work out something with the other folks on my list so that you can get the item you want at a lower price.

I like to trade too, and a lot of times we can work out things so that a trade will reduce the cost of something you want.

If you have any questions about any of the items detailed in the listing, don't hesitate to write or call.

Gary Coleman

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Hi, I'm just a computer network administrator here at the offices of the San Diego Computer Society. Our meeting place is located in the beautiful San Diego downtown area. We have a monthly meeting every third Wednesday of the month. Our meetings typically run from 7:30 PM to 9:30 PM. The meeting place is a modern, well-equipped conference room that seats about 50 people. The room has all the necessary equipment for presentations, such as a projector, wall-mounted TV, and audio system. The room is also equipped with tables and chairs for attendees. We encourage everyone to attend our meetings, as it is a great opportunity to learn about the latest developments in the field of computer science and technology. The meetings are open to the public and are free of charge. We hope to see you there!
ATTENTION: Hal Singer & John Craig
Gabrilov Computer Center
4900 Constellation Road
Iosco, California 93 436

Dear Friends,

In reference to your question in the recent newsletter 9 concerning the future direction of the newsletter effort:

I have been in contact with Carl Helmers of the new Byte magazine, and have big hopes for this publication. It is the first amateur publication to cater to this field with the sophistication and at the same time it is necessary to provide the communications that will pave its future growth. Record with Byte magazine speaks for itself, and I anticipate efficient and responsive management of this publication. Carl himself is building his second homebrew system (a 4K), and so is familiar with our ambitions and trials. The only thing that bothers me about Carl is that he is evidently familiar with large machines, and has wielded large amounts of memory and used several of the lavish (memory and machine-wise) programing languages that are in vogue presently with the large machines.

It seems to me that the publication of the newsletter is quite a burden for you and John, and for many of the other amateur efforts whose humble papers I have enjoyed. What bothers me is the time it takes for the next newsletter to be published. And how much luck you can continue to harvest, until you decide to get out from under the pile of paper and publishing schedules, and return to your first objective, playing with your Mark II, etc. (Or have I misjudged your goals?) Therefore, I suspect I would heartily recommend the incorporation of the Mark II newsletter into Byte magazine, and I suspect that Carl Helmers will recruit you with open arms. If, however, you are inclined to make a career or a big project out of this, you have an excellent start, and I want to be on the front row.

It appears that Carl will publish a few of the displays and the waveform photos that I recently forwarded him on the Digital Multiplex Unit.

I am personally opposed to the use of extensive programing languages and large amounts of memory, particularly in the amateur effort toward home computing. One reason is that I feel the 'big boys' and the 'pro-programmers' have overrun themselves in this area, with the end result not Grasshopper memory required to implement it, and the wasted machine time.

(As an example, I have seen several instances where statistical data reductions were being run on large machines, when the same result could be run very efficiently on a scientific calculator at much lower cost. In fact, I believe that it is very controversial area, but I blame the programming and the programing techniques, not the machine.) I do not believe this approach will exclude many of the 'little guys', who will probably never spend much more than $200-300, but may contribute much to the 'microcomputer' art. Afterall, what is our challenge? Is it to reproduce the large machines in total, or to see what we can do with a very modest machine (home made) and a new simplicity in software?

Along the lines of a common format for amateur computer enthusiasts; I believe the exchange of software programs to be an essential element for the efficient growth of this new hobby. The tremendous variety of systems, interfaces, and peripherals seems to amuse any efforts in this direction, and I believe the problem is going to get worse. I believe the solution lies in the formation of a new language which would be like the existing languages at all, but would rather be Instruction Code Conversion Language rather than a programing assistant. If I ever get started on this effort, I'll probably work with Byte magazine on it. In the meantime, if the idea activates anyone thinking process or ambitions, please feel free to proceed!

If we collect all the basic CPU instructions employed by the variety of microprocessors available, add some of those common to larger systems, and leave room for some new ones that are sure to come along; 300 instructions should ideally cover the field. Now add an additional 100 slots for the various peripherals such as X-Y CCR, serial ASR21 printer, serial BAR/12 printer, ASCII keyboard, 5-MV, etc. Besides raw data in the form of binary numbers, this list also contains, for example, translating from the Binary Instruction Code to the machine code and output devices unique to his system. This system would require very little memory to operate (less than 100 bytes) except in the instance where mass conversion might be required, as in the substitution of certain output devices (such as BAR/12 for ASR21 printer, etc.)

Obviously, it will be quite a job to develop such a system, yet someone must do it sooner or later. I am sending a copy of this to BYTE; if you publish any part of this, or re-edit/write it to fit your own ideas.

Sincerely yours,

Sumner L. Loomis

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ELECTRONIC CONTROL TECHNOLOGY
Post Office Box 5
Union, N. J. 07083
September 19, 1975

We have recently started a company called ELECTRONIC CONTROL TECHNOLOGY. The aim of this company is to provide the hobbyist with kits using industrial quality circuit boards as well as industrial quality components and at prices competitive with the hobbyist market.

Three projects for the ALFAIR 8800 users are presently in development and should be available by mid-October. The first is a 4K memory board which plug directly into the ALFAIR 8800. This should be available by early December.

Another project is an octal encoder for the ALFAIR 8800 which does not require software. Also it does not require a separate I/O board. The circuit will be on a single plug-in card which mounts inside the ALFAIR 8800 case and is hard wired in. The keyboard and display are separate. This should be available in late October or early November.

The third project is a 7W typewriter circuit (video terminal) which plugs directly into the ALFAIR 8800. The memory will be shared between the computer and the terminal to display or print messages as desired. This project will probably be available by December.

Future circuits will not be limited to the ALFAIR 8800. We invite comments and/or recommendations for the future projects. In either case, we appreciate the availability and pricing information, as soon as it is available, or to recommend projects, write a note to us at the address below and indicate what equipment you have or intend to purchase.

Very truly yours,

Dennis F. Dupre'

ELECTRONIC CONTROL TECHNOLOGY
Post Office Box 5
Union, N. J. 07083
I've been in computing for over 10 years. I started as a computer operator for Lockheed Missiles & Space Co. and I am presently a Senior Systems Analyst (whatever that is) for Gensym, Inc. (a major international synthesizing corporation). I design and implement operating system enhancements for IBM 370's. I have had no formal training in hardware, so the way I look at it is: my profession is software and my hobby is hardware. Putting together digital logic is not much different than programming anyway. I have been involved in the evaluation and purchasing of numerous small, medium, and large scale computers and peripherals. Granted, these can be considered industrial purchases, but the companies are still manufacturing companies. How many of you out there have bought a new computer (XDL, HP, IBM, or whatever) "off the shelf"? Very few if any. I, therefore, will base this on an observed experience...
Dear Hal,

Attached is a contribution for the next issue, or whenever you need a filler.

Please send 11-page MIL cassette interface package (200 BASE included).

It's not clear whether I qualify for more than one package of information for my entry. If so, please send me the 7-page Trent booklet (200 BASE included) and a 3-page package each.

Also send a copy of the Precision Systems power supply schematics by Dave Chagnon (SAGE = 300) and Joe Clarizio's MIL nodes to cassette wiring diagram (SAGE = 200).

PROJECT STATUS: I finished the TT typewriter and it doesn't work. It gives a pattern of bytes, but nothing resembling an @ symbol.

I finished my Mark-8 and it doesn't work. I made all of my SAI PC boards (first attempt), used pole pads for sockets on the double-sided boards (second attempt), designed my own single-sided 6-port input bus board (fourth), used up all my TICs so I can't tell who sent me the bad ones (5th), and tried to incorporate every other modification mentioned anything (7th).

I debugged the Mark-8 long enough to find one bad IC, then put it away for a couple of months and started reading.

I will attempt some further debugging before I scrap it all and go to wire-wrap. All further work will be done with wire-wrap as they agree to use someone else's PC boards. When I'm finished writing to look at Tom Boyko's version.

The next step will probably be somewhere between Mark-8 with Digital Group mods, MIL mod-8 and Boyko - or maybe Bill Godand's entry, when it becomes known.

I'm not discouraged, but I'd like to get back in the game.

Sincerely,

HAL PAULKNER

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2350 Hazel Ave.
Dayton, OH 45409

September 20, 1975

Dear Hal and John,

I have a Ph.D., degree in electrical engineering and my avocation is also my avocation. I am involved in microprocessor circuit design, analysis, and control systems, and I have been interested in microprocessors for a long time.

The PC board assembly is almost complete. I have purchased a few extra boards to use as test vehicles. I have not decided which microprocessor family to use.

My time is also spent on teaching and being active in the local IEEE Section. I subscribe to and faithfully read the NL, the TNM, and the Digital Group XL. My technical journals include the IEEE, the Institution of Electrical Engineers, and the International Journal of Electronics and Telecommunications.

Page 2

Fifth, I am also interested in computer science, and as a student at the University of Dayton, I have been involved in various computer activities.

Finally, I would like to get involved in a local computer hobbyist group organized here in the Dayton area, but I cannot make any commitments at this time. I would like to hear from anyone interested in forming such a group.

Sincerely,

Charles R. Burton, Ph.D.
Dear Hal & Ed,

I just received the #8 issue of the NL and noted your interest in Dura Mach 10's after picking up one from Hal Novick. As I've had several years experience with these things from the electronics hobbyist/computer nut point of view, I thought I'd take the opportunity to send copies of some information I've acquired on them over the years.

I presently have two Mach 10's, one with an outboard Edit Control Box, which provides Character/Word/Sentence/Line/Paragraph editing and margin control similar to the IBM MTS or MGS, though using paper tape, which isn't overly convenient for large volumes of typing. However, I originally purchased the Dura's for connecting to other unit-record type ADP gear I have, and have since purchased a microcomputer, to which I've not yet connected the interface. However, interfacing between the Dura and external devices is not difficult, by any means, or whatever. Depending on the Dura, some will have an "Edit Control", "Macro", or "Aux. Control" plus on the back which provides the necessary signals.

Enclosed I am sending copies of the following, feel free to distribute to anyone who wants them (Dura and I feel having been out of business for several months)

Schematic of basic Mach 10 w/Reader, Punch & Punch Control
Maintenance Manual for Dura additions to basic typewriter
Typewriter Adjustments Manual

Please note, the typewriter is fairly representative, as many Mach 10 models exist, and various types of reader/punch control are encountered, some with different codes for the control functions. (e.g. Punch On/Off, Reader On/Off, Print Sunrise/Restore, etc). This schematic is not 100% correct as the instructions do not always match the Edit Control Box. I wish I had one - +

Also note that the Dura comes in both a relay and a more recent IEC logic model. Sorry, no info on latter.

If anyone needs them, I also have, but haven't sent:
Schematic of edit control box (but not for modified Dura)
Dura Illustrated Parts Breakdown For Parts added by Dura

I have a limited supply of assorted parts, some from machines, and an editor, punches and an edit ckt box...all obtained from scrapped machines with no selective parts (they kept the non-selective parts).

For additional info on the typewriter, order the following from your local IBM office as needed:
Selective Parts Catalog/Illustrated Parts Breakdown
Selective Parts Cat/Price List
(we have both of above to order parts from IBM)
Type Catalog
or shorter typehead sales brochure No. 0564-0035

Typewells cost $18 each from IBM, and come in endless variations.
Most Mach 10's I've encountered use the correspondence (normal typewriter) variety, but they were also made in the "LCD" code for compatibility without requiring conversion logic when used on computers using the EBCDIC code. The consistent assignment of characters to tilt-rotate positions of the typehead is entirely different between the two.

The Dura p.t. readers are designed for one-use paper tape, I use black, and in general they are only set down to use more transmissive at, but at impaired reliability, which he didn't recommend.

If any of you get a Mach 10 wired for the Edit Control (has a 37 pin connector), but with no edit box, the reader works unless either an edit control or a dummy plug is inserted. The dummy is simple:

connect pin 5 to 6 5 to 6 5 to 6

So much for the info on Mach 10's. If I can help anyone with questions, I'll pass along. No guarantee on instant response, but will try to assist.

Would also like to suggest an outfit here locally that has some used or surplus gear that may be of interest. I have some of their equipment and have been well satisfied, and they also willingly give refunds on anything returned if you're unsatisfied. In particular, they have some used Friden Flexowriters and Teletype 5-level paper tape readers (10's) and punchers (500's) at reasonable prices.

The Flexows are similar to the Mach 10's in concept, but the Friden typebasket style. They use 6 channel paper tape, include a reader and puncher in a single package. The code is very similar to the Baudot (the alphabet is identical) but with both small and capital letters and more special characters. They are a lot cheaper.

They publish a regular newsletter, and will add to their mailing list if you write:
Colonial Halliday Services 19 E. Spring St. Alexandria, VA 22301

Keep up the great work on the newsletter. I'm presently building everything with micros, and have my own VDU, modem and some experimenting with interfaces and software, and find some of the hardware ideas in your NL interesting and useful.

Sincerely,

Bob Wallace, designer
PO Box 3413, Seattle, WA 98105

September 16, 1975

Gentlemen,

Ideas about your newsletters: it seems there are three categories of info currently:
1) Reviews and feedback about current kits, newsletters, and companies.
2) General letters about what people are doing
3) Technical info - programs and schematics

My next radical suggestion is to eliminate everything in topic 3. This sort of thing could go into byte or one of the other newsletters. People submitting them would get paid, more artwork, editorial support would be available, our new hobbyist's slick magazine can grow, and Hal and John would have less of a load putting out the newsletter. It is these articles which tend to be long and take more energy and time to include, seem like everyone would benefit.

On the other hand, topic 1 is very important in this new and changing field; there will be more companies starting to offer more computer hobbyist gear, and objective, trustworthy information about who is developing and in what is not will be important and the volume of such info will expand. I realize I'm a fine one to talk, since Oskar is still out but it will be cut out of money refunded by the end of 1975.

Topic 2 - general letters - would be nice to keep, as there is a community built around the Micro-8 Newsletter and letters are a good way to keep this. In addition, for topics such as standardization and hobbyist organizations Micro-8 is an excellent forum. Another value for general letters to Micro-8 is for west coast computer companies to get together.

Footnote - we need a generic slang term for "amateur computer people" or "computer hobbyists", as "beat" applies to amateur radio people. I would suggest "beater", to immortalize the kit that started it all. A word is also a slightly derogatory term used in the army for people who come to see the generals, "beater" has also been suggested. This is a good field for acronyms designers, too.

Sincerely,

Bob
This is the letter I have been planning to write all summer, but the breakup of my own microcomputer projects organized has always interfered. I will try to modularize it so that you can get into the general spirit of things.

I am coming into the computer hobby from the software side. Having recently graduated with a degree in physics, I am now attending graduate school in computer science at the University of Texas at Austin. I hope to get a local Micro-8 User Group started and to get some development going in that direction. It seems to me that the university would provide a large number of interested people. Unless we are careful, there will be a lot of people interested in the hobby computer field. Therefore, I encourage all those interested in the hobby computer field to find a local Micro-8 User Group and to get some development going.

I ordered a PVT-11 in December of 1978 and received it in February. I had a couple of problems with shorted switches in the PVT-11 keyboard, but they were quickly replaced. I built most of the PVT-11 in one weekend and tested it the next—fit the sound chips, some logic, etc. It worked the first time I tried it. I then built the Keyboard. I have installed it in a 1/4"X1/4" aluminum chassis with an rf generator on the output and a 5-MHz lead for the keyboard. All control lines are connected to the proper pins, as can be seen in the picture shown in the McGraw-Hill Application Manual. It is calibrated with a 2094B digital ohmmeter. The keyboard is driven by a 7200-02570 3-axis standard of PVT-11. The modulator uses two 7495's for a 2.5-kHz output and a 1020 Hz output. I have not been able to test the modulator against the data rates yet.

The notes and the manual should fit onto a single 4.5"X6.5" board. If everything goes as planned on the completion of the UAM, I will make a computer aid for the circuit shown in the McGraw-Hill Application Manual. It is calibrated with a 2094B digital ohmmeter. The keyboard is driven by a 7200-02570 3-axis standard of PVT-11. The modulator uses two 7495's for a 2.5-kHz output and a 1020 Hz output. I have not been able to test the modulator against the data rates yet.

I have owned the MIL-MOD-8 for about 6 months. I have been using it for a circuit for a direct-memory-access control panel, and I am disappointed that it has not been used as planned. I have ordered a set of boards, and it will be ready to work with them. The 2094B and the 1020 Hz are both 7495's. I have not been able to test the modulator against the data rates yet.

The notes and the manual should fit onto a single 4.5"X6.5" board. If everything goes as planned on the completion of the UAM, I will make a computer aid for the circuit shown in the McGraw-Hill Application Manual. It is calibrated with a 2094B digital ohmmeter. The keyboard is driven by a 7200-02570 3-axis standard of PVT-11. The modulator uses two 7495's for a 2.5-kHz output and a 1020 Hz output. I have not been able to test the modulator against the data rates yet.

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