

digital group software systems inc.

SUPER CLOCK ©

SUPER CLOCK is, in effect, a program which converts a Digital Group Inc. (DGI), Z-80 system into a very expensive digital clock. It is relatively easy to use and is fairly self explanatory. However, the following description might be helpful.

Selecting Option 7 from the shopping list causes all of the counters to be set to zero (0). Option 8 does not change the values of the counters. Otherwise, the operations of the two options are identical. Upon selecting either Option 7 or 8 you should see the following display on the SUPER CLOCK shopping list on the TV-screen:

H = SET HOURS
M = SET MINUTES
S = SET SECONDS
R = RUN CLOCK
T = RUN TIMER
L = SET HOUR LIMIT
Z = SET ALL TO ZEROES

If you select H, M, or S, the following message will appear on the TV-screen:

ENTER SET VALUES

At this point, enter a two-digit zero (0) filled (e.g., 5=05) value corresponding to the value to be set. There will be a pause of approximately 2 seconds after the second digit is entered to give you time to check the value. Then control will be returned to the SUPER CLOCK shopping list.

Option L is used to set the roll-over limit for the Hours. Thus, you can have either a 12 or 24 hour clock or, for that matter, any values up to 99 hours. In the display, 00 follows 11 in the 12 hour clock. It also follows 23 in the 24 hour clock, etc.

Option R starts the clock running forward from whatever values were entered. Option T starts the clock running in reverse and it will count down to zero (0) and go into an alarm mode! The user is invited to interface any kind of alarm desired and alter the code accordingly to make it sound off. As written, the timer automatically resets itself to 5 minutes after "ringing" the alarm.

To use SUPER CLOCK with TVC-64, change the bytes at 002020 and 002031 from 000 to 016. You must also alter the timing constants to make up for the changes.

If you find SUPER CLOCK to be not quite accurate, alter the timing constants in the delay loop (lines 2460 through 2510) until it is right on. Accuracy on the order of 1 part in 250,000 is possible.

HAVE FUN!!!!

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SC 77-5

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SUPER CLOCK Z-80

ASSM 010000 120000

010000			0100	TVCHR	EQU	000372	
010000			0110	TVSPC	EQU	000370	
010000			0120	TVEDT	EQU	002000	
010000			0130	KEYBD	EQU	001250	
010000			0140	HEXIPT	EQU	004155	
010000			0145	TENTHS	EQU	001173	
010000	041	302	010	0150	CLOCK	LD	HL,SCREEN
010003	001	002	007	0160		LD	BC,2
010006	066	240		0170	CLKCLR	LD	(HL),240
010010	043			0180		INC	HL
010011	020	373		0190		DJNZ	CLKCLR
010013	015			0200		DEC	C
010014	040	370		0210		JR	NZ,CLKCLR
010016	257			0220		XOR	A
010017	041	277	010	0230		LD	HL,HOUR
010022	167			0240		LD	(HL),A
010023	043			0250		INC	HL
010024	167			0260		LD	(HL),A
010025	043			0270		INC	HL
010026	167			0280		LD	(HL),A
010027	041	112	010	0290	DSPSHL	LD	HL,SHPLST
010032	315	700	002	0300		CALL	TVEDT
010035	315	250	001	0310		CALL	KEYBD
010040	006	007		0320		LD	B,7
010042	041	065	010	0330		LD	HL,KEYTAB
010045	276			0340	KEYLUP	CP	(HL)
010046	050	007		0350		JR	Z,KEYHIT
010050	043			0360		INC	HL
010051	043			0370		INC	HL
010052	043			0380		INC	HL
010053	020	370		0390		DJNZ	KEYLUP
010055	030	350		0400		JR	DSPSHL
010057	043			0410	KEYHIT	INC	HL
010060	136			0420		LD	F,(HL)
010061	043			0430		INC	HL
010062	126			0440		LD	L,(HL)
010063	353			0450		FX	DE,HL
010064	351			0460		JP	(HL)
010065				0470	KEYTAB	DW	'R'
322							
010066	060	013		0480		DW	RUN
010070				0490		DW	'H'
310							
010071	303	012		0500		DW	HOURS
010073				0510		DW	'M'
315							
010074	317	012		0520		DW	MINUTS
010076				0530		DW	'S'
323							
010077	332	012		0540		DW	SECNDS
010101				0550		DW	'T'
324							
010102	333	015		0560		DW	TIMER
010104				0570		DW	'Z'
332							
010105	360	012		0580		DW	ZERALL
010107				0590		DW	'L'
314							

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010110 345 012	0600	DW	LIMIT
010112 377	0610 SHPLST	DE	377
010113	0620	DW	'H = SET HOURS'
310 240 275 240 323			
305 324 240 310 317			
325 322 323			
010130 063	0630	DE	63
010131	0640	DW	'M = SET MINUTES'
315 240 275 240 323			
305 324 240 315 311			
316 325 324 305 323			
010150 061	0650	DE	61
010151	0660	DW	'S = SET SECONDS'
323 240 275 240 323			
305 324 240 323 305			
303 317 316 304 323			
010170 061	0670	DE	61
010171	0680	DW	'R = RUN CLOCK'
322 240 275 240 322			
325 316 240 323 314			
317 303 313			
010200 063	0690	DE	63
010207	0700	DW	'T = RUN TIMER'
324 240 275 240 322			
325 316 240 324 311			
315 305 322			
010224 063	0710	DE	63
010225	0720	DW	'L = SET HOUR LIMIT'
314 240 275 240 323			
305 324 240 310 317			
325 322 240 314 311			
315 311 324			
010247 056	0730	DE	56
010250	0740	DW	'Z = SET ALL TC ZEROS'
332 240 275 240 323			
305 324 240 301 314			
314 240 324 317 240			
332 305 322 317 323			
010274 154	0750	DE	154
010275 000	0760	DE	0
010276 020	0770 HRLIMT	DE	12H
010277 000	0780 HOUR	DE	0
010300 000	0790 MINUT	DE	0
010301 000	0800 SECND	DE	0
010302	0810 SCREEN	LS	512D
010302 000	0820	DE	0
010303	0830 SCRHR1	EQU	SCREEN+2D
010303	0840 SCRHR2	EQU	SCREEN+9D
010303	0850 SCRHM1	EQU	SCREEN+17D
010303	0860 SCRHM2	EQU	SCREEN+24D
010303	0870 SCRSC1	EQU	SCREEN+298D
010303	0880 SCRSC2	EQU	SCREEN+305D
010303 072 275 010	0890 HOURS	LD	A, (HRLIMT)
010306 315 363 012	0900	CALL	SETTER
010311 262 277 010	0910	LD	(HOUR), A
010314 303 227 010	0920	JP	DSPSHL
010317 075 140	0930 MINUTS	LD	A, 60H
010321 315 363 012	0940	CALL	SETTER

SUPER CLOCK Z-80 Continued

012324	062	300	010	0950	LD	(MINUT),A
012327	303	027	010	0960	JP	DSPSHL
012332	076	140		0970	SECNDS	LD A,60H
012334	315	363	012	0980	CALL	SETTER
012337	062	301	010	0990	LD	(SECND),A
012342	303	027	010	1000	JP	DSPSHL
012345	076	377		1010	LIMIT	LD A,0FFH
012347	315	363	012	1020	CALL	SETTER
012352	062	276	010	1030	LD	(HRLIMIT),A
012355	303	027	010	1040	JP	DSPSHL
012360	303	000	010	1050	ZERALL	JP CLOCK
012363	365			1060	SETTER	PUSH AF SAVE LIMIT
012364	041	310	015	1070	LD	HL,SETMES
012367	315	000	002	1080	CALL	TVEDT
012372	076	002		1090	LD	B,2
012374	315	250	001	1100	SETLUP	CALL KEYBD
012377	365			1110	PUSH	AF
013000	315	372	000	1120	CALL	TVCHR
013003	361			1130	POP	AF
013004	376	262		1140	CP	260
013006	070	031		1150	JR	C,SETERR
013010	376	272		1160	CP	270
013012	060	025		1170	JR	NC,SETERR
013014	051			1180	ADD	HL,HL
013015	051			1190	ADD	HL,HL
013016	051			1200	ADD	HL,HL
013017	051			1210	ADD	HL,HL
013020	326	260		1220	SUB	260
013022	205			1230	ADD	L
013023	157			1240	LD	L,A
013024	020	346		1250	DJNZ	SETLUP
013026	301			1260	POP	BC
013027	270			1270	CP	P
013030	060	007		1280	JR	NC,SETERR
013032	365			1290	PUSH	AF
013033	315	006	014	1300	CALL	DELAYB
013036	020			1310	NOP	
013037	361			1320	POP	AF
013040	311			1330	RET	
013041	041	274	015	1340	SETERR	LD HL,SETERM
013044	315	000	002	1350	CALL	TVEDT
013047	315	006	014	1360	CALL	DELAYB
013052	315	006	014	1370	CALL	DELAYB
013055	303	027	010	1380	JP	DSPSHL
013060	315	073	013	1390	RUN	CALL DISPLY
013063	315	266	013	1400	CALL	TICK
013066	315	006	014	1410	CALL	DELAYB
013071	030	365		1420	JR	RUN
013073	041	304	010	1430	DISPLY	LD HL,SCRHR1
013076	072	277	010	1440	LD	A,(HOUR)
013101	315	203	013	1450	CALL	SPLIT
013104	315	223	013	1460	CALL	DIGMOV
013107	171			1470	LD	A,C
013110	041	313	010	1480	LD	HL,SCRHR2
013113	315	223	013	1490	CALL	DIGMOV
013116	072	300	010	1500	LD	A,(MINUT)
013121	315	203	013	1510	CALL	SPLIT
013124	041	323	010	1520	LD	HL,SCRMN1
013127	315	223	013	1530	CALL	DIGMOV
013132	171			1540	LD	A,C
013133	041	332	010	1550	LD	HL,SCRMN2

013136	315	223	013	1560	CALL DIGMOV
013141	072	301	010	1570	LD A,(SECND)
013144	315	203	013	1580	CALL SPLIT
013147	041	354	011	1590	LD HL,SCRSC1
013152	315	223	013	1600	CALL DIGMOV
013155	171			1610	LD A,C
013156	041	363	011	1620	LD HL,SCRSC2
013161	315	223	013	1630	CALL DIGMOV
013164	076	252		1640	LD A,'*'
013166	062	021	011	1650	LD (SCREEN+70D),A
013171	062	121	011	1660	LD (SCREEN+143D),A
013174	041	302	010	1670	LD HL,SCREEN
013177	315	000	002	1680	CALL TVEDT
013202	311			1690	RET
013203	365			1700	SPLIT PUSH AF
013204	340	017		1710	AND 2FH
013206	117			1720	LD C,A
013207	361			1730	POP AF
013210	313	077		1740	SRL A
013212	313	077		1750	SRL A
013214	313	077		1760	SRL A
013216	313	077		1770	SRL A
013220	346	017		1780	AND 2FH
013222	311			1790	RET
013223	345			1800	DIGMOV PUSH HI
013224	207			1810	ADD A
013225	041	045	014	1820	LD HL,DIGITS
013230	205			1830	ADD L
013231	157			1840	LD L,A
013232	136			1850	LD E,(HL)
013233	043			1860	INC HL
013234	126			1870	LD D,(HL)
013235	341			1880	POP HL
013236	305			1890	PUSH BC
013237	016	007		1900	LD C,7
013241	006	005		1910	DGMVLP LD B,5
013243	345			1920	PUSH HL
013244	032			1930	DGMVL2 LD A,(DE)
013245	167			1940	LD (HL),A
013246	023			1950	INC DE
013247	043			1960	INC HL
013250	020	372		1970	DJNZ DGMVL2
013252	341			1980	POP HL
013253	325			1990	PUSH DE
013254	021	040	000	2000	LD DE,40
013257	031			2010	ADD HL,DE
013260	321			2020	POP DE
013261	015			2030	DEC C
013262	040	355		2040	JR NZ,DGMVLP
013264	301			2050	POP BC
013265	311			2060	RET
013266	072	301	010	2070	TICK LD A,(SECND)
013271	300	001		2080	ADD 1
013273	047			2090	DAA
013274	376	140		2100	CP 60H
013276	332	307	013	2110	JP C,TIKSNC
013301	257			2120	XOR A
013302	016	001		2130	LD C,1
013304	303	315	013	2140	JP TIKSNX
013307	016	000		2150	TIKSNC LD C,0
013311	267			2160	OR A

213312	303	315	013	2170	JP	TIKSNX
213315	262	301	010	2180	TIKSNX LD	(SECND),A
213320	272	302	010	2190	LD	A,(MINUT)
213323	201			2200	ADD	C
213324	047			2210	DAA	
213325	376	140		2220	CP	60H
213327	332	340	013	2230	JP	C,TIKMNC
213332	257			2240	XOR	A
213333	216	001		2250	LD	C,1
213335	303	346	013	2260	JP	TIKMNX
213340	016	000		2270	TIKMNC LD	C,0
213342	267			2280	OR	A
213343	303	346	013	2290	JP	TIKMNX
213346	062	300	010	2300	TIKMNX LD	(MINUT),A
213351	272	276	010	2310	LD	A,(HRLIMT)
213354	127			2320	LD	E,A
213355	072	277	010	2330	LD	A,(HOUR)
213360	201			2340	ADD	C
213361	047			2350	DAA	
213362	272			2360	CP	E
213363	332	374	013	2370	JP	C,TIKHNC
213366	257			2380	XOR	A
213367	016	001		2390	LD	C,1
213371	303	002	014	2400	JP	TIKHNY
213374	016	000		2410	TIKHNC LD	C,2
213376	267			2420	OR	A
213377	303	002	014	2430	JP	TIKHNY
214002	262	277	010	2440	TIKHNY LD	(HOUR),A
214005	311			2450	RET	
214006				2451	* DUE TO MINUTE DIFFERENCES IN THE	
214006				2452	* CRYSTALS FROM MACHINE TO MACHINE	
214006				2453	* IT MAY BE NECESSARY TO ALTER THE	
214006				2454	* THE VALUES TO WHICH EACH OF THE	
214006				2455	* REGISTERS IS SET IN THE FLOWING	
214006				2456	* TIMING LOCP.	
214006				2457	* FOR TVC-64 EXTENSIVE CHANGES	
214006				2458	* WILL NEED TO BE MADE.	
214006	006	201		2460	DELAYB LD	B,1
214010	016	021		2470	DELAYC LD	C,1
214012	026	001		2480	DELAYD LD	D,1
214014	036	003		2490	DELAYE LD	E,3
214016	046	116		2500	DELAYH LD	H,116
214020	056	100		2510	DELAYL LD	L,100
214022	055			2520	DELOOP	DEC L
214023	040	375		2530	JR	NZ,DELOOP
214025	045			2540	DEC	H
214026	040	372		2550	JR	NZ,DELOOP
214030	035			2560	DEC	E
214031	040	367		2570	JR	NZ,DELOOP
214033	025			2580	DEC	D
214034	040	364		2590	JR	NZ,DELOOP
214036	015			2600	DEC	C
214037	040	361		2610	JR	NZ,DELOOP
214041	005			2620	DEC	B
214042	040	356		2630	JR	NZ,DELOOP
214044	311			2640	RET	
214045	073	014		2650	DIGITS DW	ZERO
214047	136	014		2660	DW	ONE
214051	201	014		2670	DW	TWO
214053	244	014		2680	DW	THREE
214055	307	014		2690	DW	FOUR

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014057 352 014	2700	DW	FIVE
014061 015 015	2710	DW	SIX
014063 060 015	2720	DW	SEVEN
014065 123 015	2730	DW	EIGHT
014067 166 015	2740	DW	NINE
014071 231 015	2750	DW	SPACE
014073	2760 ZERO	DW	' 000 '
240 260 260 260 240			
014100	2770	DW	' 0 0 '
260 240 240 240 260			
014105	2780	DW	' 0 00 '
260 240 240 260 260			
014112	2790	DW	' 0 0 0 '
260 240 260 240 260			
014117	2800	DW	' 00 0 '
260 260 240 240 260			
014124	2810	DW	' 0 0 '
260 240 240 240 260			
014131	2820	DW	' 000 '
240 260 260 260 240			
014136	2830 ONE	DW	' 1 '
240 240 261 240 240			
014143	2840	DW	' 11 '
240 261 261 240 240			
014150	2850	DW	' 1 '
240 240 261 240 240			
014155	2860	DW	' 1 '
240 240 261 240 240			
014162	2870	DW	' 1 '
240 240 261 240 240			
014167	2880	DW	' 1 '
240 240 261 240 240			
014174	2890	DW	' 111 '
240 261 261 261 240			
014201	2900 TWO	DW	' 222 '
240 262 262 262 240			
014206	2910	DW	' 2 2 '
262 240 240 240 262			
014213	2920	DW	' 2 '
240 240 240 240 262			
014220	2930	DW	' 2 '
240 240 240 262 240			
014225	2940	DW	' 2 '

142 242 262 240 240			
214232 240 262 240 240 240	2950	DW	' 2 '
214237 262 262 262 262 262	2960	DW	'22222'
214244 240 263 263 263 240	2970 THREE	DW	' 333 '
214251 263 240 240 240 263	2980	DW	'3 3'
214256 240 240 240 240 263	2990	DW	' 3 '
214263 240 240 263 263 240	3000	DW	' 33 '
214270 240 240 240 240 263	3010	DW	' 3 '
214275 263 240 240 240 263	3020	DW	'3 3'
214302 240 263 263 263 240	3030	DW	' 333 '
214307 240 240 240 264 240	3040 FOUR	DW	' 4 '
214314 240 240 264 264 240	3050	DW	' 44 '
214321 240 264 240 264 240	3060	DW	' 4 4 '
214326 264 240 240 264 240	3070	DW	'4 4 '
214333 264 264 264 264 264	3080	DW	'44444'
214340 240 240 240 264 240	3090	DW	' 4 '
214345 240 240 240 264 240	3100	DW	' 4 '
214352 265 265 265 265 265	3110 FIVE	DW	'55555'
214357 265 240 240 240 240	3120	DW	'5 '
214364 265 240 240 240 240	3130	DW	'5 '
214371 265 265 265 265 240	3140	DW	'5555 '

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014376 240 240 240 240 265	3150	DW	' 5'
015003 265 240 240 240 265	3160	DW	'5 5'
015010 240 265 265 265 240	3170	DW	' 555 '
015015 240 266 266 266 240	3180 SIX	DW	' 666 '
015022 266 240 240 240 266	3190	DW	'6 6'
015027 266 240 240 240 240	3200	DW	'6 '
015034 266 266 266 266 240	3210	DW	'6666 '
015041 266 240 240 240 266	3220	DW	'6 6'
015046 266 240 240 240 266	3230	DW	'6 6'
015053 240 266 266 266 240	3240	DW	' 666 '
015060 267 267 267 267 267	3250 SEVEN	DW	'77777'
015065 240 240 240 240 267	3260	DW	' 7'
015072 240 240 240 267 240	3270	DW	' 7 '
015077 240 240 267 240 240	3280	DW	' 7 '
015104 240 267 240 240 240	3290	DW	' 7 '
015111 267 240 240 240 240	3300	DW	'7 '
015116 267 240 240 240 240	3310	DW	'7 '
015123 240 270 270 270 240	3320 EIGHT	DW	' 888 '
015130 270 240 240 240 270	3330	DW	'8 8'
015135 240 270 240 270 240	3340	DW	' 8 8 '

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015142 240 270 270 270 240	3350	DW	' 888 '
015147 270 240 240 240 270	3360	DW	' 8 8 '
015154 270 240 240 240 270	3370	DW	' 8 8 '
015161 240 270 270 270 240	3380	DW	' 888 '
015166 240 271 271 271 240	3390 NINE	DW	' 999 '
015173 271 240 240 240 271	3400	DW	' 9 9 '
015200 271 240 240 240 271	3410	DW	' 9 9 '
015205 240 271 271 271 271	3420	DW	' 9999 '
015212 240 240 240 240 271	3430	DW	' 9 '
015217 271 240 240 240 271	3440	DW	' 9 9 '
015224 240 271 271 271 240	3450	DW	' 999 '
015231 240 240 240 240 240	3460 SPACE	DW	' '
015236 240 240 240 240 240	3470	DW	' '
015243 240 240 240 240 240	3480	DW	' '
015250 240 240 240 240 240	3490	DW	' '
015255 240 240 240 240 240	3500	DW	' '
015262 240 240 240 240 240	3510	DW	' '
015267 240 240 240 240 240	3520	DW	' '
015274 377	3530 SETERM DB		377
015275 154	3540 DB		154
015276 323 305 324 240 305 322 322 317 322	3550 DW		' SET ERROR '
015307 000	3560 DB		0
015310 377	3570 SETMES DB		377

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015311 150	3580	DB	150
015312	3590	DW	'ENTER SET VALUE'
325 316 324 305 322			
240 323 305 324 240			
326 301 314 325 305			
015331 130	3600	DB	130
015332 000	3610	DB	0
015333	3630	WATCH	EQU RUN
015333 315 273 013	4000	TIMER	CALL DISPLY
015336 315 346 015	4010		CALL TOCK
015341 315 006 014	4020		CALL DELAYB
015344 030 365	4030	JR	TIMER
015346 072 301 010	4040	TOCK	LD A,(SECND)
015351 326 001	4050	SUB	1
015353 047	4060	DAA	
015354 376 231	4070	CP	99H
015356 302 370 015	4080	JP	NZ,TCKSNC
015361 076 131	4090	LD	A,59H
015363 016 001	4100	LD	C,1
015365 303 377 015	4110	JP	TCKSNX
015370 016 000	4120	TOKSNC	LD C,0
015372 016 000	4130	LD	C,0 INTENTIONAL DUPE FOR TIMIN
015374 303 377 015	4140	JP	TOKSNX
015377 062 301 010	4160	TOKSNX	LD (SECND),A
016002 072 300 010	4170	LD	A,(MINUT)
016005 221	4180	SUB	C
016006 047	4190	DAA	
016007 376 231	4200	CP	99H
016011 302 023 016	4210	JP	NZ,TOKMNC
016014 076 131	4220	LD	A,59H
016016 016 001	4230	LD	C,1
016020 303 032 016	4240	JP	TOKMNX
016023 016 000	4250	TOKMNC	LD C,0
016025 016 000	4260	LD	C,0
016027 303 032 016	4270	JP	TOKMNX
016032 062 300 010	4280	TOKMNX	LD (MINUT),A
016035 072 277 010	4290	LD	A,(HOUR)
016040 221	4300	SUB	C
016041 047	4310	DAA	
016042 376 231	4320	CP	99H
016044 302 062 016	4330	JP	NZ,TOKHNC
016047 315 066 016	4340	CALL	ALARM
016052 257	4350	XOR	A
016053 062 277 010	4360	LD	(HOUR),A
016056 076 004	4370	LD	A,04H
016060 030 341	4380	JR	TOKMNC
016062 062 277 010	4390	TOKHNC	LD (HOUR),A
016065 311	4400	RET	
016066 006 040	4410	ALARM	LD B,40
016070 305	4420	ALARML	PUSH BC
016071 041 110 016	4430	LD	HL,ALARMM
016074 315 000 002	4440	CALL	TVEDT
016077 076 002	4450	LD	A,2
016101 315 173 001	4460	CALL	TENTHS
016104 301	4470	POP	BC
016105 020 361	4480	DJNZ	ALARML
016107 311	4490	RET	
016110 052	4500	ALARMM	DB 52
016111	4510	DW	'DING-A-LING!'
304 311 316 307 255			

301 255 314 311 316
307 241
016125 052
016126 000
016127
016127
016127
016127
016127
016127
016127
016370 076 240
016372 315 372 000
016375 303 370 000

4520 DB 52
4530 DB 000
5000 * THE FOLLOWING ROUTINES ARE TO
5010 * ACCOMODATE THE TVC-64
5011 * CHANGE THE BYTES AT 002020 AND 002031
5012 * FROM 000 TO 016, AND THEN ADJUST
5013 * THE TIMING CONSTANTS TO RUN
5014 * PROPERLY WITH A TVC-64.
5020 ORG 016370
5030 TV64SP LD A,240
5040 TV64CH CALL TVCHR
5050 JP TVSPC