CHAPTER - IV

CHAPTER - 4

REQUIREMENTS OF CONTROL

4.1. REQUIREMENT OF CONTROLS :

The software activity of the proposed system is classifiable in two distinct modes of action viz. 1) Selection of the activity to be executed and 2) Execution of various control sequences to achieve the desired goal .

1) Selection of the activity : As discussed in the Sec. 3.2, the scope can acquire a screen full of data and save it for future references **"The Save Mode"**. Further the scope can digitize, store and display the channel information continuously **"The Acquisition + Display Mode"**. In addition to these the scope can display the data stored in the save mode on a specified channel or it can display the saved data along with continuous acquisition and display of another channel **"The Save Display Mode"**. μ_p should additionaly leave a provision to reselect the activity just performed **"The Enter All Mode"**. It is important to note that if Enter all mode is selected just after the system is powered on the software should be full proof to diselect the mode and return the system to monitor again.

Upon power on μc remains in a state, state0, where it expects a key entry to decide next course of action. In state0, all the I/O ports and system registers are initialised to their default values.

Upon a key entry is detected, the uc enters in state1, where it analyses the key code and sagrigates the course of action pertaining to one of the basic mode discussed in para one.

Within the save mode the uc analyses the pannel settings information and displays the selected mode of operation in to the DSO screen. The next key entry signifies selection of memory bank either by default or by the appropriate key number. Next it decides on the basis of time base settings whether the acquisition is in Slow, Fast or Repeatative range of address generation. The relevant parameters to these modes are acquised by uc or selected by default. Table 4.11 specifies the required parameters in all the modes of action. Table 4.1 also mentions the format of key entries and their initialisation status. The uc then performs reinitialisation of various latches to multiplex and execute the desired activity.

Table 4.11

Available modes of action.

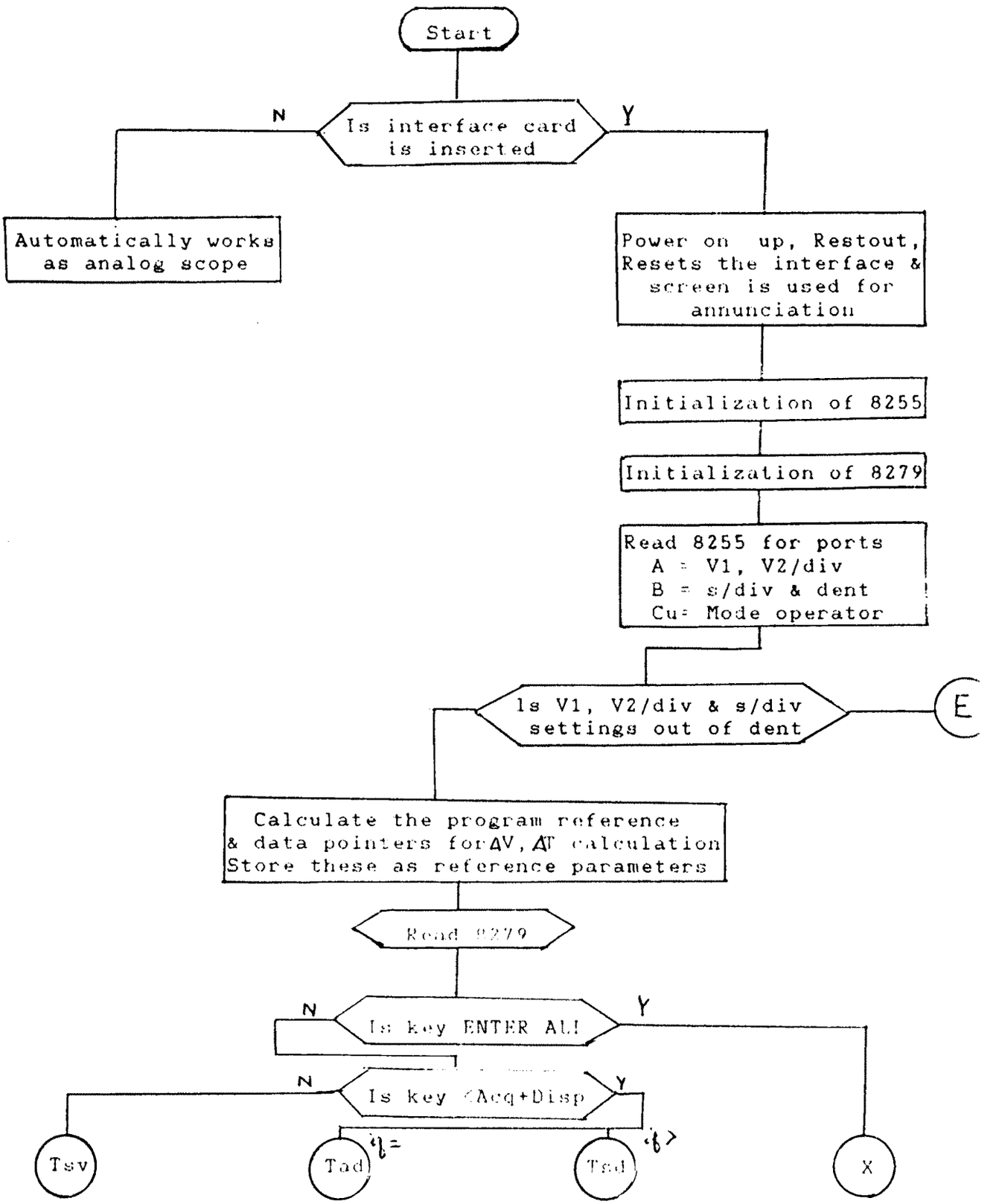
Sr. No.	Mode Action	U/$\overline{T}$	PTC	SWT	Keyentry Status	Memory Bank
1.	Save	Yes	--	--	Single	Yes
2.	Acq+Disp	--	Yes	--	Two keys	--
3.	Save+Disp	--	--	Yes	Two keys	Yes

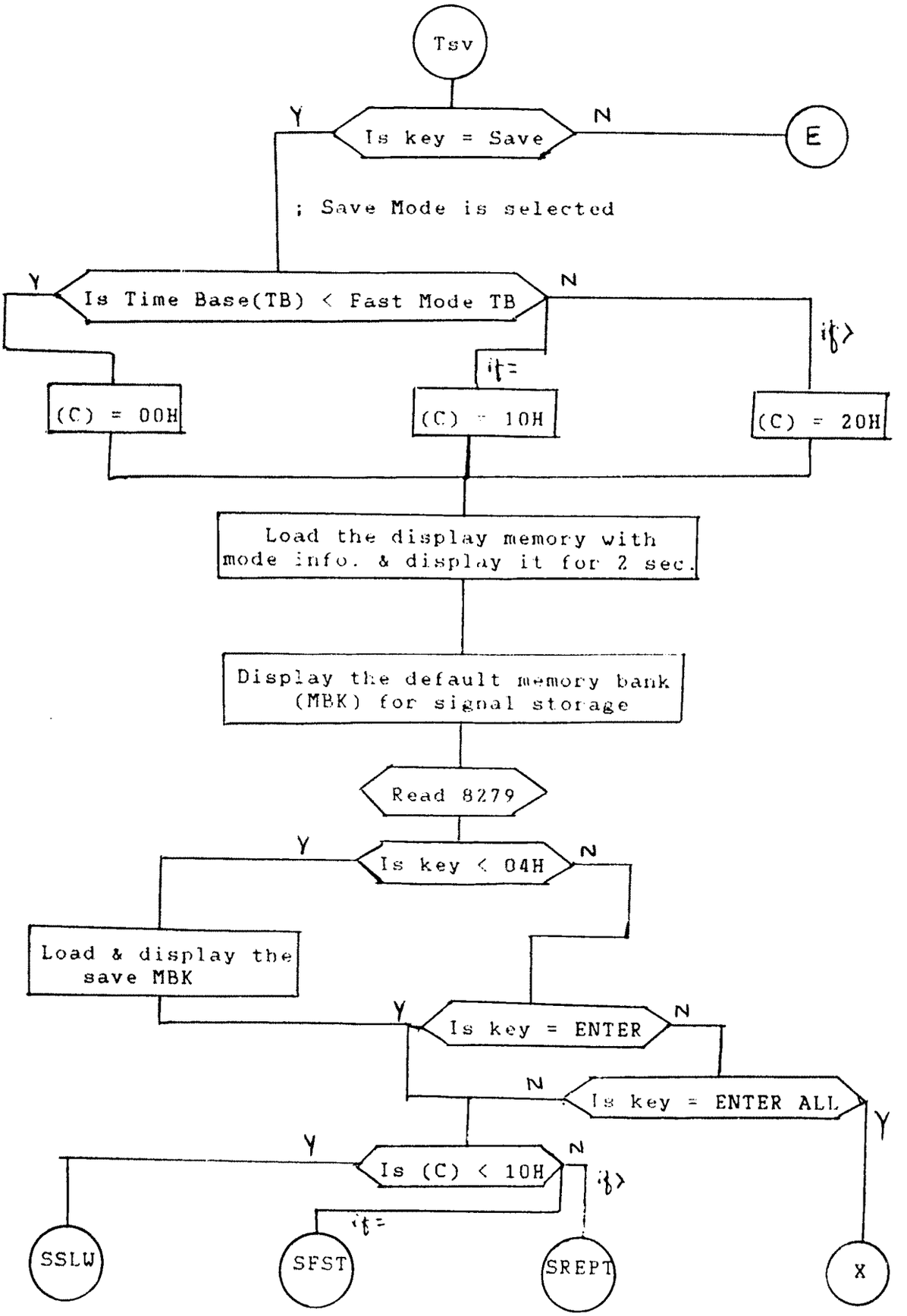
In state2 the control is passed on to action sequencer routine. The action sequencer initialises the address generater

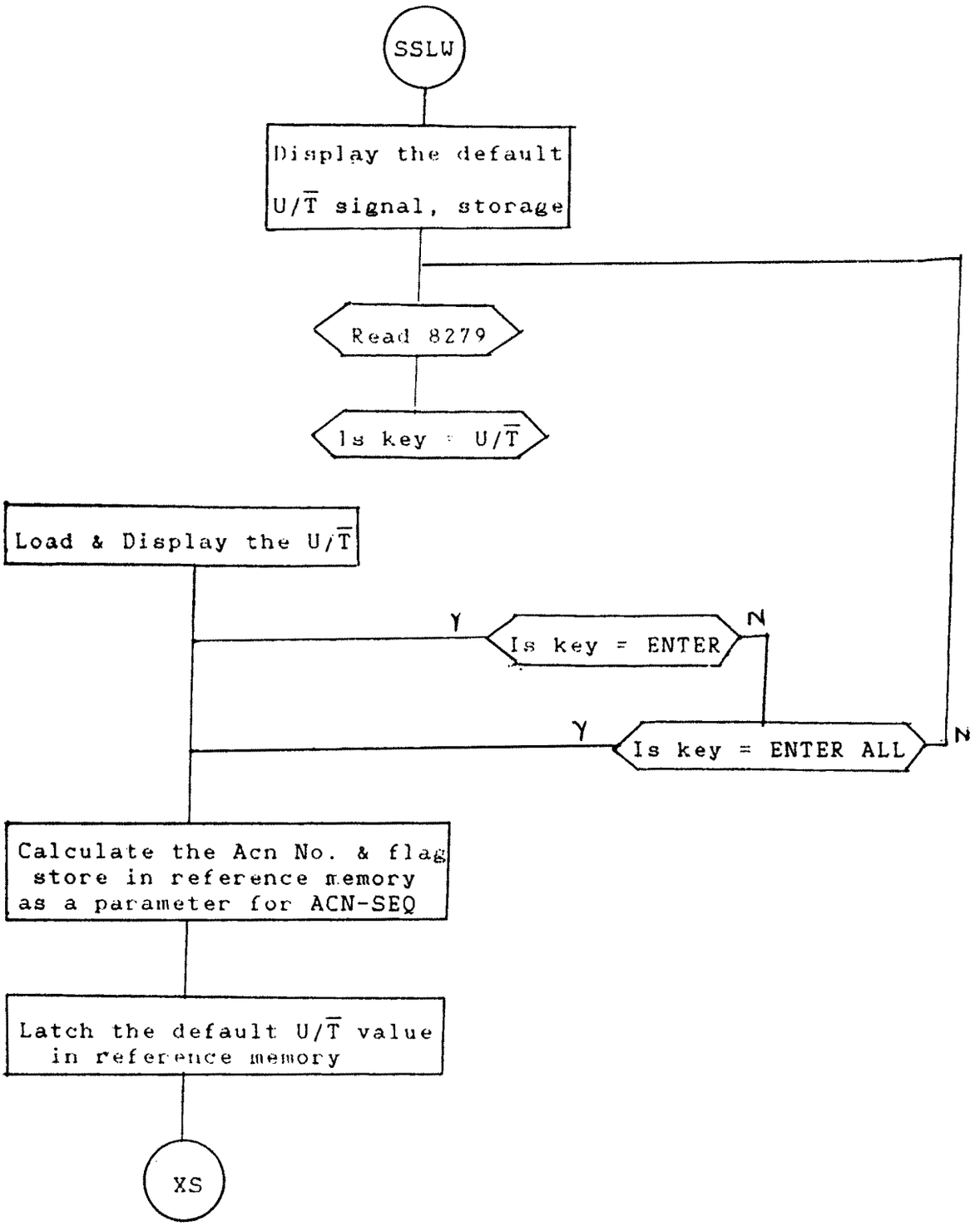
mode amd loads the control word for the very first activity of the action. End of activity will be indicated through an interrupt, either RST7.5, RST6.5, RST5.5 or INTR. Each interrupt specifies the outcome of the activity. Then depending upon the outcome the action sequencer loads the next mode word of the control. Dependent on the requirement, it changes the selected address generator module and display the voltage difference and time difference between the cursor positions. The activities in Acquisition + Display Mode and Save Display Mode follow on the similar lines those of the save mode. Therefore, are not discussed separately. If the Enter all mode is selected the μc will switch into action sequencer directly using reference registers, to pass on the Action No. and default values [selected in the previous mode selection] of various parameter. The exit from any of these mode occur if the pannel settings are changed, during the course of action.

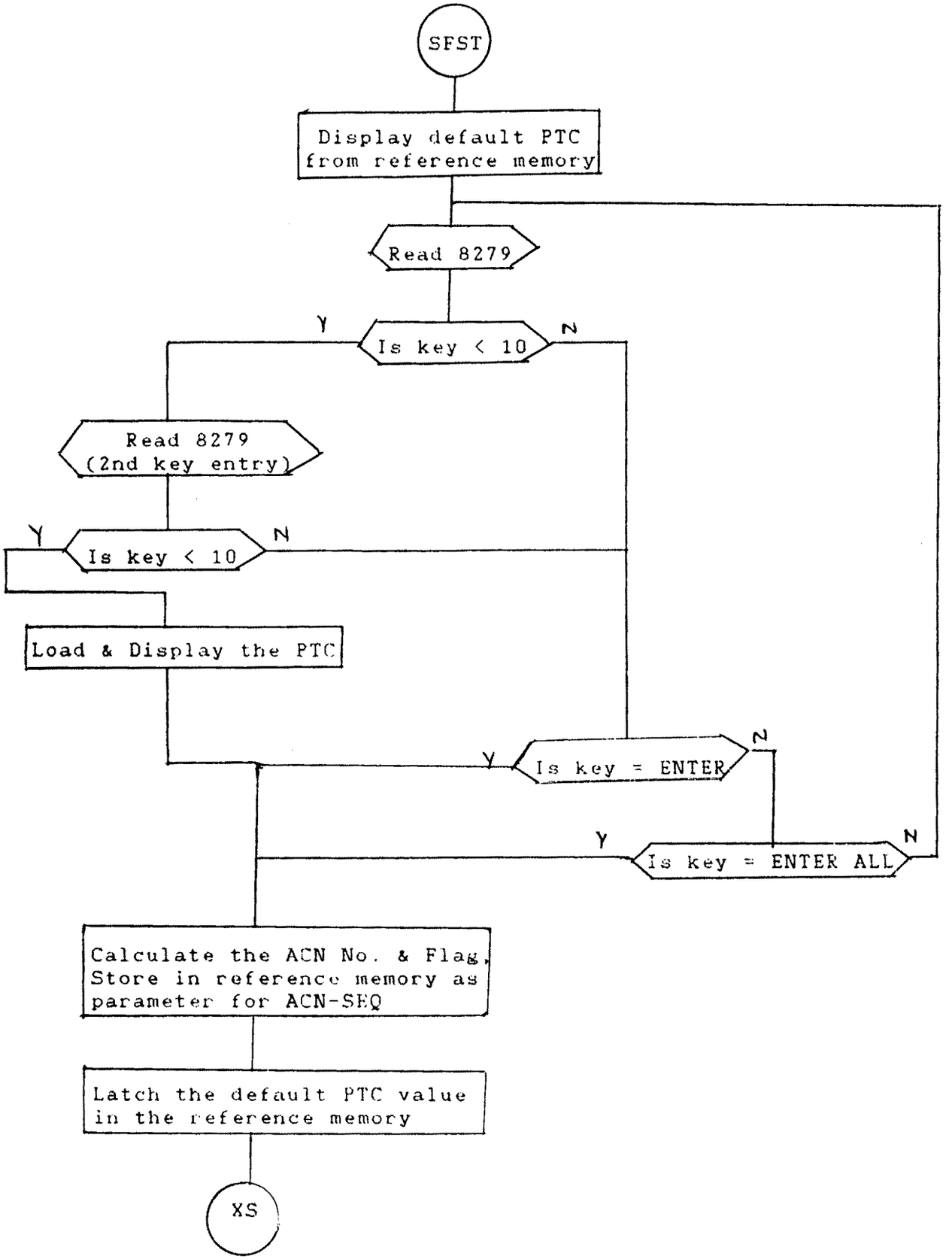
As hardware has been completely defined in Chapter-3. A almost specific Flow-chart of the software activity is given as, Flow-chart 4.11. In the forth coming sections details of the software activities are elaborated.

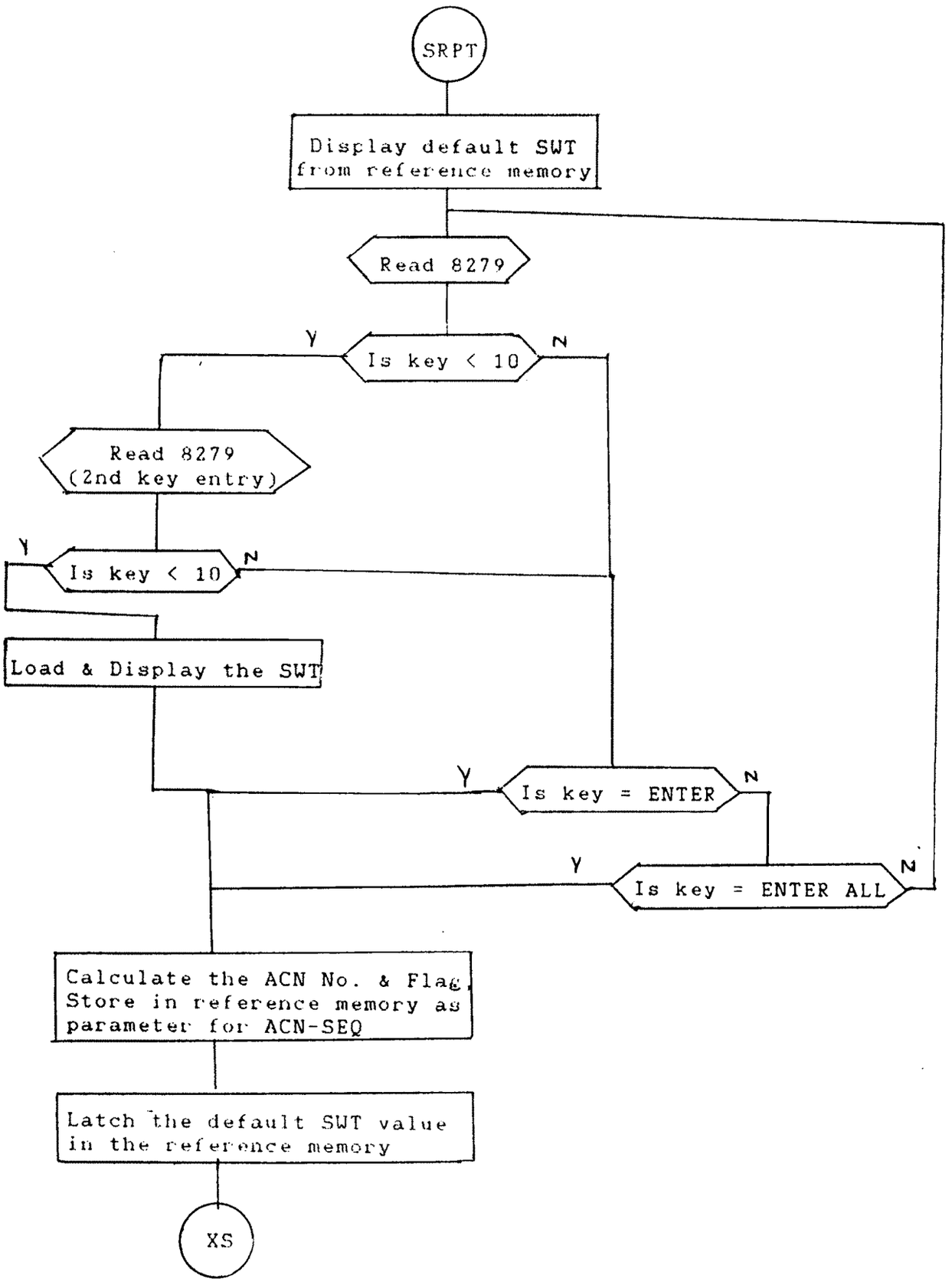
4.11 FLOW CHART

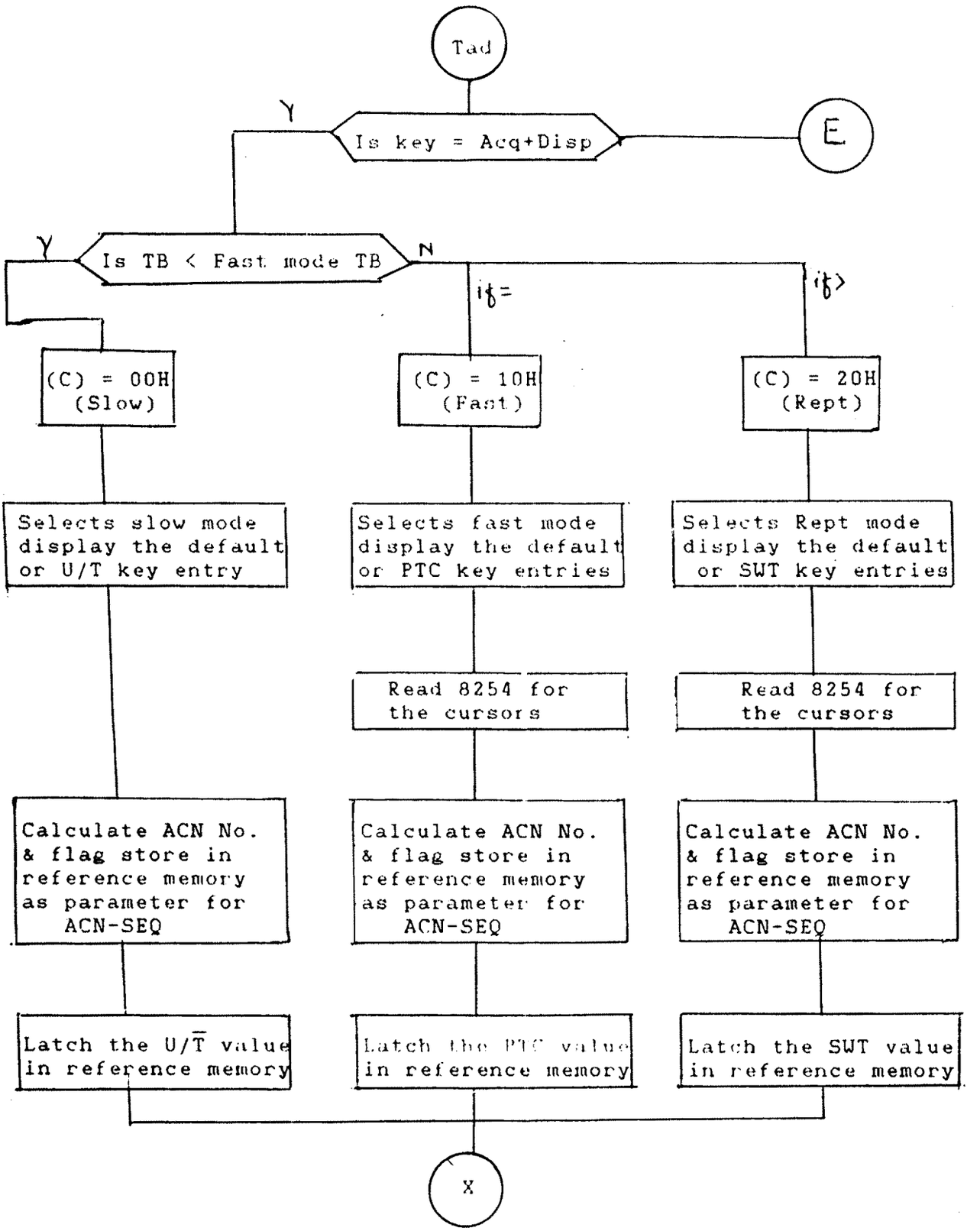


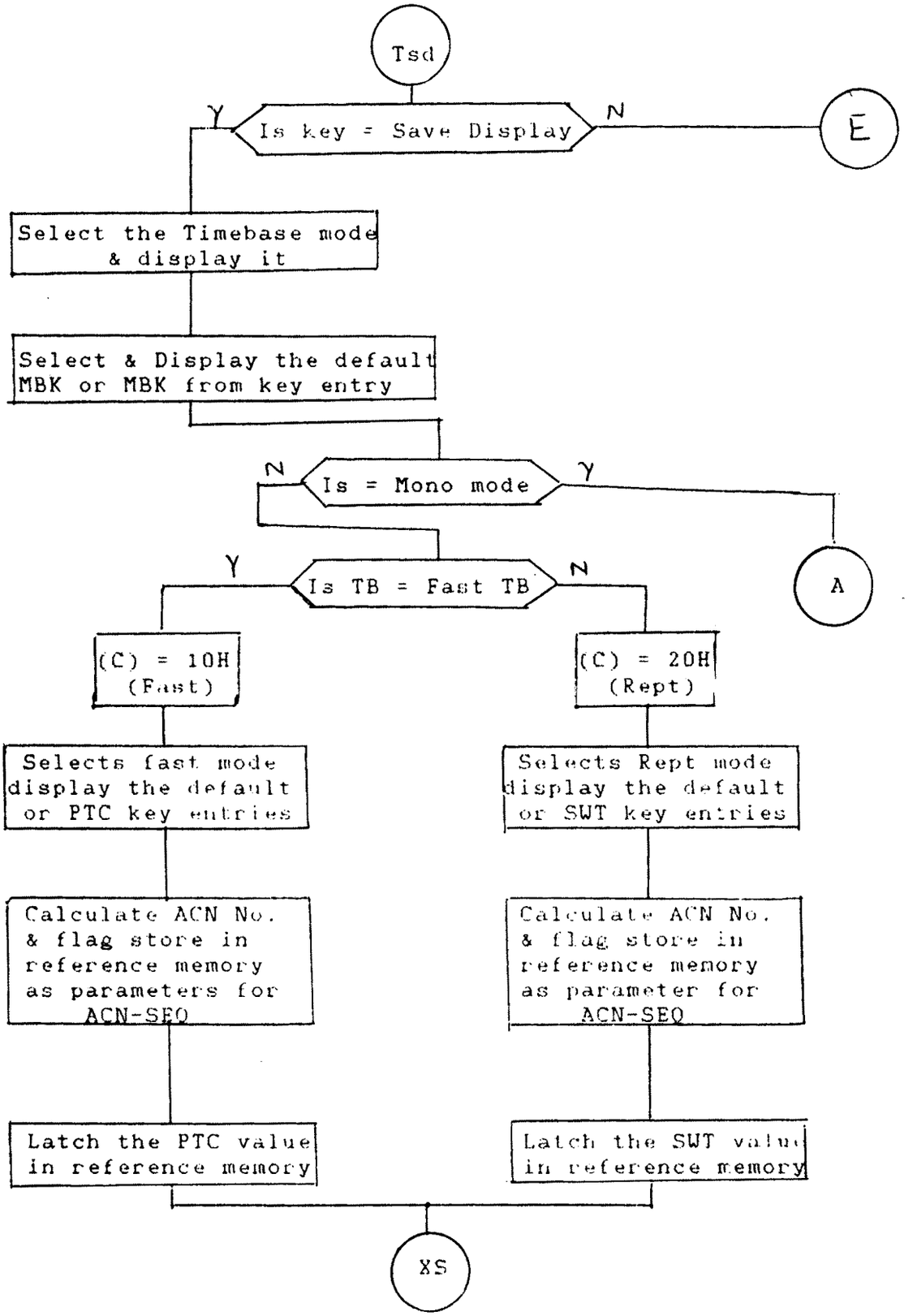

Tsv
Y
Is key = Save
N
E
; Save Mode is selected
Y
Is Time Base(TB) < Fast Mode TB
N
if>
if=
(C) = 00H
(C) = 10H
(C) = 20H
Load the display memory with mode info. & display it for 2 sec.
Display the default memory bank (MBK) for signal storage
Read 8279
Y
Is key < 04H
N
Load & display the save MBK
Y
Is key = ENTER
N
N
Is key = ENTER ALL
Y
Y
Is (C) < 10H
N
if>
if=
SSLW
SFST
SREPT
X

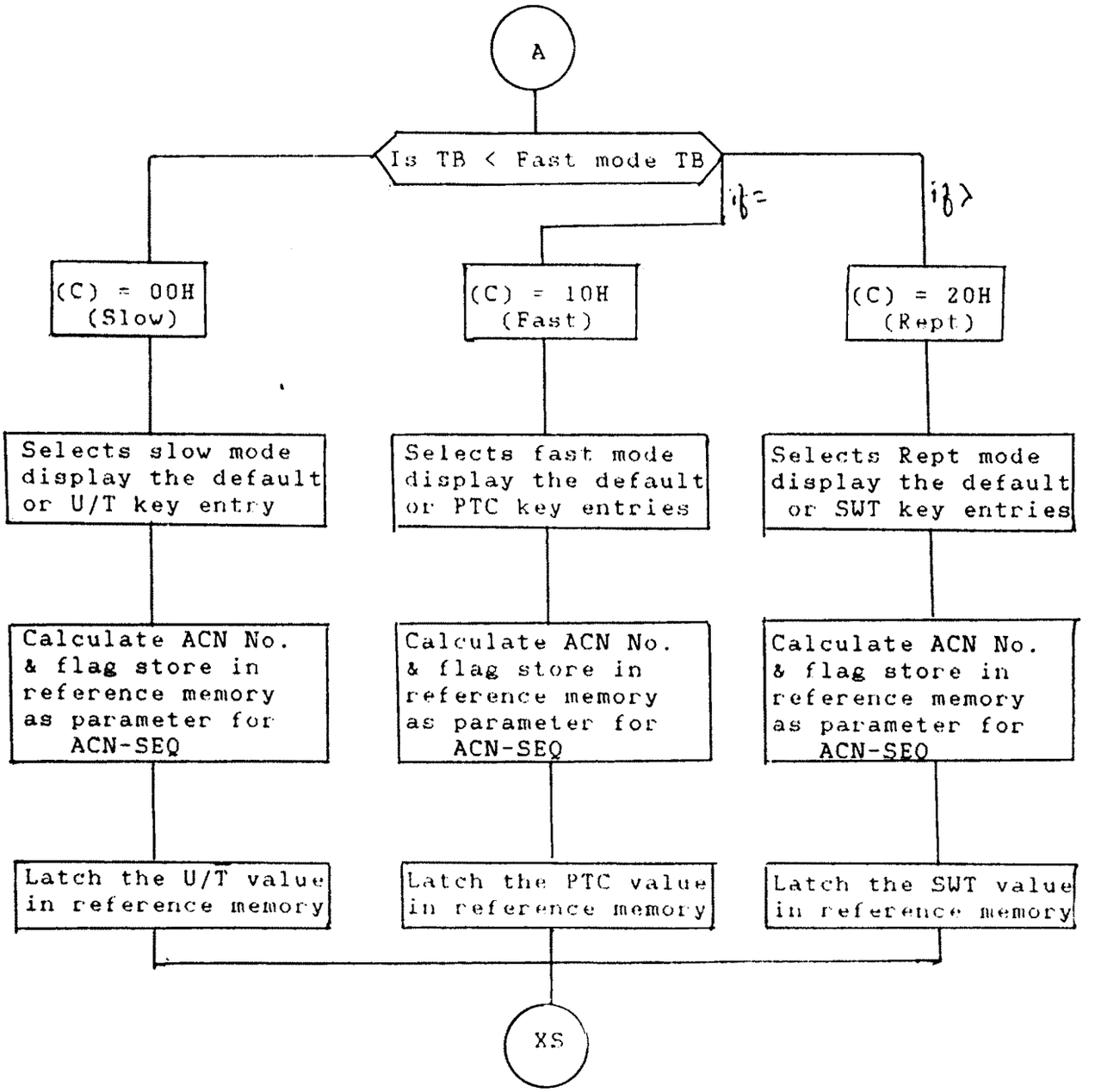

SSLW
Display the default U/T signal, storage
Read 8279
Is key = U/T
Load & Display the U/T
Y
Is key = ENTER
N
Y
Is key = ENTER ALL
N
Calculate the Acn No. & flag store in reference memory as a parameter for ACN-SEQ
Latch the default U/T value in reference memory
XS

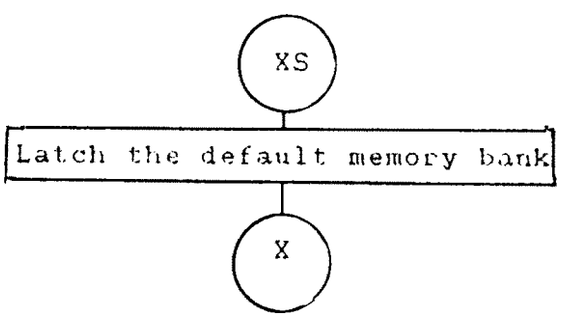

SFST
Display default PTC from reference memory
Read 8279
Y
Is key < 10
N
Read 8279 (2nd key entry)
Y
Is key < 10
N
Load & Display the PTC
Y
Is key = ENTER
N
Y
Is key = ENTER ALL
N
Calculate the ACN No. & Flag, Store in reference memory as parameter for ACN-SEQ
Latch the default PTC value in the reference memory
XS

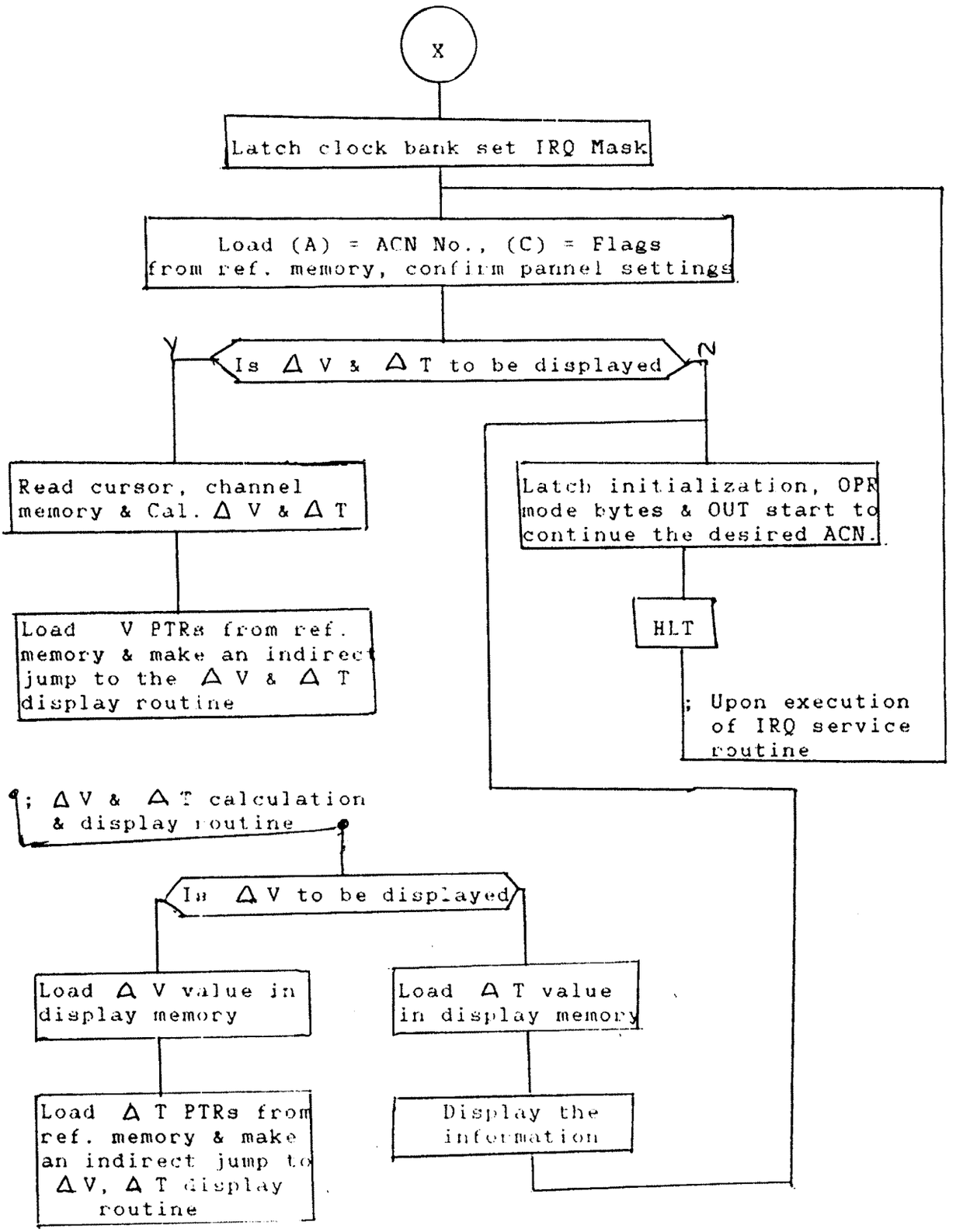

SRPT
Display default SWT from reference memory
Read 8279
Y
Is key < 10
N
Read 8279 (2nd key entry)
Y
Is key < 10
N
Load & Display the SWT
Y
Is key = ENTER
N
Y
Is key = ENTER ALL
N
Calculate the ACN No. & Flag, Store in reference memory as parameter for ACN-SEQ
Latch the default SWT value in the reference memory
XS


Tad
Y
Is key = Acq+Disp
E
Y
Is TB < Fast mode TB
N
if=
if>
(C) = 00H (Slow)
(C) = 10H (Fast)
(C) = 20H (Rept)
Selects slow mode display the default or U/T key entry
Selects fast mode display the default or PTC key entries
Selects Rept mode display the default or SWT key entries
Read 8254 for the cursors
Read 8254 for the cursors
Calculate ACN No. & flag store in reference memory as parameter for ACN-SEQ
Calculate ACN No. & flag store in reference memory as parameter for ACN-SEQ
Calculate ACN No. & flag store in reference memory as parameter for ACN-SEQ
Latch the U/T value in reference memory
Latch the PTC value in reference memory
Latch the SWT value in reference memory
X

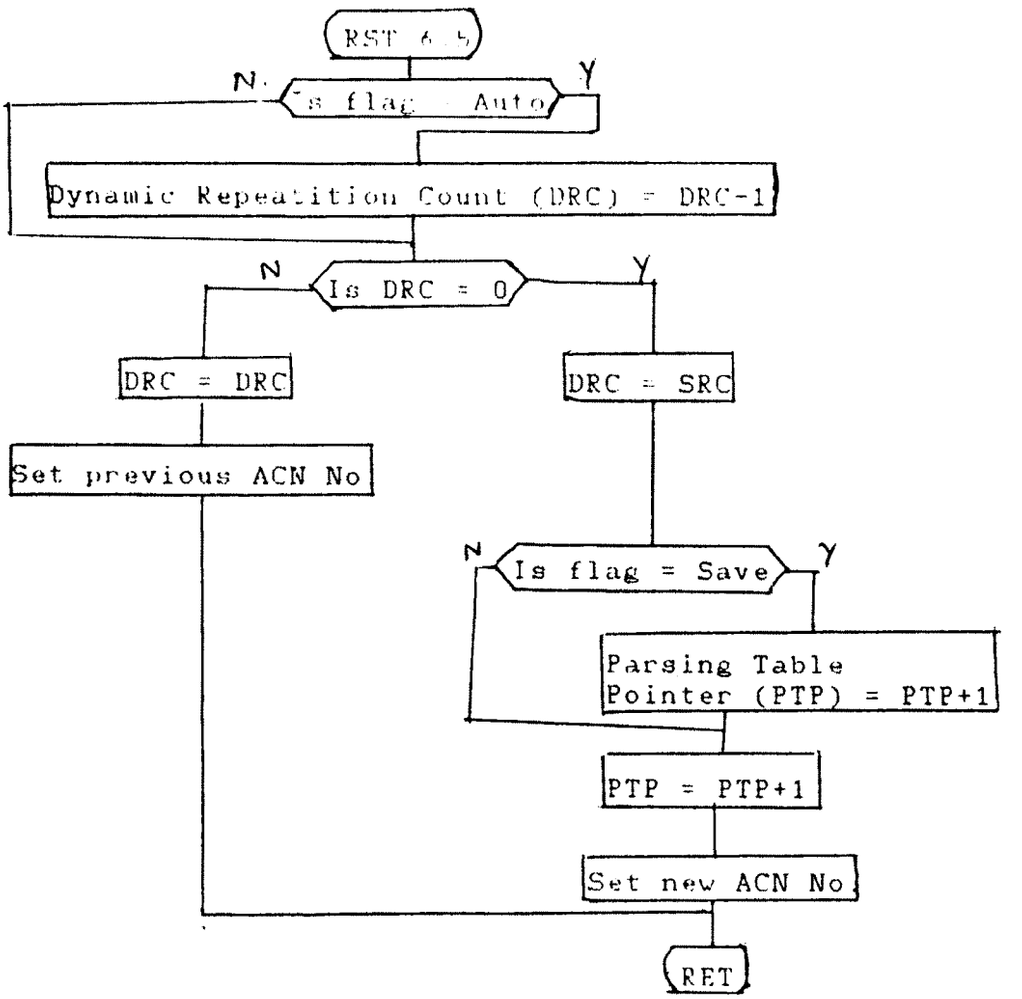

Tsd
Is key = Save Display
Y
N
E
Select the Timebase mode & display it
Select & Display the default MBK or MBK from key entry
N
Is = Mono mode
Y
A
Y
Is TB = Fast TB
N
(C) = 10H (Fast)
(C) = 20H (Rept)
Selects fast mode display the default or PTC key entries
Selects Rept mode display the default or SWT key entries
Calculate ACN No. & flag store in reference memory as parameters for ACN-SEQ
Calculate ACN No. & flag store in reference memory as parameter for ACN-SEQ
Latch the PTC value in reference memory
Latch the SWT value in reference memory
XS

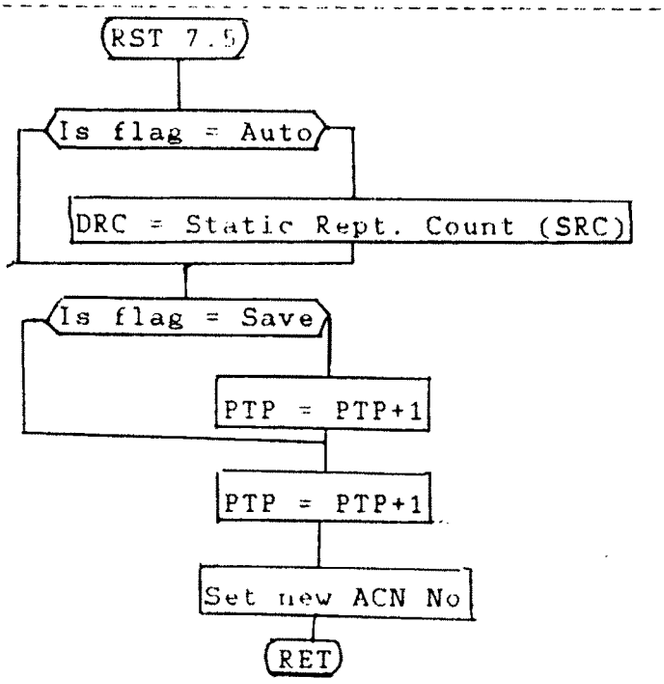

A
Is TB < Fast mode TB
if=
if>
(C) = 00H (Slow)
(C) = 10H (Fast)
(C) = 20H (Rept)
Selects slow mode display the default or U/T key entry
Selects fast mode display the default or PTC key entries
Selects Rept mode display the default or SWT key entries
Calculate ACN No. & flag store in reference memory as parameter for ACN-SEQ
Calculate ACN No. & flag store in reference memory as parameter for ACN-SEQ
Calculate ACN No. & flag store in reference memory as parameter for ACN-SEQ
Latch the U/T value in reference memory
Latch the PTC value in reference memory
Latch the SWT value in reference memory
XS


XS
Latch the default memory bank
X



Note : 27 different load information for Δ V & Δ T are developed (Sec. 4.2)


RST 6.5
N
Is flag = Auto
Y
Dynamic Repeatition Count (DRC) = DRC-1
N
Is DRC = 0
Y
DRC = DRC
DRC = SRC
Set previous ACN No
N
Is flag = Save
Y
Parsing Table Pointer (PTP) = PTP+1
PTP = PTP+1
Set new ACN No
RET


RST 7.5
Is flag = Auto
DRC = Static Rept. Count (SRC)
Is flag = Save
PTP = PTP+1
PTP = PTP+1
Set new ACN No
RET

4.2. THE I/O AND MEMORY MAPPING :

Fig. 4.21 shows the inter connections of various components on the system bus, which do not form part of the DSO interface directly. I/O and memory mapping charts are given in the Table 4.21, 4.23 respectively. A supplimentary table indicating split up of the reference memory and default values of the reference registers is given as the first page of the software listing itself.

Table 4.21

I/O Mapping Chart

Sr.No.	I/O Port	Address
1.	8255	0 0
2.	8279	1 0
3.	8254	2 0
4.	Clock Generator	3 0
5.	Mode Latch 8212	4 0
6.	Mode Opr.Latch	5 0
7.	Transiver Latch	6 0
8.	Output Latch	7 0
9.	PTC Latch1	8 0
10.	PTC Latch2	9 0
11.	SWT Latch	A 0
12.	DMA Control Latch	B 0

Sr.No.	I/O Port	Address
13.	Primary Add. Latch1	C 0
14.	Primary Add. Latch2	D 0
15.	Start Bit Latch	E 0

Table 4.22

Keyboard Entries

Sr.No.	Key Code	First meaning	Second meaning
1.	01 H	1	Save key
2.	02 H	2	Acq+Disp key
3.	03 H	3	Save-Disp key
4.	04 H	4	-
5.	05 H	5	-
6.	06 H	6	-
7.	07 H	7	-
8.	08 H	8	-
9.	09 H	9	-
10.	0A H	A	-
11.	0B H	B	-
12.	0C H	C	-
13.	0D H	D	-
14.	0E H	E	-
15.	0F H	F	-
16.	10 H	Enter key	-
17.	11 H	Enter All key	-

Table 4.23

Memory Mapping Chart

Sr.No.	Parameter	Memory Address
1.	Monitor Page	0 0 0 0 - 0 F F F
2.	Data Page	1 0 0 0 - 1 B F F
3.	Action Pointer	1 C 0 0 - 1 C F F
4.	Pannel Settings	1 D 0 0 - 1 D F F
5.	Mode Operation	1 E 0 0 - 1 E F F
6.	Reconstruction Table & Auto/Normal Weight	1 F 0 0 - 1 F F F
7.	System RAM Area	2 0 0 0 - 2 3 F F
8.	Display Information	2 4 0 0 - 2 7 F F
9.	Cursor/Trigger Memory	4 0 0 0 - 5 0 0 0
10.	Acq. Memory Ch1 [MCh1]	5 0 0 0 - 5 7 F F
11.	Acq. Memory Ch2 [MCh2]	5 8 0 0 - 5 F F F

1) ROM data reference area :

a) The address range 1D00H to 1EFFH occupies the reference information required for the software in its various states. A first page of 512 bytes stores the characters to be displayed as menu, in the various stages of the software interaction. The menu includes information lines, specifying mode of activity, the selected time base range and pannel settings. The length of line is of 32 bytes and is selected as set of two groups of 16 bytes to form the complete information. As an example the displayed information and corresponding character spacing is given below.

Ø	Ø	S	A	V	E	D	I	S	P	Ø	Ø	R	E	P	T	Ø	Ø	D	U	Ø	A	L	T	Ø	A	Ø	C	H	1	Ø	Ø

The pannel setting information put into the display RAM is washed out from the display and abbreviated characters indicating, the parameters to be inputed and their default are displayed along with the mode information. Register pair H and D is used for transfer of ROM information to the display register.

b) Display of magnitudes - The format of magnitude display is laoded into the display memory before the system enters into the action sequence switching. During the execution, the appropriate V and T values are loaded into the display register.

For computing the actual values a tedious and involved procedure is adopted. It has been so seen that the computation should be as fast as possible, the amount of software overhead required be optimum. The constraint is because of the limited set of arithmatic instructions with 8085. The actual procedure is discussed in the next section but the data look-up tables form the consecutive 3K page of ROM.

The time base setting, the V/div settings on both the channels are converted into a different internal representation code and the corresponding look-up tables occupy ROM address 1F00H to 1FFFH. The address range 0000H to 0FFFH is used for monitor storage. The requirement of RAM was limited for the stack and data reference area. Taking into account the further developments a 1K RAM page has been conveniently used for the purpose. The acquisition memory of the system also forms the RAM space for the monitor, at the addrcss vectors indicated in Table 4.23.

The I/O maps provide address allocations for the various control ports used in the system. In addition to these the ports of keyboard interface 8279, timer 8254 and the parallel port 8255 are also defined in the mapping. A character generator ROM used in the information display system and RAM used in save mode do not form part of the up interface.

2) **I/O Programming** : The parallel port 8255 is meant to read the pannel settings information. Port A accomodates the V/div for both the channels. Each channel is encoded into a 4 bit number. Port B provides encoded s/div settings as its 5LSBs while the 3MSBs are used to read the status of variable V/div or s/div settings [whether or not the controls are on dent]. The mode settings information is read through port C_L, the device is programmed in mode0, Port A, B, C_L as input and Port C_U as an output. A bit in C_U controls the interface inter connection and the remaining bits are open for further development. A encoding of the V/div, s/div and pannel settings is given in Table 4.24 & 4.25.

Table 4.24

Encoding of the Ports/div

Sr.No.	Volts/div	Encoded Volts/div	Reconstructed Volts/div
1.	20	B H	20 H
2.	10	A H	1E H
3.	5	9 H	1D H
4.	2	8 H	1C H
5.	1	7 H	1A H
6.	0.5	6 H	19 H
7.	0.2	5 H	18 H
8.	0.1	4 H	16 H
9.	50 m	3 H	15 H

Sr.No.	Volts/div	Encoded Volts/div	Reconstructed Volts/div
10.	20 m	2 H	14 H
11.	10 m	1 H	12 H
12.	5 m	0 H	11 H

Table 4.25

Encoding of sec/div

Sr.No.	Sec/div	Encoded Sec/div	Reconstructed Sec/div
1.	0.2	11 H	18 H
2.	0.1	10 H	16 H
3.	50 m	1F H	15 H
4.	20 m	1E H	14 H
5.	10 m	1D H	12 H
6.	5 m	1C H	11 H
7.	2 m	1B H	10 H
8.	1 m	1A H	0E H
9.	0.5 m	19 H	0D H
10.	0.2 m	18 H	0C H
11.	0.1 m	17 H	0A H
12.	50 μ	16 H	09 H
13.	20 μ	15 H	08 H
14.	10 μ	14 H	06 H
15.	5 μ	03 H	05 H
16.	2 μ	02 H	04 H
17.	1 μ	01 H	02 H
18.	0.5 μ	00 H	01 H

The 8279 is programmed in to 2key-lock-out encoded keyboard scan mode with clock pre-scaler at 30. The clock input to the 8279 is of 3MHz [CLOCK-OUT].

The 8254 is used to record and control the cursor positions. The device programming varies in fast and repeatative modes. Counter0 is used to generate a divided by n square wave output. In

the fast mode the counter0 generates, a divided by 8 clock, the clock output is fed to counter 1 and 2 simultaneously and counter 1 and 2 provide the actual cursor position for left and right cursor respectively. In repeatative mode the memory storage and retrieval is slot based (Sec.3.3). For the time base settings of 5 & 2 μs/div, first 5 locations out of each block of 8 bits are loaded and retrieved. The cursor position recorded by the 8254 reconciles with this storage scheme by settings the counter0 as a divided by 5 counter. For time base at 1 μs/div and 0.5 μs/div. The counter0 generates a divided by 10 and 20 square wave respectively. The initial counts in counter1 and 2 are also managed simultaneously.

3) Δ V and Δ T Calculations : A virtue of s/div and V/div settings control is that both these moves in steps of 1, 2 and 5. The full scale of horizontal as well as vertical deflections is preconditioned at 10cms full scale (Sec. 3.3).
The magnitude calculations follows the equation.

$$V = V/div \times 10 \times \Delta V/256 \quad \ldots\ldots (1)$$

[where Δ V is the binary difference]

The cursor positions are also treated as 256 cursor points and therefore the calculation of Δ T will proceed as,

$$T = S/div \times 10 \times \Delta T/256 \quad \ldots\ldots (2)$$

[where Δ T is the binary difference]

Equation (1) and (2) suggest that the magnitude calculation will be independent of whether it is Δ V or Δ T. Therefore the

calculation procedure is combined for both these quantities. The magnitude is displayed in the form, as given in Table 4.26.

Table 4.26

The Magnitude Display Form

Sr. No.	V/div or S/div settings	C	B	A	Group
1.	20	X X X	X X.X	X.X X	G-91
2.	10	X X X	X.X X	X X X m	G-83
3.	5	X X.X	X.X X	X X X m	G-82
4.	2	X X.X	X.X X	X X X m	G-81
5.	1	X.X X	X X X m	X X.X m	G-73
6.	0.5	X.X X	X X X m	X X.X m	G-72
7.	0.2	X.X X	X X X m	X X.X m	G-71
8.	0.1	X X X m	X X.X m	X.X X m	G-63
9.	50 m	X X X m	X X.X m	X.X X m	G-62
10.	20 m	X X X m	X X.X m	X.X X m	G-61
11.	10 m	X X.X m	X.X X m	X X X u	G-53
12.	5 m	X X.X m	X.X X m	X X X u	G-52
13.	2 m	X X.X m	X.X X m	X X X u	G-51

Sr. No.	V/div or S/div settings	C	B	A	Group
14.	1 m	X.X X m	X X X μ	X X.X μ	G-43
15.	0.5 m	X.X X m	X X X μ	X X.X μ	G-42
16.	0.2 m	X.X X m	X X X μ	X X.X μ	G 41
17.	0.1 m	X X X μ	X X.X μ	X.X X μ	G-33
18.	50 μ	X X X μ	X X.X μ	X.X X μ	G-32
19.	20 μ	X X X μ	X X.X μ	X.X X μ	G-31
20.	10 μ	X X.X μ	X.X X μ	X X X n	G-23
21.	5 μ	X X.X μ	X.X X μ	X X X n	G-22
22.	2 μ	X X.X μ	X.X X μ	X X X n	G-24
23.	1 μ	X.X X u	X X X n	X X.X n	G-13
24.	0.5 μ	X.X X u	X X X n	X X.X n	G-12

The available V/div and s/div settings are given in Table 4.26, starting from any position, the 3rd settings will be a divided by 10 of the starting point, therefore the magnitude will be shifted only in the decimal positions. At present the magnitude display proposed has 3 significant figures. Therefore the ratio of 10^3 only is accomodable with the shift of decimal point, which is not really sufficient. The reason are as follows. The maximum ratio of the settings encountered for the time base positions of 0.1s/div and 0.1 μs/div is of 10^5. Further the ratio $\Delta V/256$ and

$\Delta T/256$ will also dectate the required least count. Table 4.4 shows the format of magnitude display in each V/div and s/div settings. The magnitude part of calculation will be different for the settings of multiple of 1, 2 or 5 but it will be same for any multiple of, 1 viz. 0.1, 0.01 etc. or 2 viz. 0.2, 0.02 etc. or 5 viz. 0.5, 0.05 etc. These magnitudes are stored as a group of 4 bytes in the ROM (Table 4.23).

Within each settings the magnitude is required to be displayed in three different forms, Table 4.26, to reconcile with the requirement of the least count. Further the suppliments μ, m, μ, n are also exclusive with each setting. There are in all 24 different formats of magnitude display, each format has been executed as a separate program.

The program to be executed to display appropriate ΔV and ΔT are determined in the state0. The address vectors corresponding to these programs and the respective data areas are loaded into the reference memory area. Making use of these reference locations, an indirect jump is executed using LHLD and PCHL structure. This procedure is executed after each acquisition cycle whenever magnitude display is valid. Because of the magnitude calculation the required hold of time between two acquisition is little more. The rough estimate are as below (Table 4.27). It is aparent from values that the magnitude calculation do not impose any difficulty for persistance of vision for the time base settings below 1 ms/div. [This estimate assumes a continuous

signal satisfying the trigger requirement] This is apparent from Table 4.27.

Table 4.27

Requirement of Hold Time

Sr. No.	Mode	Time base Setting	Calculation of magnitude	Information Display	Display of Signal
1.	Fast	50ms/div to 10 us/div	350 usec.	80 usec.	s/div X 10
2.	Rept.	5 & 2 us/div	400 usec.	80 usec.	s/div X 10
		1 us/div	410 usec.	80 usec.	s/div X 10
		0.5 us/div	420 usec.	80 usec.	s/div X 10

Note : Calculations are for 1 ms/div.

4) The Action Sequencer : The magnitude calculation forms part of the action sequencer and the magnitude calculation is effected upon acquisition of the specified channel in the fast and the repeatative modes. As specified earlier the magnitude calculation is not effected for slow and save modes, for these modes the program flow directly jumps to the action sequencing routine.

A flag is used to indicate the action sequencer whether or not it has to output the initialisation byte. The initialisation byte basically selects the address generator. If the action getting executed has once initialised the address generator, then in the execution of the forth coming activities selection of address generator is redundant. Next the action sequencer outputs

the mode control byte as dictated by the activity and then outputs a start bit, indicating start of the action. The sequencer awaits for the interrupt to occur. Dependent on the interrupt received, it executes the next activity. These various activities are parsed systematically. The basic concept while developing the action sequencer is based on the similar lines that of the keyboard parsing, specified form microprocessor control analytical instruments (38). The initial action number and flags are treated as a token and these themselves direct the next action word. The concepts are transparant through the parsing table explained below.

The parsing table of the action sequencer is given in Table 3.21. The table has entries of the action word, the abbreviated form of action. Address generator initialisation byte, mode control byte, flags indicating save, Auto/Normal mode of action, the interrupt received and the action word of the next activity to be executed. The next activity column has a multiple choice, two fold, and the selection of the activity is dependent on the flags and interrupt received. Normally the action sequencer will select the first action word. In the save mode and the save display mode the second action word is selected. The interrupts RST6.5 and RST7.5 indicates whether a valid trigger has been received or not. In absence of trigger activities in auto and normal modes are different.

In normal mode the acquisition activity is repeated indefinately till a trigger is received i.e. interrupt RST7.5. In the auto mode

for each time base settings the acquisition is repeated for a specific count such that the total time ellapse without trigger will be of 300 us. These repeatation counts are loaded into the specific reference register of 16 bit length.

In the repeatative mode the acquisition is repeated in the similar manner as in fast mode for the number of times dectated by the slot weight.

The parsing table is loaded into ROM with each action word occupying a 4 byte space.

Remaining features of the action sequencer are transparent through the parsing table and a listing itself. A few points whichever are unimportant to be put as a elaborate discussion are transparent through the listing itself.

4.3. LISTING :

Table 4.31

List of Variable Entries

Address RAM Base+	Quantity
0	Encoded V1/div & V2/div
1	Encoded S/div
2	Encoded pannel setting
3	V1/div setting
4	V2/div setting
5	S/div setting
6	Pannel setting (Mode operand)
7	Reconstructed S/div setting
8	Reconstructed V/div setting
9,10	Acquisition Memory, Base Address
11,12	Data Page Address
13,14	Pointer for PC, Δ V calculation

Address RAM Base+	Quantity
15,16	Pointer for PC, ΔT calculation
19	Default parameters, Save memory
20	Default parameters, Trigger-Untrigger
21	Flag-Action
22	Action No.
23,24	Pretrigger count
25,26	Repeatition count static
27	Display status flag
28,29	Address of Acquisition base
30	ΔV/ ΔT indication flag
32,33	Data page address ΔT
34-39	Initialized Slot weight
46,47	Default pretrigger count
48	Display flag
49,50	Repeat count

Table 4.32

List of Data Equivalent Variables

Data	Quantity
1	Offset reconstruction table, LSB
2	Base reconstruction address pointer, MSB
3	Base MCh2 RAM, MSB
4	Base MCh1 RAM, MSB
5	Base PCv
6	Offset GiPRM
7	Offset GiSEC, MSB
8	Base 1K page, MSB
9	Base PCt
11	Offset GiSEC, LSB
12	Display info. ROM
13	Display RAM
14	Mode info, MSB
15	Clock Pointer
16	Start clock
17	Display pointer ΔV
19	Display pointer R
20	Display pointer ΔT
21	Slot weight bank
22	Offset slot weight

AVOCET SYSTEMS 8085/Z80 ASSEMBLER - VERSION 1.05M SERIAL #00364

SOURCE FILE NAME: DIGISO.ASM

```
0000                            ; INITILISATION
0000                              ORG     0000H

0000            MASK_1:    EQU          00H
0000            START:     EQU          00H
000E            MASK_2:          EQU          0EH
0000            CNTR_854:           EQU          00H
0020            COUNT:           EQU          20H
0000            CNTR_855:        EQU          00H
0000            CNTR_879:        EQU          00H
0000            DATA_879:           EQU          00H
0000            ADD_GENL:           EQU          00H
0000            ADD_GENM:           EQU          00H
0000            CNTR_0:    EQU          00H
0000            CNTR_1:    EQU          00H
0000            CNTR_2:    EQU          00H
0000            PORT_A:    EQU          00H
0000            PORT_B:    EQU          00H
0000            PORT_C:    EQU          00H
0000            PORT_16:           EQU          00H
0000            PORT_17:           EQU          00H
0000            PORT_18:           EQU          00H
0000            PORT_19:           EQU          00H
0000            PORT_20:           EQU          00H
0000            PORT_21:           EQU          00H
0000            PORT_MOD:          EQU          00H
0000            PORT_INL:          EQU          00H
0000            PORT_MDL:          EQU          00H
0000            DATA_1:    EQU          00H
0000            DATA_2:    EQU          00H
0000            DATA_3:    EQU          00H
0000            DATA_4:    EQU          00H
0000            DATA_5:    EQU          00H
0000            DATA_6:    EQU          00H
0000            DATA_7:    EQU          00H
0000            DATA_8:    EQU          00H
0000            DATA_9:    EQU          00H
0000            DATA_10:           EQU          00H
0000            DATA_11:           EQU          00H
0000            DATA_12:           EQU          00H
0000            DATA_13:           EQU          00H
0000            DATA_14:           EQU          00H
0000            DATA_15:           EQU          00H
0000            DATA_16:           EQU          00H
0000            DATA_17:           EQU          00H
0000            DATA_18:           EQU          00H
0000            DATA_19:           EQU          00H
0000            DATA_20:           EQU          00H
```

```
0000                DATA_22:        EQU     0CH
0000                DATA_23:        EQU     00H
0000                DATA_24:        EQU     00H
0000                ENTER:      EQU         00H
0000                ENTERALL:       EQU     00H
0000                ACQ_KEY:        EQU     00H
0000                SAVE_KEY:       EQU     00H
0000                DISP_KEY:       EQU     00H
0000                PTC_REG:        EQU     00H
0000                SAVE_REG:       EQU     00H
0000 00000000       RAM_BASE:       DB      00,00,00,00,00,00,00,00,00,00,00,00
000E 00000000                       DB      00,00,00,00,00,00,00,00,00,00,00,00
001C 00000000                       DB      00,00,00,00,00,01,06,00,0CH,00,06,0
002A 00000000                       DB      00,00,00,00,00,00,00,00,00,00,00,00
0038                STAK_SPC:       DS      100


009C                        ; ROM BASE INIT.
009C FB                             EI
009D 3E0E                           MVI   A,MASK_2
009F 30                             SIM
00A0 313800                         LXI   SP,STAK_SPC
00A3                        ; INIT  8255
00A3 3E93                           MVI   A,93H
00A5 D300                           OUT   CNTR_855
00A7                        ; INIT. 8279
00A7 97                             SUB   A
00A8 D300                           OUT   CNTR_879
00AA 3E3E                           MVI   A,3EH
00AC                  ;  READ & STORE SETTING

00AC DB00                           IN    PORT_A
00AE 47                             MOV   B,A
00AF E60F                           ANI   0FH
00B1 4F                             MOV   C,A                   ;C = 0000 V1/div
00B2 78                             MOV   A,B
00B3 E6F0                           ANI   11110000B
00B5 0F                             RRC
00B6 0F                             RRC
00B7 0F                             RRC
00B8 0F                             RRC
00B9 47                             MOV   B,A                   ;b = 0000 V2/DIV
00BA DB00                           IN    PORT_B
00BC 57                             MOV   D,A
00BD E6E0                           ANI   11100000B
00BF CAC700                         JZ    NOT_DENT
00C2 3EE0                           MVI   A,11100000B
00C4 C3C50D                         JMP   ERROR
00C7 57             NOT_DENT:       MOV   D,A
00C8 DB00                           IN    PORT_C
00CA E60F                           ANI   0FH
00CC 210300                         LXI   H,RAM_BASE +3
```

```
00CF 71                         MOV   M,C
00D0 23                         INX   H
00D1 70                         MOV   M,B
00D2 23                         INX   H
00D3 72                         MOV   M,D
00D4 23                         INX   H
00D5 77                         MOV   M,A

00D6                            ;RECONSTRUCTION & STORE

00D6 210600                     LXI   H,RAM_BASE +6                ;BASE MOD INFO PT
00D9 0E00                       MVI   C,DATA_3                     ;BASE MCH2 RAM MS
00DB 1600                       MVI   D,DATA_2                     ;BASE RECON ADD P
00DD 46                         MOV   B,M
00DE 2B                         DCX   H
00DF 7E                         MOV   A,M
00E0 C600                       ADI   00H                          ;DATA
00E2 5F                         MOV   E,A
00E3 1A                         LDAX  D
00E4 320700                     STA   RAM_BASE +7                  ;RECON S/DIV
00E7 2B                         DCX   H
00E8 78                         MOV   A,B
00E9 E601                       ANI   01H
00EB C2F100                     JNZ   TO_CH
00EE 2B                         DCX   H
00EF 0E00                       MVI   C,DATA_4          ;BASE MCH1 RAM MSB
00F1            TO_CH :         MOV   A,C
00F1 320A00                     STA   RAM_BASE +10      ;CH BASE PTR MSB
00F4 7E                         MOV   A,M
00F5 C600                       ADI   DATA_1
00F7 5F                         MOV   E,A
00F8 1A                         LDAX  D
00F9 320800                     STA   RAM_BASE +8                  ;RECON V/DIV
00FC 47                         MOV   B,A
00FD 210000                     LXI   H,DATA_5                     ;BASE PCv
0100 110000                     LXI   D,DATA_6                     ;OFFSET GiPRM
0103 0F                         RRC
0104 0F                         RRC
0105 E63F                       ANI   3FH
0107 3C                         INR   A
0108 3D                         DCR   A
0109 CA1001                     JZ    CONTDO
010C 19                         DAD   D
010D C30801                     JMP   $-5
0110            CONTDO :        MOV   A,B
0110 1E00                       MVI   E,DATA_7          ;OFFSET Gi SEC MSB
0112 E603                       ANI   03H
0114 3D                         DCR   A
0115 CA1C01                     JZ    CONTD1
0118 19                         DAD   D
0119 C31401                     JMP   $-5
011C            CONTD1  :       SHLD  RAM_BASE +13                 ;PTR PCv
```

```
011C 2600                       MVI   H,DATA_8                    ;BASE 1K P MSB
011E 78                         MOV   A,B
011F E603                       ANI   03H
0121 84                         ADD   H
0122 321E00                     STA   RAM_BASE +30                ;PTR DTv MSB
0125 3A0700                     LDA   RAM_BASE +7                 ;RECON S/DIV
0128 47                         MOV   B,A
0129 210000                     LXI   H, DATA_9                   ;BASE PCt
012C 110000                     LXI   D,DATA_10                   ;OFFSET Gi PRM
012F 0F                         RRC
0130 0F                         RRC
0131 E63F                       ANI   3FH
0133 3C                         INR   A
0134 3D                         DCR   A
0135 CA3C01                     JZ    CONTD2
0138 19                         DAD   D
0139 C33401                     JMP   $-5
013C            CONTD2  :       MOV   A,B
013C 1E00                       MVI   E,DATA_11         ,OFFSET Gi SEC LSB
013E E603                       ANI   03H
0140 3D                         DCR   A
0141 CA4801                     JZ    CONTD3
0144 19                         DAD   D
0145 C34001                     JMP   $-5
0148            CONTD3  :       SHLD  RAM_BASE +15                ;PTR PCt
0148 2600                       MVI   H,DATA_8                    ;BASE 1K P MSB
014A 78                         MOV   A,B
014B E603                       ANI   03H
014D 84                         ADD   H
014E 322000                     STA   RAM_BASE +32                ;PTR DTt MSB
0151                            ;READ INKPBD FOR MODE

0151 DB00                       IN    CNTR_879                    ;INKPBD BLK
0153 47                         MOV   B,A
0154 E630                       ANI   30H
0156 CA5B01                     JZ    $+5
0159 3E01                       MVI   A,00000001B
015B C3C50D                     JMP   ERROR
015E 78                         MOV   A,B
015F E60F                       ANI   0FH
0161 CA5101                     JZ    $-10H
0164 3E40                       MVI   A,40H
0166 D300                       OUT   CNTR_879
0168 DB00                       IN    DATA_879
016A FE00                       CPI   ACQ_KEY
016C FA7A01                     JM    SAVE
016F CA6004                     JZ    ACQ_DISP
0172 FE00                       CPI   ENTER
0174 CA8A0A                     JZ    CONT0
0177 C3B307                     JMP   SAVEDISP
017A FE00       SAVE:           CPI   SAVE_KEY
```

```
)17C CA8401                    JZ    SAVE_MOD
)17F 3E02                      MVI   A,00000010B
)181 C3C50D                    JMP   ERROR
)184 3A0500    SAVE_MOD:       LDA   RAM_BASE +5       ;BASE ADD INFO +2
)187 47                        MOV   B,A
)188 0E00                      MVI   C,00H
)18A E610                      ANI   10H
)18C CA9701                    JZ    $+0BH                       ;SLOW_MOD
)18F 78                        MOV   A,B
)190 E60E                      ANI   0EH
)192 CA9701                    JZ    $+5                         ;REPT_MOD
)195 0E10                      MVI   C,10H
)197 C39C01                    JMP   $+5                         ;FAST_MOD
019A 0E20                      MVI   C,20H
019C C39701                    JMP   $-5
019F C5                        PUSH  B
01A0 3E10                      MVI   A,10H
01A2 81                        ADD   C
01A3 1600                      MVI   D,DATA_12       ;DISP INFO PTR MSB
01A5 5F                        MOV   E,A
01A6 0610                      MVI   B,10H
01A8 210000                    LXI   H,DATA_13
01AB 1A                        LDAX  D                           ;LD DISP BLK
01AC 77                        MOV   M,A
01AD 23                        INX   H
01AE 13                        INX   D
01AF 05                        DCR   B
01B0 C2AB01                    JNZ   $-5
01B3 1600                      MVI   D,DATA_14         ;BASE MOD DISP PTR
01B5 3A0600                    LDA   RAM_BASE +6                 ;MOD_OPR
01B8 FE04                      CPI   04H
01BA FAC201                    JM    CONT2
01BD 3E03                      MVI   A,00000011B
01BF C3C50D                    JMP   ERROR
01C2 87        CONT2:          ADD   A
01C3 87                        ADD   A
01C4 87                        ADD   A
01C5 87                        ADD   A
01C6 5F                        MOV   E,A
01C7 0610                      MVI   B,10H
01C9 1A                        LDAX  D
01CA 77                        MOV   M,A
01CB 23                        INX   H
01CC 13                        INX   D
01CD 05                        DCR   B
01CE C2C901                    JNZ   $-5
01D1 CDAA0D                    CALL  DISP3.2
01D4 CDB80D                    CALL  BLANK1
01D7 1600                      MVI   D,DATA_12         ;DISP INFO PTR MSB
01D9 1EA8                      MVI,  E,10101000B
01DB 0604                      MVI   B,04H
```

```
01DD 211000                     LXI  H,DATA_13+16       ;BASE DISP PTE +10H
01E0 1A                         LDAX D
01E1 77                         MOV  M,A
01E2 23                         INX  H
01E3 13                         INX  D
01E4 05                         DCR  B
01E5 C2E001                     JNZ  $-5
01E8 3A1300                     LDA  RAM_BASE +19              ;DEFLT BANK
01EB 23                         INX  H
01EC 77                         MOV  M,A
01ED CD9E0D                     CALL DISP3.1
01F0 DB00       OUTT7:          IN   CNTR_879
01F2 47                         MOV  B,A
01F3 E630                       ANI  30H
01F5 CAFA01                     JZ   $+5
01F8 3E01                       MVI  A,00000001B
01FA C3C50D                     JMP  ERROR
01FD 78                         MOV  A,B
01FE E60F                       ANI  0FH
0200 CAF001                     JZ   $-10H
0203 3E40                       MVI  A,40H
0205 D300                       OUT  CNTR_879
0207 DB00                       IN   DATA_879
0209 FE04                       CPI  04E
020B FA1B02                     JM   CONT1
020E FE00                       CPI  ENTER
0210 CA2502                     JZ   OUTT4
0213 FE00                       CPI  ENTERALI
0215 CA7D02                     JZ   OUTT5
0218 C31F02                     JMP  OUTT6
021B 77         CONT1:          MOV  M,A
021C 321300                     STA  RAM_BASE +19              ;DEFLT BANK
021F CD9E0D     OUTT6:          CALL DISP3.1
0222 C3F001                     JMP  OUTT7
0225 C1         OUTT4:          POP  B
0226 C5                         PUSH B
0227 3E10                       MVI  A,10H
0229 B9                         CMP  C
022A CAC102                     JZ   SFST_MOD
022D F23302                     JP   SSLW_MOD
0230 FA8D03                     JM   SRPT_MOD
0233 210000     SSLW_MOD:       LXI  H,DATA_12         ;BASE DISP RAM PTR +10H
0236 1EB0                       MVI  E,10110000B
0238 1A                         LDAX D
0239 77                         MOV  M,A
023A 23                         INX  H
023B 13                         INX  D
023C 05                         DCR  B
023D C23802                     JNZ  $-5
0240 3A1400                     LDA  RAM_BASE +20              ;DEFLT UNT
0243 23                         INX  H
0244 77                         MOV  M,A
0245 CD9E0D                     CALL DISP3.1
```

```
0248 DB00      OUTT0A:         IN    CNTR_879          ;INPKBD BLK
024A 47                        MOV   B,A
024B E630                      ANI   30H
024D CA5202                    JZ    $+5
0250 3E01                      MVI   A,00000001B
0252 C3C50D                    JMP   ERROR
0255 78                        MOV   A,B
0256 E60F                      ANI   0FH
0258 CA4802                    JZ    $-10H
025B 3E40                      MVI   A,40H
025D D300                      OUT   CNTR_879
025F DB00                      IN    DATA_879
0261 FE02                      CPI   02H
0263 FA7302                    JM    OUTT8
0266 FE00                      CPI   ENTER
0268 CA7D02                    JZ    OUTT5
026B FE00                      CPI   ENTERALT
026D CA7D02                    JZ    OUTT5
0270 C37702                    JMP   OUTT9
0273 77        OUTT8:          MOV   M,A
0274 321400                    STA   RAM_BASE +20              ;DEFLT UNT
0277 CD9E0D    OUTT9:          CALL  DISP3.1
027A C34802                    JMP   OUTT0A
027D C1        OUTT5:          POP   B
027E 3E10                      MVI   A,10H
0280 B9                        CMP   C
0281 CA3A03                    JZ    FAST_S
0284 F28A02                    JP    SLOW_S
0287 FA0604                    JM    REPT_S
028A 210000    SLOW_S:         LXI   H,DATA_12       ;BASE DISP RAM PTR +10H
028D 1EC8                      MVI   E,11001000B
028F 0604                      MVI   B,04H
0291 1A                        LDAX  D
0292 77                        MOV   M,A
0293 23                        INX   H
0294 13                        INX   D
0295 05                        DCR   B
0296 C29102                    JNZ   $-5
0299 3A1400                    LDA   RAM_BASE +20              ;BASE ADD UNT
029C 87                        ADD   A
029D 47                        MOV   B,A
029E 3A0600                    LDA   RAM_BASE +6               ;MOD_OPR
02A1 E601                      ANI   01H
02A3 80                        ADD   B
02A4 3C                        INR   A
02A5 321600                    STA   RAM_BASE +22              ;ACT NO PTR
02A8 47                        MOV   B,A
02A9 3E01                      MVI   A,01H
02AB 321500                    STA   RAM_BASE +21              ;FLG_PTR
02AE 4F                        MOV   C,A
02AF 78                        MOV   A,B
02B0 23                        INX   H
02B1 E6F0                      ANI   11110000B
```

```
02B3 77                 MOV   M,A
02B4 23                 INX   H
02B5 78                 MOV   A,B
02B6 E60F               ANI   0FH
02B8 77                 MOV   M,A
02B9 23                 INX   H
02BA 71                 MOV   M,C
02BB CDAA0D             CALL  DISP3.2
02BE C3850A             JMP   CONT0S
02C1 211000   SFST_MOD:  LXI   H,DATA_BASE+10H   ;BASE DISP RAM PTR+10H
02C4 1EB8               MVI   E,10111000B
02C6 0604               MVI   B,04H
02C8 1A                 LDAX  D                  ;LD DISP BLK
02C9 77                 MOV   M,A
02CA 23                 INX   H
02CB 13                 INX   D
02CC 05                 DCR   B
02CD C2C802             JNZ   $-5
02D0 3A1800             LDA   RAM_BASE+24        ;DEFLT PTC MSB
02D3 23                 INX   H
02D4 77                 MOV   M,A
02D5 3A1700             LDA   RAM_BASE+23        ;DEFLT PTC LSB
02D8 23                 INX   H
02D9 77                 MOV   M,A
02DA CD9E0D             CALL  DISP3.1
02DD DB00     CONT14:   IN    CNTR_879           ;INP KBD BLK
02DF 47                 MOV   B,A
02E0 E630               ANI   30H
02E2 CAE702             JZ    $+5
02E5 3EE4               MVI   A,11100100B
02E7 C3C50D             JMP   ERROR
02EA 78                 MOV   A,B
02EB E60F               ANI   0FH
02ED CADD02             JZ    $-10H
02F0 3E40               MVI   A,40H
02F2 D300               OUT   CNTR_879
02F4 DB00               IN    DATA_879
02F6 FE10               CPI   10H
02F8 FAFE02             JM    CONT10
02FB C31D03             JMP   CONT11
02FE 4F       CONT10:   MOV   C,A
02FF DB00               IN    CNTR_879           ;INP KBD BLK
0301 47                 MOV   B,A
0302 E630               ANI   30H
0304 CA0903             JZ    $+5
0307 3E04               MVI   A,04H
0309 C3C50D             JMP   ERROR
030C 78                 MOV   A,B
030D E60F               ANI   0FH
030F CAFF02             JZ    $-10H
0312 3E40               MVI   A,40H
0314 D300               OUT   CNTR_879
0316 DB00               IN    DATA_879
```

```
0318 FE10                      CPI   10H
031A FA2A03                    JM    CONT12
031D FE00       CONT11:        CPI   ENTER
031F CA7D02                    JZ    OUTT5
0322 FE00                      CPI   ENTEFALL
0324 CA7D02                    JZ    OUTT5
0327 C33403                    JMP   CONT13
032A 77         CONT12:        MOV   M,A
032B 2B                        DCX   H
032C 71                        MOV   M,C
032D 321700                    STA   RAM_BASE +23          ;DEFLT PTC LSB
0330 79                        MOV   A,C
0331 321800                    STA   RAM_BASE +24          ;DEFLT PTC MSB
0334 CD9E0D     CONT13.        CALL  DISP3.1
0337 C3DD02                    JMP   CONT14
033A 211000     FAST_S:        LXI   H,DATA_13+16   ;BASE DISP RAM PTR+10H
033D 1EC8                      MVI   E,11001000B
033F 0604                      MVI   B,04H
0341 1A                        LDAX  D              ;LD DISP BLK
0342 77                        MOV   M,A
0343 23                        INX   H
0344 13                        INX   D
0345 05                        DCR   B
0346 C24103                    JNZ   $-5
0349 23                        INX   H
034A 3A0600                    LDA   RAM_BASE +6           ;MODE OPR
034D 47                        MOV   B,A
034E E602                      ANI   02H
0350 4F                        MOV   C,A                   ;FLAG PTR
0351 0C                        INR   C
0352 78                        MOV   A,B
0353 E601                      ANI   01H
0355 87                        ADD   A
0356 C618                      ADI   18H                   ;ACN NO PTR
0358 47                        MOV   B,A
0359 321600                    STA   RAM_BASE +22     ;DEFLT ACN NO PTR
035C 23                        INX   H
035D E6F0                      ANI   11110000B
035F 77                        MOV   M,A
0360 23                        INX   H
0361 78                        MOV   A,B
0362 E60F                      ANI   0FH
0364 77                        MOV   M,A
0365 23                        INX   H
0366 71                        MOV   M,C
0367 79                        MOV   A,C
0368 3A1800                    LDA   RAM_BASE +24          ;DEFLT PTC MSB
036B 87                        ADD   A
036C 87                        ADD   A
036D 87                        ADD   A
036E 87                        ADD   A
036F 47                        MOV   B,A
0370 3A1700                    LDA   RAM_BASE +23          ;DEFLT PTC LSB
```

```
0373 80                         ADD   B
0374 D300                       OUT   PTC_REG
0376 210000                     LXI   H,DATA_20
0379 111900                     LXI   D,RAM_BASE +25
037C 3A0500                     LDA   RAM_BASE +5
037F 87                         ADD   A
0380 0600                       MVI   B,00H
0382 4F                         MOV   C,A
0383 09                         DAD   B
0384 7E                         MOV   A,M
0385 12                         STAX  D
0386 23                         INX   H
0387 13                         INX   D
0388 7E                         MOV   A,M
0389 12                         STAX  D
038A C3850A                     JMP   CONTOS

038D                            ;SAVE REPT MOD

038D 211000     SRPT_MOD:       LXI   H,DATA_13+16    ,BASE DISP RAM PTR+10H
0390 1EC0                       MVI   E,11000000B
0392 0604                       MVI   B,04H
0394 1A                         LDAX  D                     ,LD DISP BLK
0395 77                         MOV   M,A
0396 23                         INX   H
0397 13                         INX   D
0398 05                         DCR   B
0399 C29403                     JNZ   $-5
039C 1600                       MVI   D,DATA_21       ,SWT BANK MSB LD SWT BLK
039E 3A0500                     LDA   RAM_BASE +5     ,BASE MOD INFO+2
03A1 87                         ADD   A
03A2 C600                       ADI   DATA_22
03A4 5F                         MOV   E,A
03A5 1A                         LDAX  D
03A6 4F                         MOV   C,A
03A7 13                         INX   D
03A8 1A                         LDAX  D
03A9 23                         INX   H
03AA 71                         MOV   M,C
03AB 23                         INX   H
03AC 77                         MOV   M,A
03AD CD9E0D                     CALL  DISP3.1
03B0 DB00       CONT19:         IN    CNTR_879              ;INP KBD BLK
03B2 47                         MOV   B,A
03B3 E630                       ANI   30H
03B5 CABA03                     JZ    $+5
03B8 3E05                       MVI   A,05H
03BA C3C50D                     JMP   ERROR
03BD 78                         MOV   A,B
03BE E60F                       ANI   0FH
03C0 CAB003                     JZ    $-10H
03C3 3E40                       MVI   A,40H
```

```
03C5 D300                       OUT   CNTR_879
03C7 DB00                       IN    DATA_879
03C9 FE10                       CPI   10H
03CB FAD103                     JM    CONT15
03CE C3EF03                     JMP   CONT16
03D1 4F         CONT15:         MOV   C,A
03D2 DB00                       IN    CNTR_879          ;INP KBD BLK
03D4 47                         MOV   B,A
03D5 E630                       ANI   30H
03D7 CADC03                     JZ    $+5
03DA 3E06                       MVI   A,06H
03DC C3C50D                     JMP   ERROR
03DF 78                         MOV   A,B
03E0 E60F                       ANI   0FH
03E2 CAD203                     JZ    $-10H
03E5 3E40                       MVI   A,40H
03E7 D300                       OUT   CNTR_879
03E9 DB00                       IN    DATA_879
03EB B8                         CMP   B
03EC FAF903                     JM    CONT17
03EF FE00       CONT16:         CPI   ENTER
03F1 CA7D02                     JZ    OUTT5
03F4 FE00                       CPI   ENTERALL
03F6 CA7D02                     JZ    OUTT5
03F9 77         CONT17:         MOV   M,A
03FA 2B                         DCX   H
03FB 71                         MOV   M,C
03FC 12                         STAX  D
03FD 79                         MOV   A,C
03FE 2B                         DCX   H
03FF 12                         STAX  D
0400 CD9E0D     CONT18:         CALL  DISP3.1
0403 C3B003                     JMP   CONT19
0406 211000     REPT_S:         LXI   H,DATA_13+16  ;BASE DISP RAM PTR+10H
0409 1EC8                       MVI   E,11001000B
040B 0604                       MVI   B,04H
040D 1A                         LDAX  D               ;LD DISP BLK
040E 77                         MOV   M,A
040F 23                         INX   H
0410 13                         INX   D
0411 05                         DCR   B
0412 C20D04                     JNZ   $-5
0415 3A0600                     LDA   RAM_BASE +6             ;MOD OPR
0418 47                         MOV   B,A
0419 E602                       ANI   02H
041B CA2304                     JZ    CONT20
041E 3E07                       MVI   A,07H
0420 C3C50D                     JMP   ERROR
0423 0E01       CONT20:         MVI   C,01H                   ;FLAG PTR
0425 78                         MOV   A,B
0426 E601                       ANI   01H
0428 87                         ADD   A
0429 C623                       ADI   23H                     ;ACN NO PTR
```

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042B 321600                     STA   RAM_BASE +27          ;DEFLT ACN NO PTR
042E 47                         MOV   B,A
042F 23                         INX   H
0430 E6F0                       ANI   11110000B
0432 77                         MOV   M,A
0433 23                         INX   H
0434 78                         MOV   A,B
0435 E60F                       ANI   0FH
0437 77                         MOV   M,A
0438 23                         INX   H
0439 71                         MOV   M,C
043A 79                         MOV   A,C
043B 321500                     STA   RAM_BASE +21          ,DEFLT FLAG PTR
043E CDAA0D                     CALL  DISP3 2
0441 3A0500                     LDA   RAM_BASE +5           ;BASE MOD INFO +2
0444 D300                       OUT   SSEL_PTG              ,SLOT SEL_REG
0446 3A0500                     LDA   RAM_BASE +5           ;BASE MOD INFO +2
0449 D300                       OUT   POPT_21
044B 210000                     LXI   H,DATA_21
044E 87                         ADD   A
044F C600                       ADI   DATA_21
0451 6F                         MOV   L,A
0452 46                         MOV   B,M
0453 23                         INX   H
0454 7E                         MOV   A,M
0455 87                         ADD   A
0456 87                         ADD   A
0457 87                         ADD   A
0458 87                         ADD   A
0459 80                         ADD   B
045A 321900                     STA   RAM_BASE +25
045D C3850A                     JMP   CONTOS
0460                            ;ACQ + DISP MODE

0460 3A0500     ACQ_DISP.       LDA   RAM_BASE +5           ,BASE ADD INFO+2
0463 47                         MOV   B,A
0464 0E00                       MVI   C,00H
0466 E610                       ANI   10H
0468 CA7304                     JZ    $+0BH                       ;SLOW_MOD
046B 78                         MOV   A,B
046C E60E                       ANI   0EH
046E CA7304                     JZ    $+5                         ;REPT_MOD
0471 0E10                       MVI   C,10H
0473 C37804                     JMP   $+5                         ;FAST_MOD
0476 0E20                       MVI   C,20H
0478 C37304                     JMP   $-5
047B C5                         PUSH  B
047C 3E40                       MVI   A,40H
047E 81                         ADD   C
047F 1600                       MVI   D,DATA_12           ;DISP INFO PTR MSB
0481 5F                         MOV   E,A
0482 0610                       MVI   B,10H
0484 210000                     LXI   H,DATA_13           ;BASE DISP PTR
```

```
0487 1A                         LDAX D                  ;LD DISP BLK
0488 77                         MOV  M,A
0489 23                         INX  H
048A 13                         INX  D
048B 05                         DCR  B
048C C28704                     JNZ  $-5
048F 1600                       MVI  D,DATA_14          ;BASE MOD INFO PTR MSB
0491 3A0600                     LDA  RAM_BASE +6        ;MOD OPR
0494 87                         ADD  A
0495 87                         ADD  A
0496 87                         ADD  A
0497 87                         ADD  A
0498 5F                         MOV  E,A
0499 0610                       MVI  B,10H
049B 1A                         LDAX D                  ;LD DISP BLK
049C 77                         MOV  M,A
049D 23                         INX  H
049E 13                         INX  D
049F 05                         DCR  B
04A0 C29B04                     JNZ  $-5
04A3 CDAA0D                     CALL DISP3.2
04A6 CDB80D                     CALL BLANK1
04A9 C1                         POP  B
04AA B9                         CMP  C
04AB CA5205                     JZ   AD_FSTMD
04AE F2B404                     JP   AD_SLWMD
04B1 FA4C06                     JM   AD_RPTMD
04B4 211000     AD_SLWMD:       LXI  H,DATA_13 +16      ;BASE DISP RAM PTR+10
04B7 1EB0                       MVI  E,10110000B
04B9 0604                       MVI  B,04H
04BB 1A                         LDAX D                  ;LD DISP BLK
04BC 77                         MOV  M,A
04BD 23                         INX  H
04BE 13                         INX  D
04BF 05                         DCR  B
04C0 C2BB04                     JNZ  $-5
04C3 3A1400                     LDA  RAM_BASE +20       ;DEFLT UNT
04C6 23                         INX  H
04C7 77                         MOV  M,A
04C8 CD9E0D                     CALL DISP3.1
04CB DB00       CONT24:         IN   CNTR_879           ;INPKBD BLK
04CD 47                         MOV  B,A
04CE E630                       ANI  30H
04D0 CAD504                     JZ   $+5
04D3 3E08                       MVI  A,08H
04D5 C3C50D                     JMP  ERROR
04D8 78                         MOV  A,B
04D9 E60F                       ANI  0FH
04DB CACB04                     JZ   $-10H
04DE 3E40                       MVI  A,40H
04E0 D300                       OUT  CNTR_879
04E2 DB00                       IN   DATA_879
04E4 FE02                       CPI  02H
```

```
04E6 FAF604                     JM    CONT21
04E9 FE00                       CPI   ENTER
04EB CA0005                     JZ    CONTADS
04EE FE00                       CPI   ENTERALL
04F0 CA0005                     JZ    CONTADS
04F3 C3FA04                     JMP   CONT23
04F6 77          CONT21:        MOV   M,A
04F7 321400                     STA RAM_BASE +20        ;DEFLT UNT
04FA CD9E0D      CONT23:        CALL  DISP3.1
04FD C3CB04                     JMP   CONT24
0500 211000      CONTADS:       LXI   H,DATA_13 +16     ;BASE DISP RAM PTR+10H
0503 1EC8                       MVI   E,11001000B
0505 0604                       MVI   B,04H
0507 1A                         LDAX  D                 ;LD DISP BLK
0508 77                         MOV   M,A
0509 23                         INX   H
050A 13                         INX   D
050B 05                         DCR   B
050C C20705                     JNZ   $-5
050F 3A0600                     LDA   RAM_BASE +6        ;MOD OPR
0512 0E00                       MVI   C,00H
0514 FE04                       CPI   04H
0516 FA2305                     JM    CONT25
0519 FEC0                       CPI   11000000B
051B F22F05                     JP    CONT26
051E 3E08                       MVI   A,08H
0520 C3C50D                     JMP   ERROR
0523 E601        CONT25:        ANI   01H
0525 3C                         INR   A
0526 47                         MOV   B,A
0527 3A1400                     LDA   RAM_BASE +20              ;DEFLT UNT
052A 87                         ADD   A
052B 80                         ADD   B
052C C33905                     JMP   CONT27
052F E601        CONT26:        ANI   01H
0531 C605                       ADI   05H
0533 47                         MOV   B,A
0534 3A1400                     LDA   RAM_BASE +20              ;DEFLT UNT
0537 87                         ADD   A
0538 80                         ADD   B
0539 321600      CONT27:        STA   RAM_BASE +22              ;DEFLT ACN NO
053C 47                         MOV   B,A
053D 23                         INX   H
053E E6F0                       ANI   11110000B
0540 77                         MOV   M,A
0541 23                         INX   H
0542 78                         MOV   A,B
0543 E60F                       ANI   0FH
0545 77                         MOV   M,A
0546 23                         INX   H
0547 71                         MOV   M,C
0548 79                         MOV   A,C
0549 321500                     STA   RAM_BASE +21       ;DEFLT FLAG PTR
```

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054C CDAA0D                    CALL DISP3.2
054F C38A0A                    JMP  CONT0

0552 210000     AD_FSTMD:      LXI  H,DATA_13                ;BASE DISP RAM P
0555 1EB8                      MVI  E,10111000B
0557 0604                      MVI  B,04H
0559 1A                        LDAX D                  ;LD DISP BLK
055A 77                        MOV  M,A
055B 23                        INX  H
055C 13                        INX  D
055D 05                        DCR  B
055E C25905                    JNZ  $-5
0561 3A1800                    LDA  RAM_BASE +24              ;DEFLT PTC MSB
0564 23                        INX  H
0565 77                        MOV  M,A
0566 3A1700                    LDA  RAM_BASE +23              ;DEFLT PTC LSB
0569 23                        INX  H
056A 77                        MOV  M,A
056B CD9E0D                    CALL DISP3.1
056E DB00       CONT32:        IN   CNTR_879           ;INP KBD BLK
0570 47                        MOV  B,A
0571 E630                      ANI  30H
0573 CA7805                    JZ   $+5
0576 3E09                      MVI  A,09H
0578 C3C50D                    JMP  ERROR
057B 78                        MOV  A,B
057C E60F                      ANI  0FH
057E CA6E05                    JZ   $-10H
0581 3E40                      MVI  A,40H
0583 D300                      OUT  CNTR_879
0585 DB00                      IN   DATA_879
0587 FE10                      CPI  10H
0589 FA8F05                    JM   CONT28
058C C3AE05                    JMP  CONT29
058F 4F         CONT28:        MOV  C,A
0590 DB00                      IN   CNTR_879           ;INP KBD BLK
0592 47                        MOV  B,A
0593 E630                      ANI  30H
0595 CA9A05                    JZ   $+5
0598 3E0A                      MVI  A,0AH
059A C3C50D                    JMP  ERROR
059D 78                        MOV  A,B
059E E60F                      ANI  0FH
05A0 CA9005                    JZ   $-10H
05A3 3E40                      MVI  A,40H
05A5 D300                      OUT  CNTR_879
05A7 DB00                      IN   DATA_879
05A9 FE10                      CPI  10H
05AB FABB05                    JM   CONT30
05AE FE00       CONT29:        CPI  ENTER
05B0 CACB05                    JZ   CONTADF
05B3 FE00                      CPI  ENTERALL
05B5 CA0005                    JZ   CONTADS
```

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05B8 C3C505                     JMP   CONT31
05BB 77          CONT30:        MOV   M,A
05BC 2B                         DCX   H
05BD 71                         MOV   M,C
05BE 321700                     STA   RAM_BASE +23              ;DEFLT PTC LSB
05C1 79                         MOV   A,C
05C2 321800                     STA   RAM_BASE +24              ;DEFLT PTC MSB
05C5 CD9E0D      CONT31:        CALL  DISP3.1
05C8 C36E05                     JMP   CONT32
05CB 210000      CONTADF:       LXI   H,DATA_13          ;BASE DISP RAM PTR
05CE 1EC8                       MVI   E,11001000B
05D0 0604                       MVI   B,04H
05D2 1A                         LDAX  D                  ;LD DISP BLK
05D3 77                         MOV   M,A
05D4 23                         INX   H
05D5 13                         INX   D
05D6 05                         DCR   B
05D7 C2D205                     JNZ   $-5
05DA 3A0600                     LDA   RAM_BASE +6                ;MODE OPR
05DD 47                         MOV   B,A
05DE E602                       ANI   02H
05E0 4F                         MOV   C,A
05E1 78                         MOV   A,B
05E2 E601                       ANI   01H
05E4 87                         ADD   A
05E5 57                         MOV   D,A
05E6 78                         MOV   A,B
05E7 FE0C                       CPI   0CH
05E9 F20006                     JP    CONT33
05EC 78                         MOV   A,B
05ED E608                       ANI   08H
05EF C20706                     JNZ   CONT34
05F2 78                         MOV   A,B
05F3 E604                       ANI   04H
05F5 C20E06                     JNZ   CONT35
05F8 7A                         MOV   A,D
05F9 87                         ADD   A
05FA C611                       ADI   11H
05FC 47                         MOV   B,A
05FD C31206                     JMP   CONT36
0600 7A          CONT33:        MOV   A,D
0601 C620                       ADI   20H
0603 47                         MOV   B,A
0604 C31206                     JMP   CONT36
0607 7A          CONT34:        MOV   A,D
0608 C61C                       ADI   1CH
060A 47                         MOV   B,A
060B C31206                     JMP   CONT36
060E 7A          CONT35:        MOV   A,D
060F C624                       ADI   24H
0611 47                         MOV   B,A
0612 78          CONT36:        MOV   A,B
0613 321600                     STA   RAM_BASE +22              ;DEFLT ACN NO
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0616 23                         INX  H
0617 E6F0                       ANI  11110000B
0619 77                         MOV  M,A
061A 23                         INX  H
061B 78                         MOV  A,B
061C E60F                       ANI  0FH
061E 77                         MOV  M,A
061F 23                         INX  H
0620 71                         MOV  M,C
0621 79                         MOV  A,C
0622 321500                     STA  RAM_BASE +21       ;DEFLT FLAG PTR
0625 3E36                       MVI  A,36H
0627 D300                       OUT  CNTR_854
0629 3E08                       MVI  A,08H
062B D300                       OUT  CNTR_0
062D 97                         SUB  A
062E D300                       OUT  CNTR_0
0630 3E76                       MVI  A,76H
0632 D300                       OUT  CNTR_854
0634 97                         SUB  A
0635 D300                       OUT  CNTR_1
0637 3E01                       MVI  A,01H
0639 D300                       OUT  CNTR_1
063B 3EB6                       MVI  A,10110110B
063D D300                       OUT  CNTR_854
063F 97                         SUB  A
0640 D300                       OUT  CNTR_2
0642 3E01                       MVI  A,01H
0644 D300                       OUT  CNTR_2
0646 321B00                     STA  RAM_BASE +27           ;DISP STAT
0649 C38A0A                     JMP  CONT0

064C                ;ACQ + DISP REPT MOD

064C 211000     AD_RPTMD:       LXI  H,DATA_13+16       ;BASE DISP RAM PTR+10H
064F 1EC0                       MVI  E,11000000B
0651 0604                       MVI  B,04H
0653 1A                         LDAX D                  ,LD DISP BLK
0654 77                         MOV  M,A
0655 23                         INX  H
0656 13                         INX  D
0657 05                         DCR  B
0658 C25306                     JNZ  $-5
065B 1600                       MVI  D,DATA_21      ;SWT BANK MSB,LD SWT BLK
065D 3A0500                     LDA  RAM_BASE +5    ;BASE MOD INFO+2
0660 87                         ADD  A
0661 C600                       ADI  DATA_22
0663 5F                         MOV  E,A
0664 1A                         LDAX D
0665 4F                         MOV  C,A
0666 13                         INX  D
0667 1A                         LDAX D
0668 23                         INX  H
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0669 71                         MOV  M,C
066A 23                         INX  H
066B 77                         MOV  M,A
066C CD9E0D                     CALL DISP3.1
066F DB00       CONT41:         IN   CNTR_879          ;INP KBD BLK
0671 47                         MOV  B,A
0672 E630                       ANI  30H
0674 CA7906                     JZ   $+5
0677 3E0B                       MVI  A,0BH
0679 C3C50D                     JMP  ERROR
067C 78                         MOV  A,B
067D E60F                       ANI  0FH
067F CA6F06                     JZ   $-10H
0682 3E40                       MVI  A,40H
0684 D300                       OUT  CNTR_879
0686 DB00                       IN   DATA_879
0688 FE10                       CPI  10H
068A FA9006                     JM   CONT37
068D C3B006                     JMP  CONT38
0690 4F         CONT37:         MOV  C,A
0691 DB00                       IN   CNTR_879          ;INP KBD BLK
0693 47                         MOV  B,A
0694 E630                       ANI  30H
0696 CA9B06                     JZ   $+5
0699 3E0C                       MVI  A,0CH
069B C3C50D                     JMP  ERROR
069E 78                         MOV  A,B
069F E60F                       ANI  0FH
06A1 CA9106                     JZ   $-10H
06A4 3E40                       MVI  A,40H
06A6 D300                       OUT  CNTR_879
06A8 FE10                       CPI  10H
06AA FABD06                     JM   CONT39
06AD C3B006                     JMP  CONT38
06B0 FE00       CONT38:         CPI  ENTER
06B2 CACA06                     JZ   CONTADR
06B5 FE00                       CPI  ENTERALL
06B7 CACA06                     JZ   CONTADR
06BA C3C406                     JMP  CONT40
06BD 77         CONT39:         MOV  M,A
06BE 2B                         DCX  H
06BF 71                         MOV  M,C
06C0 12                         STAX D
06C1 79                         MOV  A,C
06C2 1B                         DCX  D
06C3 12                         STAX D
06C4 CD9E0D     CONT40:         CALL DISP3.1
06C7 C36F06                     JMP  CONT41
06CA 211000     CONTADR:        LXI  H,DATA_13 +16  ;BASE DISP RAM PTR +10H
06CD 1EC8                       MVI  E,11001000B
06CF 0604                       MVI  B,04H
06D1 1A                         LDAX D                 ;LD DISP BLK
06D2 77                         MOV  M,A
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06D3 23                         INX  H
06D4 13                         INX  D
06D5 05                         DCR  B
06D6 C2D106                     JNZ  $-5
06D9 3A0600                     LDA  RAM_BASE +6          ;MOD OPR
06DC 47                         MOV  B,A
06DD E602                       ANI  02H
06DF CAE706                     JZ   CONT20X
06E2 3E07                       MVI  A,07H
06E4 C3C50D                     JMP  ERROR
06E7 0E01       CONT20X:        MVI  C,01H          ,FLAG PTR
06E9 78                         MOV  A,B
06EA FE08                       CPI  08H
06EC FAF806                     JM   CONT_201
06EF 78                         MOV  A,B
06F0 E601                       ANI  01H
06F2 87                         ADD  A
06F3 C62C                       ADI  2CH
06F5 C3FE06                     JMP  CONT_202
06F8 78         CONT_201:       MOV  A,B
06F9 E601                       ANI  01H
06FB 87                         ADD  A
06FC C628                       ADI  28H                  ,ACN NO PTR
06FE 321600     CONT_202        STA  RAM_BASE +22         ,DFFLT ACN NO PTR
0701 47                         MOV  B,A
0702 23                         INX  H
0703 E6F0                       ANI  11110000B
0705 77                         MOV  M,A
0706 23                         INX  H
0707 78                         MOV  A,B
0708 E60F                       ANI  0FH
070A 77                         MOV  M,A
070B 23                         INX  H
070C 71                         MOV  M,C
070D 79                         MOV  A,C
070E 321500                     STA  RAM_BASE +21         ;DEFLT FLAG PTR
0711 CDAA0D                     CALL DISP3.2
0714 3A0500                     LDA  RAM_BASE +5          ;BASE MOD INFO +2
0717 D300                       OUT  PORT_21
0719 210000                     LXI  H,DATA_21
071C 87                         ADD  A
071D C600                       ADI  DATA_21
071F 6F                         MOV  L,A
0720 46                         MOV  B,M
0721 23                         INX  H
0722 7E                         MOV  A,M
0723 87                         ADD  A
0724 87                         ADD  A
0725 87                         ADD  A
0726 87                         ADD  A
0727 80                         ADD  B
0728 321900                     STA  RAM_BASE +25
072B 3A0500                     LDA  RAM_BASE +5
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072E FE01                       CPI   01H
0730 CA8A07                     JZ    DISP_3
0733 FE02                       CPI   02H
0735 CA6107                     JZ    DISP_2
0738 3E36       DISP_1:         MVI   A,36H
073A D300                       OUT   CNTR_854
073C 3E05                       MVI   A,05H
073E D300                       OUT   CNTR_0
0740 97                         SUB   A
0741 D300                       OUT   CNTR_0
0743 3E76                       MVI   A,76H
0745 D300                       OUT   CNTR_854
0747 97                         SUB   A
0748 D300                       OUT   CNTR_1
074A 3E01                       MVI   A,01H
074C D300                       OUT   CNTR_1
074E 3EB6                       MVI   A,10110110B
0750 D300                       OUT   CNTR_854
0752 97                         SUB   A
0753 D300                       OUT   CNTR_2
0755 3E01                       MVI   A,01H
0757 D300                       OUT   CNTR_2
0759 3E02                       MVI   A,02H
075B 321B00                     STA   RAM_BASE +27              ;DISP STAT
075E C38A0A                     JMP   CONT0
0761 3E36       DISP_2:         MVI   A,36H
0763 D300                       OUT   CNTR_854
0765 3E0A                       MVI   A,0AH
0767 D300                       OUT   CNTR_0
0769 97                         SUB   A
076A D300                       OUT   CNTR_0
076C 3E76                       MVI   A,76H
076E D300                       OUT   CNTR_854
0770 3E80                       MVI   A,80H
0772 D300                       OUT   CNTR_1
0774 97                         SUB   A
0775 D300                       OUT   CNTR_1
0777 3EB6                       MVI   A,10110110B
0779 D300                       OUT   CNTR_854
077B 3E80                       MVI   A,80H
077D D300                       OUT   CNTR_2
077F 97                         SUB   A
0780 D300                       OUT   CNTR_2
0782 3E04                       MVI   A,04H
0784 321B00                     STA   RAM_BASE +27              ;DISP STAT
0787 C38A0A                     JMP   CONT0
078A 3E36       DISP_3:         MVI   A,36H
078C D300                       OUT   CNTR_854
078E 3E14                       MVI   A,14H
0790 D300                       OUT   CNTR_0
0792 97                         SUB   A
0793 D300                       OUT   CNTR_0
0795 3E76                       MVI   A,76H
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0797 D300                       OUT   CNTR_854
0799 3E40                       MVI   A,40H
079B D300                       OUT   CNTR_1
079D 97                         SUB   A
079E D300                       OUT   CNTR_1
07A0 3EB6                       MVI   A,10110110B
07A2 D300                       OUT   CNTR_854
07A4 3E40                       MVI   A,40H
07A6 D300                       OUT   CNTR_2
07A8 97                         SUB   A
07A9 D300                       OUT   CNTR_2
07AB 3E08                       MVI   A,08H
07AD 321B00                     STA   RAM_BASE +27              ;DISP STAT
07B0 C38A0A                     JMP   CONT0
07B3 FE00       SAVEDISP:       CPI   DISP_KEY
07B5 CABD07                     JZ    CONT203
07B8 3E13                       MVI   A,13H
07BA C3C50D                     JMP   ERROR
07BD 3A0500     CONT203:        LDA   RAM_BASE +5       ;BASE ADD INFO+2
07C0 47                         MOV   B,A
07C1 0E00                       MVI   C,00H
07C3 E610                       ANI   10H
07C5 CAD007                     JZ    $+0BH               ;SLOW_MOD
07C8 78                         MOV   A,B
07C9 E60E                       ANI   0EH
07CB CAD007                     JZ    $+5                 ;REPT_MOD
07CE 0E10                       MVI   C,10H
07D0 C3D507                     JMP   $+5                 ;FAST_MOD
07D3 0E20                       MVI   C,20H
07D5 C3D007                     JMP   $-5
07D8 C5                         PUSH  B
07D9 3E70                       MVI   A,70H
07DB 81                         ADD   C
07DC 1600                       MVI   D,DATA_12           ,DISP INFO PTR MSB
07DE 5F                         MOV   E,A
07DF 0610                       MVI   B,10H
07E1 210000                     LXI   H,DATA_13           ;BASE DISP PTR
07E4 1A                         LDAX  D                   ;LD DISP BLK
07E5 77                         MOV   M,A
07E6 23                         INX   H
07E7 13                         INX   D
07E8 05                         DCR   B
07E9 C2E407                     JNZ   $-5
07EC 1600                       MVI   D,DATA_14           ;BASE MOD DISP PTR MSB
07EE 3A0600                     LDA   RAM_BASE +6                 ;MOD OPR
07F1 87                         ADD   A
07F2 87                         ADD   A
07F3 87                         ADD   A
07F4 87                         ADD   A
07F5 5F                         MOV   E,A
07F6 0610                       MVI   B,10H
07F8 1A                         LDAX  D                   ;LD DISP BLK
07F9 77                         MOV   M,A
```

```
07FA 23                         INX  H
07FB 13                         INX  D
07FC 05                         DCR  B
07FD C2F807                     JNZ  $-5
0800 CDAA0D                     CALL DISP3.2
0803 CDB80D                     CALL BLANK1             ;BLANKS 16 LOCATIONS
0806 1600                       MVI  D,DATA_12          ;DISP INFO PTR MSB
0808 1EA8                       MVI  E,10101000B
080A 0604                       MVI  B,04H
080C 211000                     LXI  H,DATA_13 +16 ;BASE DISP INFO RAM PTR +10H
080F 1A                         LDAX D                    ,LD DISP BLK
0810 77                         MOV  M,A
0811 23                         INX  H
0812 13                         INX  D
0813 05                         DCR  B
0814 C20F08                     JNZ  $-5
0817 3A1300                     LDA  RAM_BASE +19         ,DEFLT BANK
081A 23                         INX  H
081B 77                         MOV  M,A
081C CD9E0D                     CALL DISP3.1
081F DB00       CONT70:         IN   CNTR_879             ;INP KBD BLK
0821 47                         MOV  B,A
0822 E630                       ANI  30H
0824 CA2908                     JZ   $+5
0827 3E10                       MVI  A,10H
0829 C3C50D                     JMP  ERROR
082C 78                         MOV  A,B
082D E60F                       ANI  0FH
082F CA1F08                     JZ   $-10H
0832 3E40                       MVI  A,40H
0834 D300                       OUT  CNTR_879
0836 DB00                       IN   DATA_879
0838 FE04                       CPI  04H
083A FA4508                     JM   CONT51
083D FE00                       CPI  ENTER
083F CA4F08                     JZ   CONT52
0842 C34908                     JMP  CONT54
0845 77         CONT51:         MOV  M,A
0846 321300                     STA  RAM_BASE +19               ;DEFLT BANK
0849 CD9E0D     CONT54:         CALL DISP3.1
084C C31F08                     JMP  CONT70
084F 3A0600     CONT52:         LDA  RAM_BASE +6                ;MOD OPR
0852 47                         MOV  B,A
0853 FE04                       CPI  04H
0855 FABA08                     JM   MONO_MOD
0858 FE08                       CPI  08H
085A F26208                     JP   CONT55
085D 3E11                       MVI  A,11H
085F C3C50D                     JMP  ERROR
0862 E604       CONT55:         ANI  04H
0864 CA0309                     JZ   DUAL_MOD
0867 3E12                       MVI  A,12H
0869 C3C50D                     JMP  ERROR
```

```
086C 2600                       MVI   H,DATA_23
086E 110300                     LXI   D,RAM_BASE +3
0871 0E00                       MVI   C,00H
0873 3A1300                     LDA   RAM_BASE +19
0876 C600                       ADI   DATA_24
0878 6F                         MOV   L,A
0879 3A0600                     LDA   RAM_BASE +6                ;MOD OPR
087C 47                         MOV   B,A
087D E601                       ANI   01H
087F CA8308                     JZ    CONT57
0882 23                         INX   H
0883 1A         CONT57:         LDAX  D
0884 BE                         CMP   M
0885 CA8A08                     JZ    CONT58
0888 0EFF                       MVI   C,11111111B
088A 78         CONT58:         MOV   A,B
088B E601                       ANI   01H
088D CA9108                     JZ    CONT59
0890 2B                         DCX   H
0891 23         CONT59:         INX   H
0892 23                         INX   H
0893 1A                         LDAX  D
0894 BE                         CMP   M
0895 CA9A08                     JZ    CONT60
0898 0EFF                       MVI   C,11111111B
089A 79         CONT60:         MOV   A,C
089B FE00                       CPI   00H
089D CABA08                     JZ    MONO_MOD
08A0 CDB80D                     CALL  BLANK1
08A3 211000                     LXI   H,DATA_13 +16 ;BASE DISP INFO RAM PTR +10H
08A6 1600                       MVI   D,DATA_12     ,BASE DISP PTR MSB
08A8 1EA0                       MVI   E,10100000B
08AA 0604                       MVI   B,04H
08AC 1A                         LDAX  D
08AD 77                         MOV   M,A
08AE 23                         INX   H
08AF 13                         INX   D
08B0 05                         DCR   B
08B1 C2A908                     JNZ   $-8
08B4 CD9E0D                     CALL  DISP3.1
08B7 C30309                     JMP   DUAL_MOD
08BA 211000     MONO_MOD:       LXI   H,DATA_13 +16 ;BASE DISP INFO RAM PTR +10H
08BD 1EC8                       MVI   E,11001000B
08BF 0604                       MVI   B,04H
08C1 1A                         LDAX  D                    ;LD DISP BLK
08C2 77                         MOV   M,A
08C3 23                         INX   H
08C4 13                         INX   D
08C5 05                         DCR   B
08C6 C2C108                     JNZ   $-5
08C9 3A0600                     LDA   RAM_BASE +6                ;MOD OPR
08CC E601                       ANI   01H
08CE 3C                         INR   A
```

```
08CF 5F                         MOV   E,A
08D0 C1                         POP   B
08D1 3E10                       MVI   A,10H
08D3 B9                         CMP   C
08D4 CAE308                     JZ    MFST_MOD
08D7 F2DD08                     JP    MSLW_MOD
08DA FAE908                     JM    MRPT_MOD
08DD 7B         MSLW_MOD:       MOV   A,E
08DE C606                       ADI   06H
08E0 C3EC08                     JMP   CONT_X1
08E3 7B         MFST_MOD:       MOV   A,E
08E4 C60C                       ADI   0CH
08E6 C3EC08                     JMP   CONT_X1
08E9 7B         MRPT_MOD:       MOV   A,E
08EA C610                       ADI   10H
08EC 47         CONT_X1:        MOV   B,A
08ED 321600                     STA   RAM_BASE +22              ;DEFLT ACN NO
08F0 0E01                       MVI   C,01H                     ;DEFLT FLAG
08F2 78                         MOV   A,B
08F3 23                         INX   H
08F4 E6F0                       ANI   11110000B
08F6 77                         MOV   M,A
08F7 23                         INX   H
08F8 E60F                       ANI   0FH
08FA 77                         MOV   M,A
08FB 23                         INX   H
08FC 71                         MOV   M,C
08FD CDAA0D                     CALL  DISP3.%
0900 C3850A                     JMP   CONTOS
0903 C1         DUAL_MOD:       POP   B
0904 3E10                       MVI   A,10H
0906 B9                         CMP   C
0907 CA1209                     JZ    DFST_MOD
090A FAC309                     JM    DRPT_MOD
090D 3E14                       MVI   A,14H
090F C3C50D                     JMP   ERROR
0912 211000     DFST_MOD:       LXI   H,DATA_13 +16 ;BASE DISP INFO RAM PTR +10H
0915 1EB8                       MVI   E,10111000B
0917 0604                       MVI   B,04H
0919 1A                         LDAX  D                 ;LD DISP BLK
091A 77                         MOV   M,A
091B 23                         INX   H
091C 13                         INX   D
091D 05                         DCR   B
091E C21909                     JNZ   $-5
0921 3A1800                     LDA   RAM_BASE +24              ;DEFLT PTC MSB
0924 23                         INX   H
0925 77                         MOV   M,A
0926 3A1700                     LDA   RAM_BASE +23              ;DEFLT PTC LSB
0929 23                         INX   H
092A 77                         MOV   M,A
092B CD9E0D                     CALL  DISP3 )
092E 0610                       MVI   B,10H
```

```
0930 DB00      CONT67:          IN    CNTR_879          ;INPKBD BLK
0932 47                         MOV   B,A
0933 E630                       ANI   30H
0935 CA3A09                     JZ    $+5
0938 3E15                       MVI   A,15H
093A C3C50D                     JMP   ERROR
093D 78                         MOV   A,B
093E E60F                       ANI   0FH
0940 CA3009                     JZ    $-10H
0943 3E40                       MVI   A,40H
0945 D300                       OUT   CNTR_879
0947 DB00                       IN    DATA_879
0949 FE10                       CPI   10H
094B FA5B09                     JM    CONT64
094E FE00                       CPI   ENTER
0950 CA6B09                     JZ    CONT65
0953 FE00                       CPI   ENTERALL
0955 CA6B09                     JZ    CONT65
0958 C36509                     JMP   CONT63
095B 77        CONT64:          MOV   M,A
095C 2B                         DCX   H
095D 71                         MOV   M,C
095E 321700                     STA   RAM_BASE +23              ;DEFLT PTC LSB
0961 79                         MOV   A,C
0962 321800                     STA   RAM_BASE +24              ;DEFLT PTC MSB
0965 CD9E0D    CONT63:          CALL  DISP3.1
0968 C33009                     JMP   CONT67
096B 211000    CONT65:          LXI   H,DATA_13 +16 ;BASE DISP INFO RAM PTR +10H
096E 1EC8                       MVI   E,11001000B
0970 0604                       MVI   B,04H
0972 1A                         LDAX  D                   ;LD DISP BLK
0973 77                         MOV   M,A
0974 23                         INX   H
0975 13                         INX   D
0976 05                         DCR   B
0977 C27209                     JNZ   $-5
097A 3A0600                     LDA   RAM_BASE +6               ;MOD OPR
097D 47                         MOV   B,A
097E E602                       ANI   02H
0980 4F                         MOV   C,A
0981 0C                         INR   C
0982 78                         MOV   A,B
0983 E601                       ANI   01H
0985 87                         ADD   A
0986 C61C                       ADI   1CH
0988 47                         MOV   B,A
0989 321600                     STA   RAM_BASE +22              ;DEFLT ACN NO
098C 23                         INX   H
098D E6F0                       ANI   11110000B
098F 77                         MOV   M,A
0990 23                         INX   H
0991 78                         MOV   A,B
0992 E60F                       ANI   0FH
```

```
0994 77                          MOV  M,A
0995 23                          INX  H
0996 71                          MOV  M,C
0997 79                          MOV  A,C
0998 321500                      STA  RAM_BASE +21              ;DEFLT FLAG
099B CDAA0D                      CALL DISP3.2
099E 3A1800                      LDA  RAM_BASE +24              ;DEFLT PTC MSB
09A1 87                          ADD  A
09A2 87                          ADD  A
09A3 87                          ADD  A
09A4 87                          ADD  A
09A5 47                          MOV  B,A
09A6 3A1700                      LDA  RAM_BASE +23              ;DEFLT PTC LSB
09A9 80                          ADD  B
09AA D300                        OUT  PTC_REG
09AC 210000                      LXI  H,DATA_20
09AF 111900                      LXI  D,RAM_BASE +25
09B2 3A0500                      LDA  RAM_BASE +5
09B5 87                          ADD  A
09B6 0600                        MVI  B,00H
09B8 4F                          MOV  C,A
09B9 09                          DAD  B
09BA 7E                          MOV  A,M
09BB 12                          STAX D
09BC 23                          INX  H
09BD 13                          INX  D
09BE 7E                          MOV  A,M
09BF 12                          STAX D
09C0 C3850A                      JMP  CONTOS
09C3 211000    DRPT_MOD:         LXI  H,DATA_13+16        ;BASE DISP RAM PTR+10H
09C6 1EC0                        MVI  E,11000000B
09C8 0604                        MVI  B,04H
09CA 1A                          LDAX D                   ;LD DISP BLK
09CB 77                          MOV  M,A
09CC 23                          INX  H
09CD 13                          INX  D
09CE 05                          DCR  B
09CF C2CA09                      JNZ  $-5
09D2 1600                        MVI  D,DATA_21      ;SWT BANK MSB,LD SWT BLK
09D4 3A0500                      LDA  RAM_BASE +5    ;BASE MOD INFO+2
09D7 87                          ADD  A
09D8 C600                        ADI  DATA_22
09DA 5F                          MOV  E,A
09DB 1A                          LDAX D
09DC 4F                          MOV  C,A
09DD 13                          INX  D
09DE 1A                          LDAX D
09DF 23                          INX  H
09E0 71                          MOV  M,C
09E1 23                          INX  H
09E2 77                          MOV  M,A
09E3 CD9E0D                      CALL DISP3.1
09E6 DB00                        IN   CNTR_879            ;INP KBD BLK
```

```
09E8 47                         MOV   B,A
09E9 E630                       ANI   30H
09EB CAF009                     JZ    $+5
09EE 3E0B                       MVI   A,0BH
09F0 C3C50D                     JMP   ERROR
09F3 78                         MOV   A,B
09F4 E60F                       ANI   0FH
09F6 CAE609                     JZ    $-10H
09F9 3E40                       MVI   A,40H
09FB D300                       OUT   CNTR_879
09FD DB00                       IN    DATA_879
09FF FE10                       CPI   10H
0A01 FA070A                     JM    CNT_37
0A04 C3270A                     JMP   CNT_38
0A07 4F         CNT_37:         MOV   C,A
0A08 DB00                       IN    CNTR_879          ;INP KBD BLK
0A0A 47                         MOV   B,A
0A0B E630                       ANI   30H
0A0D CA120A                     JZ    $+5
0A10 3E0C                       MVI   A,0CH
0A12 C3C50D                     JMP   ERROR
0A15 78                         MOV   A,B
0A16 E60F                       ANI   0FH
0A18 CA080A                     JZ    $-10H
0A1B 3E40                       MVI   A,40H
0A1D D300                       OUT   CNTR_879
0A1F FE10                       CPI   10H
0A21 FA340A                     JM    CNT_39
0A24 C3270A                     JMP   CNT_38
0A27 FE00       CNT_38:         CPI   ENTER
0A29 CA3E0A                     JZ    CONTXYZ
0A2C FE00                       CPI   ENTERALL
0A2E CA3E0A                     JZ    CONTXYZ
0A31 C33B0A                     JMP   CNT_40
0A34 77         CNT_39:         MOV   M,A
0A35 2B                         DCX   H
0A36 71                         MOV   M,C
0A37 12                         STAX  D
0A38 79                         MOV   A,C
0A39 1B                         DCX   D
0A3A 12                         STAX  D
0A3B CD9E0D     CNT_40:         CALL  DISP3.1
0A3E 211000     CONTXYZ:        LXI   H,DATA_13 +16
0A41 1EC8                       MVI   E,11001000B
0A43 0604                       MVI   B,04H
0A45 1A                         LDAX  D
0A46 77                         MOV   M,A
0A47 23                         INX   H
0A48 13                         INX   D
0A49 05                         DCR   B
0A4A C2450A                     JNZ   $ -5
0A4D 3A0600                     LDA   RAM_BASE +6
0A50 47                         MOV   B,A
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```
0A51 E602                       ANI   02H
0A53 4F                         MOV   C,A
0A54 0C                         INR   C
0A55 78                         MOV   A,B
0A56 E601                       ANI   01H
0A58 87                         ADD   A
0A59 C626                       ADI   26H
0A5B 47                         MOV   B,A
0A5C 321600                     STA   RAM_BASE +22
0A5F 23                         INX   H
0A60 E6F0                       ANI   11110000B
0A62 77                         MOV   M,A
0A63 78                         MOV   A,B
0A64 E60F                       ANI   0FH
0A66 71                         MOV   M,C
0A67 79                         MOV   A,C
0A68 321500                     STA   RAM_BASE +21
0A6B 3A0500                     LDA   RAM_BASE +5       ;BASE MOD INFO +2
0A6E D300                       OUT   PORT_21
0A70 210000                     LXI   H,DATA_21
0A73 87                         ADD   A
0A74 C600                       ADI   DATA_21
0A76 6F                         MOV   L,A
0A77 46                         MOV   B,M
0A78 23                         INX   H
0A79 7E                         MOV   A,M
0A7A 87                         ADD   A
0A7B 87                         ADD   A
0A7C 87                         ADD   A
0A7D 87                         ADD   A
0A7E 80                         ADD   B
0A7F 321900                     STA   RAM_BASE +25
0A82 C3850A                     JMP   CONTOS
0A85                            ;ACN SEQ & CURSOR

0A85 3A1300     CONTOS:         LDA   RAM_BASE +19              ;LD DFLT BNK
0A88 D300                       OUT   PORT_19
0A8A 2600       CONTO:          MVI   H,DATA_15         ;CLK PTR MSB
0A8C 0603                       MVI   B,03H
0A8E 3A0500                     LDA   RAM_BASE +5       ;BASE MODE INFO+2
0A91 87                         ADD   A
0A92 87                         ADD   A
0A93 6F                         MOV   L,A
0A94 7E                         MOV   A,M
0A95 D300                       OUT   PORT_16
0A97 23                         INX   H
0A98 7E                         MOV   A,M
0A99 D300                       OUT   PORT_19
0A9B 3E00                       MVI   A,DATA_16
0A9D D300                       OUT   PORT_18
0A9F 3E00                       MVI   A,MASK_1
0AA1 30                         SIM
0AA2 CDB80D                     CALL  BLANK1
```

```
0AA5 210000                     LXI   H,DATA_13
0AA8 1600                       MVI   D,DATA_12
0AAA 1EE0                       MVI   E,11100000B
0AAC 1A                         LDAX  D
0AAD 77                         MOV   M,A
0AAE 23                         INX   H
0AAF 13                         INX   D
0AB0 05                         DCR   B
0AB1 C2AC0A                     JNZ   $-5
0AB4 3EFF                       MVI   A,11111111B
0AB6 323000                     STA   RAM_BASE +48              ;RENTRY_F
0AB9 3A1600                     LDA   RAM_BASE +22              ;ACN_F
0ABC 4F                         MOV   C,A
0ABD 3A1700                     LDA   RAM_BASE +23              ,ACN NO
0AC0 2A1900                     LHLD  RAM_BASE +25
0AC3 223100                     SHLD  RAM_BASE +49
0AC6 47         ACN_SEQ:        MOV   B,A               ;ACN_SEQ = RENTRY
0AC7 C5                         PUSH  B
0AC8 210000                     LXI   H,RAM_BASE
0ACB DB00                       IN    PORT_A
0ACD BE                         CMP   M
0ACE CAD20A                     JZ    CONT81
0AD1 CF                         RST   1
0AD2 23         CONT81:         INX   H
0AD3 DB00                       IN    PORT_B
0AD5 BE                         CMP   M
0AD6 CADA0A                     JZ    CONT82
0AD9 CF                         RST   1
0ADA 23         CONT82:         INX   H
0ADB DB00                       IN    PORT_C
0ADD E60F                       ANI   0FH
0ADF BE                         CMP   M
0AE0 CAE40A                     JZ    CONT83
0AE3 CF                         RST   1
0AE4 C1         CONT83:         POP   B
0AE5 78                         MOV   A,B
0AE6 FE00                       CPI   00H
0AE8 C2EC0A                     JNZ   CONT84
0AEB CF                         RST   1
0AEC FE1C       CONT84:         CPI   1CH
0AEE FA3B0D                     JM    CONT85
0AF1 47                         MOV   B,A
0AF2 C5                         PUSH  B
0AF3 E601                       ANI   01H
0AF5 CA390D                     JZ    CONT86
0AF8 78                         MOV   A,B
0AF9 E602                       ANI   02H
0AFB 4F                         MOV   C,A
0AFC 3A0600                     LDA   RAM_BASE +6               ;MOD WORD
0AFF E601                       ANI   01H
0B01 87                         ADD   A
0B02 A9                         XRA   C
0B03 CA390D                     JZ    CONT86
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0B06 3A1B00                     LDA   RAM_BASE +27              ;DSP STAT
0B09 47                         MOV   B,A
0B0A E601                       ANI   01H
0B0C C2240B                     JNZ   CAL_ADD0
0B0F 78                         MOV   A,B
0B10 E602                       ANI   02H
0B12 C2820B                     JNZ   CAL_ADD1
0B15 47                         MOV   B,A
0B16 E604                       ANI   04H
0B18 C20E0C                     JNZ   CAL_ADD2
0B1B 78                         MOV   A,B
0B1C E608                       ANI   08H
0B1E C29C0C                     JNZ   CAL_ADD3
0B21 C3390D                     JMP   CONT86
0B24 DB00       CAL_ADD0:       IN    ADD_GENL
0B26 5F                         MOV   E,A
0B27 DB00                       IN    ADD_GENM
0B29 E603                       ANI   03H
0B2B 57                         MOV   D,A
0B2C 2A0900                     LHLD  RAM_BASE +9               ;BASE MCH RAM
0B2F 19                         DAD   D
0B30 221C00                     SHLD   RAM_BASE +28
0B33 97                         SUB   A
0B34 D300                       OUT   PORT_INL
0B36 3E04                       MVI   A,04H
0B38 D300                       OUT   CNTR_854
0B3A 97                         SUB   A
0B3B DB00                       IN    CNTR_1
0B3D 47                         MOV   B,A
0B3E 87                         ADD   A
0B3F D2440B                     JNC   CONT87
0B42 24                         INR   H
0B43 24                         INR   H
0B44 87         CONT87:         ADD   A
0B45 C2490B                     JNZ   CONT88
0B48 24                         INR   H
0B49 37         CONT88:         STC
0B4A 3F                         CMC
0B4B 85                         ADD   L
0B4C 6F                         MOV   L,A
0B4D D2510B                     JNC   CONT89
0B50 24                         INR   H
0B51 56         CONT89:         MOV   D,M
0B52 7C                         MOV   A,H
0B53 C608                       ADI   08H
0B55 67                         MOV   H,A
0B56 3EFF                       MVI   A,11111111B
0B58 77                         MOV   M,A
0B59 2A1C00                     LHLD  RAM_BASE +28              ;BASE ACQ ADD
0B5C 3ED8                       MVI   A,11011000B
0B5E D300                       OUT   CNTR_854
0B60 97                         SUB   A
0B61 DB00                       IN    CNTR_2
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0B63 4F                         MOV  C,A
0B64 87                         ADD  A
0B65 D26A0B                     JNC  CONT90
0B68 24                         INR  H
0B69 24                         INR  H
0B6A 87          CONT90:        ADD  A
0B6B C26F0B                     JNZ  CONT91
0B6E 24                         INR  H
0B6F 37          CONT91:        STC
0B70 3F                         CMC
0B71 85                         ADD  L
0B72 6F                         MOV  L,A
0B73 D2770B                     JNC  CONT92
0B76 24                         INR  H
0B77 5E          CONT92:        MOV  E,M
0B78 7C                         MOV  A,H
0B79 C608                       ADI  08H
0B7B 67                         MOV  H,A
0B7C 3EFF                       MVI  A,11111111B
0B7E 77                         MOV  M,A
0B7F C3290D                     JMP  DISP_MAG
0B82 2A0900      CAL_ADD1:      LHLD RAM_BASE+9                 ;BASE MCH RAM
0B85 97                         SUB  A
0B86 D300                       OUT  PORT_INL
0B88 3ED2                       MVI  A,11010010B
0B8A D300                       OUT  CNTR_854
0B8C 97                         SUB  A
0B8D DB00                       IN   CNTR_0
0B8F 47                         MOV  B,A
0B90 3ED4                       MVI  A,11010100B
0B92 D300                       OUT  CNTR_854
0B94 97                         SUB  A
0B95 DB00                       IN   CNTR_1
0B97 87                         ADD  A
0B98 D29F0B                     JNC  CONT93
0B9B 24                         INR  H
0B9C 24                         INR  H
0B9D 24                         INR  H
0B9E 24                         INR  H
0B9F 87          CONT93:        ADD  A
0BA0 D2A50B                     JNC  CONT94
0BA3 24                         INR  H
0BA4 24                         INR  H
0BA5 87          CONT94:        ADD  A
0BA6 D2AA0B                     JNC  CONT95
0BA9 24                         INR  H
0BAA 37          CONT95:        STC
0BAB 3F                         CMC
0BAC 80                         ADD  B
```

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0BAD 6F                         MOV   L,A
0BAE D2B20B                     JNC   CONT96
0BB1 24                         INR   H
0BB2 56          CONT96:        MOV   D,M
0BB3 E5                         PUSH  H
0BB4 7C                         MOV   A,H
0BB5 C608                       ADI   08H
0BB7 67                         MOV   H,A
0BB8 3EFF                       MVI   A,11111111B
0BBA 77                         MOV   M,A
0BBB 78                         MOV   A,B
0BBC 2F                         CMA
0BBD 47                         MOV   B,A
0BBE 2A0900                     LHLD  RAM_BASE +9                ;BASE MCH PTR
0BC1 3ED8                       MVI   A,11011000B
0BC3 D300                       OUT   CNTR_854
0BC5 97                         SUB   A
0BC6 DB00                       IN    CNTR_2
0BC8 2F                         CMA
0BC9 87                         ADD   A
0BCA D2D10B                     JNC   CONT97
0BCD 24                         INR   H
0BCE 24                         INR   H
0BCF 24                         INR   H
0BD0 24                         INR   H
0BD1 87          CONT97:        ADD   A
0BD2 D2D70B                     JNC   CONT98
0BD5 24                         INR   H
0BD6 24                         INR   H
0BD7 87          CONT98:        ADD   A
0BD8 D2DC0B                     JNC   CONT99
0BDB 24                         INR   H
0BDC 37          CONT99:        STC
0BDD 3F                         CMC
0BDE 80                         ADD   B
0BDF 6F                         MOV   L,A
0BE0 D2E40B                     JNC   CONTA0
0BE3 24                         INR   H
0BE4 5E          CONTA0:        MOV   E,M
0BE5 7C                         MOV   A,H
0BE6 C608                       ADI   08H
0BE8 67                         MOV   H,A
0BE9 3EFF                       MVI   A,11111111B
0BEB 77                         MOV   M,A
0BEC 7C                         MOV   A,H
0BED 87                         ADD   A
0BEE 87                         ADD   A
0BEF 87                         ADD   A
0BF0 87                         ADD   A
0BF1 87                         ADD   A
0BF2 4F                         MOV   C,A
0BF3 7D                         MOV   A,L
0BF4 0F                         RRC
```

```
0BF5 0F                          RRC
0BF6 0F                          RRC
0BF7 E61F                        ANI   1FH
0BF9 81                          ADD   C
0BFA 4F                          MOV   C,A
0BFB E1                          POP   H
0BFC 7C                          MOV   A,H
0BFD 87                          ADD   A
0BFE 87                          ADD   A
0BFF 87                          ADD   A
0C00 87                          ADD   A
0C01 87                          ADD   A
0C02 47                          MOV   B,A
0C03 7D                          MOV   A,L
0C04 0F                          RRC
0C05 0F                          RRC
0C06 0F                          RRC
0C07 E61F                        ANI   1FH
0C09 80                          ADD   B
0C0A 47                          MOV   B,A
0C0B C3290D                      JMP   DISP_MAG
0C0E 2A0900      CAL_ADD2:       LHLD  RAM_BASE +9                ;BASE MCH RAM
0C11 97                          SUB   A
0C12 D300                        OUT   PORT_INL
0C14 3ED2                        MVI   A,11010010B
0C16 D300                        OUT   CNTR_854
0C18 97                          SUB   A
0C19 DB00                        IN    CNTR_0
0C1B 47                          MOV   B,A
0C1C 3ED4                        MVI   A,11010100B
0C1E D300                        OUT   CNTR_854
0C20 97                          SUB   A
0C21 DB00                        IN    CNTR_1
0C23 87                          ADD   A
0C24 87                          ADD   A
0C25 D22C0C                      JNC   CONTA1
0C28 24                          INR   H
0C29 24                          INR   H
0C2A 24                          INR   H
0C2B 24                          INR   H
0C2C 87          CONTA1:         ADD   A
0C2D D2320C                      JNC   CONTA2
0C30 24                          INR   H
0C31 24                          INR   H
0C32 87          CONTA2:         ADD   A
0C33 D2370C                      JNC   CONTA4
0C36 24                          INR   H
0C37 37          CONTA4:         STC
0C38 3F                          CMC
0C39 80                          ADD   B
0C3A 6F                          MOV   L,A
0C3B D23F0C                      JNC   CONTA5
0C3E 24                          INR   H
```

```
0C3F 56          CONTA5:     MOV  D,M
0C40 E5                      PUSH H
0C41 7C                      MOV  A,H
0C42 C608                    ADI  08H
0C44 67                      MOV  H,A
0C45 3EFF                    MVI  A,11111111B
0C47 77                      MOV  M,A
0C48 78                      MOV  A,B
0C49 2F                      CMA
0C4A 47                      MOV  B,A
0C4B 2A0900                  LHLD RAM_BASE +9          ;BASE MCH PTR
0C4E 3ED8                    MVI  A,11011000B
0C50 D300                    OUT  CNTR_854
0C52 97                      SUB  A
0C53 DB00                    IN   CNTR_2
0C55 2F                      CMA
0C56 87                      ADD  A
0C57 87                      ADD  A
0C58 D25F0C                  JNC  CONTA6
0C5B 24                      INR  H
0C5C 24                      INR  H
0C5D 24                      INR  H
0C5E 24                      INR  H
0C5F 87          CONTA6:     ADD  A
0C60 D2650C                  JNC  CONTA7
0C63 24                      INR  H
0C64 24                      INR  H
0C65 87          CONTA7:     ADD  A
0C66 D26A0C                  JNC  CONTA9
0C69 24                      INR  H
0C6A 37          CONTA9:     STC
0C6B 3F                      CMC
0C6C 80                      ADD  B
0C6D 6F                      MOV  L,A
0C6E D2720C                  JNC  CONTB0
0C71 24                      INR  H
0C72 5E          CONTB0:     MOV  E,M
0C73 7C                      MOV  A,H
0C74 C608                    ADI  08H
0C76 67                      MOV  H,A
0C77 3EFF                    MVI  A,11111111B
0C79 77                      MOV  M,A
0C7A 7C                      MOV  A,H
0C7B 87                      ADD  A
0C7C 87                      ADD  A
0C7D 87                      ADD  A
0C7E 87                      ADD  A
0C7F 87                      ADD  A
0C80 4F                      MOV  C,A
0C81 7D                      MOV  A,L
0C82 0F                      RRC
0C83 0F                      RRC
0C84 0F                      RRC
```

```
0C85 E61F                       ANI   1FH
0C87 81                         ADD   C
0C88 4F                         MOV   C,A
0C89 E1                         POP   H
0C8A 7C                         MOV   A,H
0C8B 87                         ADD   A
0C8C 87                         ADD   A
0C8D 87                         ADD   A
0C8E 87                         ADD   A
0C8F 87                         ADD   A
0C90 47                         MOV   B,A
0C91 7D                         MOV   A,L
0C92 0F                         RRC
0C93 0F                         RRC
0C94 0F                         RRC
0C95 E61F                       ANI   1FH
0C97 80                         ADD   B
0C98 47                         MOV   B,A
0C99 C3290D                     JMP   DISP_MAG
0C9C 2A0900     CAL_ADD3:       LHLD  RAM_BASE +9               ;BASE MCH RAM
0C9F 97                         SUB   A
0CA0 D300                       OUT   PORT_INL
0CA2 3ED2                       MVI   A,11010010B
0CA4 D300                       OUT   CNTR_854
0CA6 97                         SUB   A
0CA7 DB00                       IN    CNTR_0
0CA9 47                         MOV   B,A
0CAA 3ED4                       MVI   A,11010100B
0CAC D300                       OUT   CNTR_854
0CAE 97                         SUB   A
0CAF DB00                       IN    CNTR_1
0CB1 87                         ADD   A
0CB2 87                         ADD   A
0CB3 87                         ADD   A
0CB4 D2BB0C                     JNC   CONTF1
0CB7 24                         INR   H
0CB8 24                         INR   H
0CB9 24                         INR   H
0CBA 24                         INR   H
0CBB 87         CONTF1:         ADD   A
0CBC D2C10C                     JNC   CONTF2
0CBF 24                         INR   H
0CC0 24                         INR   H
0CC1 87         CONTF2:         ADD   A
0CC2 D2C60C                     JNC   CONTD4
0CC5 24                         INR   H
0CC6 37         CONTD4:         STC
0CC7 3F                         CMC
0CC8 80                         ADD   B
0CC9 6F                         MOV   L,A
0CCA D2CE0C                     JNC   CONTD5
0CCD 24                         INR   H
0CCE 56         CONTD5:         MOV   D,M
```

```
0CCF E5                         PUSH H
0CD0 7C                         MOV  A,H
0CD1 C608                       ADI  08H
0CD3 67                         MOV  H,A
0CD4 3EFF                       MVI  A,11111111B
0CD6 77                         MOV  M,A
0CD7 78                         MOV  A,B
0CD8 2F                         CMA
0CD9 47                         MOV  B,A
0CDA 2A0900                     LHLD RAM_BASE +9                ;BASE MCH PTR
0CDD 3ED8                       MVI  A,11011000B
0CDF D300                       OUT  CNTR_854
0CE1 97                         SUB  A
0CE2 DB00                       IN   CNTR_2
0CE4 2F                         CMA
0CE5 87                         ADD  A
0CE6 87                         ADD  A
0CE7 87                         ADD  A
0CE8 D2EF0C                     JNC  CONTD6
0CEB 24                         INR  H
0CEC 24                         INR  H
0CED 24                         INR  H
0CEE 24                         INR  H
0CEF 87         CONTD6.         ADD  A
0CF0 D2F50C                     JNC  CONTD7
0CF3 24                         INR  H
0CF4 24                         INR  H
0CF5 87         CONTD7:         ADD  A
0CF6 D2FA0C                     JNC  CONTD9
0CF9 24                         INR  H
0CFA 37         CONTD9:         STC
0CFB 3F                         CMC
0CFC 80                         ADD  B
0CFD 6F                         MOV  L,A
0CFE D2020D                     JNC  CONTDB0
0D01 24                         INR  H
0D02 5E         CONTDB0:        MOV  E,M
0D03 7C                         MOV  A,H
0D04 C608                       ADI  08H
0D06 67                         MOV  H,A
0D07 3EFF                       MVI  A,11111111B
0D09 77                         MOV  M,A
0D0A 7C                         MOV  A,H
0D0B 87                         ADD  A
0D0C 87                         ADD  A
0D0D 87                         ADD  A
0D0E 87                         ADD  A
0D0F 87                         ADD  A
0D10 4F                         MOV  C,A
0D11 7D                         MOV  A,L
0D12 0F                         RRC
0D13 0F                         RRC
0D14 0F                         RRC
```

```
0D15 E61F                       ANI   1FH
0D17 81                         ADD   C
0D18 4F                         MOV   C,A
0D19 E1                         POP   H
0D1A 7C                         MOV   A,H
0D1B 87                         ADD   A
0D1C 87                         ADD   A
0D1D 87                         ADD   A
0D1E 87                         ADD   A
0D1F 87                         ADD   A
0D20 47                         MOV   B,A
0D21 7D                         MOV   A,L
0D22 0F                         RRC
0D23 0F                         RRC
0D24 0F                         RRC
0D25 E61F                       ANI   1FH
0D27 80                         ADD   B
0D28 47                         MOV   B,A
0D29            DISP_MAG :      MOV   A,D
0D29 93                         SUB   E
0D2A 57                         MOV   D,A
0D2B 78                         MOV   A,B
0D2C 91                         SUB   C
0D2D 4F                         MOV   C,A                ;C = DIFF T
0D2E 42                         MOV   B,D                ;B = DIFF V
0D2F C5                         PUSH  B
0D30 3EFF                       MVI   A,11111111B
0D32 321F00                     STA   RAM_BASE +31              ;DVDT REF PTR
0D35 2A0D00                     LHLD  RAM_BASE +13              ;BASE PCv PTR
0D38 E9                         PCHL
0D39 C1         CONT86:         POP   B
0D3A 78                         MOV   A,B
0D3B 2600       CONT85:         MVI   H,DATA_14             ;BASE PARSE TAB
0D3D 87                         ADD   A
0D3E 87                         ADD   A
0D3F 6F                         MOV   L,A
0D40 3A3000                     LDA   RAM_BASE +48              ;FLG_1
0D43 FEFF                       CPI   11111111B
0D45 C24B0D                     JNZ   NO_RENTR
0D48 7E                         MOV   A,M
0D49 D300                       OUT   PORT_INL
0D4B 23         NO_RENTR        INX   H
0D4C 7E                         MOV   A,M
0D4D D300                       OUT   PORT_MDL
0D4F D300                       OUT   START
0D51 76                         HLT
0D52 C3C60A                     JMP   ACN_SEQ

0D55                            ;THE INT & DISP SUBROUTINES

0D55 3E00       EXT_INT:        MVI   A,00H
0D57 C9                         RET
0D58 C9         INT_5.5:        RET
```

```
0D59 79          INT_6.5:        MOV  A,C
0D5A 0F                          RRC
0D5B D2680D                      JNC  $+13
0D5E EB                          XCHG
0D5F 2A3100                      LHLD RAM_BASE +49
0D62 2B                          DCX  H
0D63 7D                          MOV  A,L
0D64 B4                          ORA  H
0D65 CA6E0D                      JZ   $+9
0D68 78                          MOV  A,B
0D69 223100                      SHLD RAM_BASE +49
0D6C C37E0D                      JMP  $+18
0D6F 2A1900                      LHLD RAM_BASE +25
0D72 223100                      SHLD RAM_BASE +49
0D75 79                          MOV  A,C
0D76 0F                          RRC
0D77 0F                          RRC
0D78 D27C0D                      JNC  $+4
0D7B 23                          INX  H
0D7C 23                          INX  H
0D7D 7E                          MOV  A,M
0D7E 47                          MOV  B,A
0D7F 97                          SUB  A
0D80 3A3000                      LDA  RAM_BASE +48
0D83 78                          MOV  A,B
0D84 C9                          RET

0D85 79          INT_7.5:        MOV  A,C
0D86 0F                          RRC
0D87 D2920D                      JNC  $+11
0D8A EB                          XCHG
0D8B 2A1900                      LHLD RAM_BASE +25
0D8E 223100                      SHLD RAM_BASE +49
0D91 EB                          XCHG
0D92 0F                          RRC
0D93 D2970D                      JNC  $+4
0D96 23                          INX  H
0D97 23                          INX  H
0D98 97                          SUB  A
0D99 3A3100                      LDA  RAM_BASE +49
0D9C 77                          MOV  M,A
0D9D C9                          RET

0D9E 01FF00      DISP3.1:        LXI  B,11111111B
0DA1 0B                          DCX  B
0DA2 00                          NOP
0DA3 00                          NOP
0DA4 79                          MOV  A,C
0DA5 B0                          ORA  B
0DA6 C2A10D                      JNZ  $-5
0DA9 C9                          RET
0DAA 01FF00      DISP4 2.        LXI  B,11111111B
0DAD 0B                          DCX  B
```

```
0DAE 00                         NOP
0DAF 00                         NOP
0DB0 E3                         XTHL
0DB1 E3                         XTHL
0DB2 79                         MOV   A,C
0DB3 B0                         ORA   B
0DB4 C2AD0D                     JNZ   $-7
0DB7 C9                         RET

0DB8 210000     BLANK1: LXI   H,DATA_13
0DBB 0620                       MVI   B,20H
0DBD 97                         SUB   A
0DBE 77                         MOV   M,A
0DBF 23                         INX   H
0DC0 05                         DCR   B
0DC1 C2BE0D                     JNZ   $-3
0DC4 C9                         RET

0DC5 CDB80D     ERROR:          CALL  BLANK1
0DC8 211000                     LXI   H,DATA_13+16
0DCB 1600                       MVI   D,DATA_12
0DCD 1EA0                       MVI   E,10100000B
0DCF 4F                         MOV   C,A
0DD0 1A                         LDAX  D
0DD1 77                         MOV   M,A
0DD2 23                         INX   H
0DD3 13                         INX   D
0DD4 05                         DCR   B
0DD5 C2CD0D                     JNZ   $-8
0DD8 23                         INX   H
0DD9 79                         MOV   A,C
0DDA E6F0                       ANI   11110000B
0DDC 23                         INX   H
0DDD 77                         MOV   M,A
0DDE 79                         MOV   A,C
0DDF E60F                       ANI   0FH
0DE1 23                         INX   H
0DE2 77                         MOV   M,A
0DE3 CDAA0D                     CALL  DISP1 ?
0DE6 C7                         RST   0
0000                            END

---- SYMBOL TABLE ----

ACN_SEQ  0AC6     CONT25   0523     CONT92   0B77     DATA_14  0000  MRPT_MOD  08E9
ACQ_DISP 0460     CONT26   052E     CONT93   0B91     DATA_15  0000  MSLW_MOD  08DD
ACQ_KEY  0000     CONT27   0539     CONT94   0BA5     DATA_16  0000  NOT_DENT  00C7
ADD_GENL 0000     CONT28   058F     CONT95   0BAA     DATA_17  0000  NO_RENTR  0D4B
ADD_GENM 0000     CONT29   05AF     CONT96   0BB7     DATA_18  0000  OUTT0A    0248
AD_FSTMD 0552     CONT3    071B     CONT97   0BD1     DATA_19  0000  OUTT4     0225
AD_RPTMD 064C     CONT30   05BB     CONT98   0BD7     DATA_2   0000  OUTT5     027D
AD_SLWMD 04B4     CONT31   05C5     CONT99   0BDC     DATA_20  0000  OUTT6     021F
BLANK1   0DB8     CONT32   056E     CONTA0   0BE4     DATA_21  0000  OUTT7     01F0
```

CAL_ADD0	0B24	CONT33	0600	CONTA1	0C2C	DATA_22	0000	OUTT8	0273
CAL_ADD1	0B82	CONT34	0607	CONTA2	0C32	DATA_23	0000	OUTT9	0277
CAL_ADD2	0C0E	CONT35	060E	CONTA4	0C37	DATA_24	0000	PORT_16	0000
CAL_ADD3	0C9C	CONT36	0612	CONTA5	0C3F	DATA_3	0000	PORT_17	0000
CNTR_0	0000	CONT37	0690	CONTA6	0C5F	DATA_4	0000	PORT_18	0000
CNTR_1	0000	CONT38	06B0	CONTA7	0C65	DATA_5	0000	PORT_19	0000
CNTR_2	0000	CONT39	06BD	CONTA9	0C6A	DATA_6	0000	PORT_20	0000
CNTR_854	0000	CONT40	06C4	CONTADF	05CB	DATA_7	0000	PORT_21	0000
CNTR_855	0000	CONT41	066F	CONTADR	06CA	DATA_8	0000	PORT_A	0000
CNTR_879	0000	CONT51	0845	CONTADS	0500	DATA_879	0000	PORT_B	0000
CNT_37	0A07	CONT52	084F	CONTB0	0C72	DATA_9	0000	PORT_C	0000
CNT_38	0A27	CONT54	0849	CONTD1	011C	DFST_MOD	0912	PORT_INL	0000
CNT_39	0A34	CONT55	0862	CONTD2	013C	DISP3.1	0D9E	PORT_MDL	0000
CNT_40	0A3B	CONT57	0883	CONTD3	0148	DISP3.2	0DAA	PORT_MOD	0000
CONT0	0A8A	CONT58	088A	CONTD4	0CC6	DISP_1	0738	PTC_REG	0000
CONT0S	0A85	CONT59	0891	CONTD5	0CCE	DISP_2	0761	RAM_BASE	0000
CONT10	02FE	CONT60	089A	CONTD6	0CEF	DISP_3	078A	REPT_S	0406
CONT11	031D	CONT63	0965	CONTD7	0CF5	DISP_KEY	0000	SAVE	017A
CONT12	032A	CONT64	095B	CONTD9	0CFA	DISP_MAG	0D29	SAVEDISP	07B3
CONT13	0334	CONT65	096B	CONTDB0	0D02	DRPT_MOD	09C3	SAVE_KEY	0000
CONT14	02DD	CONT67	0930	CONTDO	0110	DUAL_MOD	0903	SAVE_MOD	0184
CONT15	03D1	CONT70	081F	CONTF1	0CBB	ENTER	0000	SFST_MOD	02C1
CONT16	03EF	CONT81	0AD2	CONTF2	0CC1	ENTERALL	0000	SLOW_S	028A
CONT17	03F9	CONT82	0ADA	CONTXYZ	0A3E	ERROR	0DC5	SRPT_MOD	038D
CONT18	0400	CONT83	0AE4	CONT_201	06F8	EXT_INT	0D55	SSEL_REG	0000
CONT19	03B0	CONT84	0AEC	CONT_202	06FE	FAST_S	033A	SSLW_MOD	0233
CONT2	01C2	CONT85	0D3B	CONT_X1	08EC	INT_5 5	0D58	STAK_SPC	0038
CONT20	0423	CONT86	0D39	COUNT	0020	INT_6.5	0D59	START	0000
CONT203	07BD	CONT87	0B44	DATA_1	0000	INT_7.5	0D85	TO_CH	00F1
CONT20X	06E7	CONT88	0B49	DATA_10	0000	MASK_1	0000		
CONT21	04F6	CONT89	0B51	DATA_11	0000	MASK_2	000E		
CONT23	04FA	CONT90	0B6A	DATA_12	0000	MFST_MOD	08E3		
CONT24	04CB	CONT91	0B6F	DATA_13	0000	MONO_MOD	08BA		

```
VOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

OURCE FILE NAME: G9.ASM

0000                            ;G i j PRGM G-91

0000                            ORG     0000H
0000            RAM_BASE:       DS      40
0028 00         DATA_17:        DB      00
0029 00         DATA_19:        DB      00
0000            DOT:            EQU     00H
0000            MIL:            EQU     00H
0000            MIC:            EQU     00H
0000            NAN:            EQU     00H
0000            INI_LCH:        EQU     00H
0000            PORT_20:        EQU     00H
0000            CONT86: EQU     00H

002A 2A2000                     LHLD RAM_BASE +32       ;BASE DATA 1K P_V
002D 3A1F00                     LDA  RAM_BASE +31       ;DVDT REF PTR
0030 FEFF                       CPI  11111111B
0032 CA3A00                     JZ   CNT_G910
0035 2A1100                     LHLD RAM_BASE +17       ;BASE DATA 1K P_T
0038 C1                         POP  B
0039 41                         MOV  B,C
003A 97         CNT_G910        SUB  A
003B 78                         MOV  A,B
003C 87                         ADD  A
003D D24200                     JNC  CNT_G911
0040 24                         INR  H
0041 24                         INR  H
0042 87         CNT_G911:       ADD  A
0043 D24700                     JNC  CNT_G912
0046 24                         INR  H
0047 6F         CNT_G912.       MOV  L,A
0048 4E                         MOV  C,M
0049 23                         INX  H
004A 56                         MOV  D,M
004B 23                         INX  H
004C 5E                         MOV  E,M
004D 212800                     LXI  H,DATA_17          ;BASE DISP PTR V
0050 3A1F00                     LDA  RAM_BASE +31       ;DVDT REF PTR
0053 FEFF                       CPI  11111111B
0055 CA5B00                     JZ   CNT_G913
0058 212900                     LXI  H,DATA_19          ;BASE DISP PTR T
005B 78         CNT_G913:       MOV  A,B
005C FE0D                       CPI  0DH
005E F26E00                     JP   CONT91B
0061 23                         INX  H                  ;G 9-1A
0062 71                         MOV  M,C
```

```
0063 3E00                       MVI   A,DOT
0065 23                         INX   H
0066 77                         MOV   M,A
0067 23                         INX   H
0068 72                         MOV   M,D
0069 23                         INX   H
006A 73                         MOV   M,E
006B C38600                     JMP   CONT_G
006E FE81       CONT91B:        CPI   81H
0070 F28000                     JP    CONT91C
0073 23                         INX   H                   ;G 9-1B
0074 71                         MOV   M,C
0075 23                         INX   H
0076 72                         MOV   M,D
0077 3E00                       MVI   A,DOT
0079 23                         INX   H
007A 77                         MOV   M,A
007B 23                         INX   H
007C 73                         MOV   M,E
007D C38600                     JMP   CONT_G
0080 23         CONT91C:        INX   H                   ;G 9-1C
0081 71                         MOV   M,C
0082 23                         INX   H
0083 72                         MOV   M,D
0084 23                         INX   H
0085 73                         MOV   M,E
0086 3A1F00     CONT_G: LDA   RAM_BASE +31                ;DVDT REF PTR
0089 FEFF                       CPI   11111111B
008B C29600                     JNZ   CNT_G917
008E 97                         SUB   A
008F 321F00                     STA   RAM_BASE +31                ;DVDT REF PTR
0092 2A0F00                     LHLD  RAM_BASE +15                ;
0095 E9                         PCHL
0096 97         CNT_G917        SUB   A
0097 D300                       OUT   INT_LCH
0099 3EFF                       MVI   A,11111111B
009B 321B00                     STA   RAM_BASE +27                ;
009E D300                       OUT   PORT_20
00A0 76                         HLT
00A1 C30000                     JMP   CONT86
0000                            END
---- SYMBOL TABLE ----

CNT_G910 003A      CNT_G917 0096      CONT_G   0086  INT_LCH  0000 PORT_20  0000
CNT_G911 0042      CONT86   0000      DATA_17  0028  MIC      0000 RAM_BASE 0000
CNT_G912 0047      CONT91B  006E      DATA_19  0029  MIL      0000
CNT_G913 005B      CONT91C  0080      DOT      0000  NAN      0000
                 **** NO ERRORS DETECTED ****

AVOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

SOURCE FILE NAME: G83.ASM
```

```
0000                                  .. 1 J PROM G 83

0000                                  ORG      0000H
0000          RAM_BASE:               DS       40
0028 00       DATA_17                 DB       00
0029 00       DATA_19.                DB       00
0000          DOT:                    EQU      00H
0000          MIL:                    EQU      00H
0000          MIC:                    EQU      00H
0000          NAN:                    EQU      00H
002A 00       PORT_20:                DB       00
002B 00       INI_LCH:                DB       00
0000          CONT86: EQU             00H

002C 2A2000                           LHLD RAM_BASE +32        ;BASE DATA 1K P_V
002F 3A1F00                           LDA  RAM_BASE +31        ;DVDT REF PTR
0032 FEFF                             CPI  11111111B
0034 CA3C00                           JZ   CNT_G830
0037 2A1100                           LHLD RAM_BASE +17        ;BASE DATA 1K P_T
003A C1                               POP  B
003B 41                               MOV  B,C
003C 97       CNT_G830:               SUB  A
003D 78                               MOV  A,B
003E 87                               ADD  A
003F D24400                           JNC  CNT_G831
0042 24                               INR  H
0043 24                               INR  H
0044 87       CNT_G831:               ADD  A
0045 D24900                           JNC  CNT_G832
0048 24                               INR  H
0049 6F       CNT_G832:               MOV  L,A
004A 4E                               MOV  C,M
004B 23                               INX  H
004C 56                               MOV  D,M
004D 23                               INX  H
004E 5E                               MOV  E,M
004F 212800                           LXI  H,DATA_17       ;BASE DISP PTR V
0052 3A1F00                           LDA  RAM_BASE +31    ;DVDT REF PTR
0055 FEFF                             CPI  11111111B
0057 CA5D00                           JZ   CNT_G833
005A 212900                           LXI  H,DATA_19       ;BASE DISP PTR T
005D 78       CNT_G833:               MOV  A,B
005E FE03                             CPI  03H
0060 F27000                           JP   CONT83B
0063 23                               INX  H               ,G 8-3A
0064 71                               MOV  M,C
0065 23                               INX  H
0066 72                               MOV  M,D
0067 23                               INX  H
0068 73                               MOV  M,E
0069 3E00                             MVI  A,MIL
006B 23                               INX  H
006C 77                               MOV  M,A
```

```
006D C38D00                     JMP   CONT_G
0070 78         CONT83B.        MOV   A,B
0071 FE19                       CPI   19H
0073 F28300                     JP    CONT83C                       ,G 8-3B
0076 23                         INX   H
0077 71                         MOV   M,C
0078 3E00                       MVI   A,DOT
007A 23                         INX   H
007B 77                         MOV   M,A
007C 23                         INX   H
007D 72                         MOV   M,D
007E 23                         INX   H
007F 73                         MOV   M,E
0080 C38D00                     JMP   CONT_G
0083 23         CONT83C:        INX   H                             ;G 8-3C
0084 71                         MOV   M,C
0085 23                         INX   H
0086 72                         MOV   M,D
0087 3E00                       MVI   A,DOT
0089 23                         INX   H
008A 77                         MOV   M,A
008B 23                         INX   H
008C 73                         MOV   M,E
008D 3A1F00     CONT_G: LDA   RAM_BASE +31                          ;DVDT REF PTR
0090 FEFF                       CPI   11111111B
0092 C29D00                     JNZ   CNT_G837
0095 97                         SUB   A
0096 321F00                     STA   RAM_BASE +31                          ;DVDT REF PTR
0099 2A0F00                     LHLD  RAM_BASE +15                          ;
009C E9                         PCHL
009D 97         CNT_G837:       SUB   A
009E D32B                       OUT   INT_LCH
00A0 3EFF                       MVI   A,11111111B
00A2 321B00                     STA   RAM_BASE +27                          ;
00A5 D32A                       OUT   PORT_20
00A7 76                         HLT
00A8 C30000                     JMP   CONT86
0000                            END
---- SYMBOL TABLE ----

CNT_G830 003C   CNT_G837 009D   CONT_G   008D INT_LCH  002B    PORT_20  002A
CNT_G831 0044   CONT83B  0070   DATA_17  0028 MIC      0000    RAM_BASE 0000
CNT_G832 0049   CONT83C  0083   DATA_19  0029 MIL      0000
CNT_G833 005D   CONT86   0000   DOT      0000 NAN      0000

***** NO ERRORS DETECTED *****

AVOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

SOURCE FILE NAME: G82.ASM
```

```
0000                            ;G I   J FRGM G-82
0000
0000                            ORG     0000H
0000                RAM_BASE:   DS      40
0028 00             DATA_17:    DB      00
0029 00             DATA_19:    DB      00
0000                DOT:        EQU     00H
0000                MIL:        EQU     00H
0000                MIC:        EQU     00H
0000                NAN:        EQU     00H
0000                INI_LCH:    EQU     00H
0000                PORT_20:    EQU     00H
0000                CONT86: EQU 00H

002D 3A1F00                     LDA   RAM_BASE +31          ;DVDT REF PTR
0030 FEFF                       CPI   11111111B
0032 CA3A00                     JZ    CNT_G820
0035 2A1100                     LHLD  RAM_BASE +17          ;BASE DATA 1K P_T
0038 C1                         POP   B
0039 41                         MOV   B,C
003A 97             CNT_G820:   SUB   A
003B 78                         MOV   A,B
003C 87                         ADD   A
003D D24200                     JNC   CNT_G821
0040 24                         INR   H
0041 24                         INR   H
0042 87             CNT_G821    ADD   A
0043 D24700                     JNC   CNT_G822
0046 24                         INR   H
0047 6F             CNT_G822.   MOV   L,A
0048 4E                         MOV   C,M
0049 23                         INX   H
004A 56                         MOV   D,M
004B 23                         INX   H
004C 5E                         MOV   E,M
004D 212800                     LXI   H,DATA_17         ;BASE DISP PTR V
0050 3A1F00                     LDA   RAM_BASE +31          ;DVDT REF PTR
0053 FEFF                       CPI   11111111B
0055 CA5B00                     JZ    CNT_G823
0058 212900                     LXI   H,DATA_19         ;BASE DISP PTR T
005B 78             CNT_G823:   MOV   A,B
005C FE06                       CPI   06H
005E F26E00                     JP    CONT82B
0061 23                         INX   H                 ;G 8-2A
0062 71                         MOV   M,C
0063 23                         INX   H
0064 72                         MOV   M,D
0065 23                         INX   H
0066 73                         MOV   M,E
0067 3E00                       MVI   A,MIL
0069 23                         INX   H
006A 77                         MOV   M,A
006B C38A00                     JMP   CONT_G
```

```
006E FE34       CONT82B:        CPI   34H
0070 F28000                     JP    CONT82C
0073 23                         INX   H                     ;G 8-2B
0074 71                         MOV   M,C
0075 3E00                       MVI   A,DOT
0077 23                         INX   H
0078 77                         MOV   M,A
0079 23                         INX   H
007A 72                         MOV   M,L
007B 23                         INX   H
007C 73                         MOV   M,E
007D C38A00                     JMP   CONT_G
0080 23         CONT82C:        INX   H                     ,G 8-2C
0081 71                         MOV   M,C
0082 23                         INX   H
0083 72                         MOV   M,D
0084 3E00                       MVI   A,DOT
0086 23                         INX   H
0087 77                         MOV   M,A
0088 23                         INX   H
0089 73                         MOV   M,E
008A 3A1F00     CONT_G: LDA   RAM_BASE +31                  ;DVDT REF PTR
008D FEFF                       CPI   11111111B
008F C29A00                     JNZ   CNT_G827
0092 97                         SUB   A
0093 321F00                     STA   RAM_BASE +31                  ;DVDT REF PTR
0096 2A0F00                     LHLD  RAM_BASE +15                  ;
0099 E9                         PCHL
009A 97         CNT_G827:       SUB   A
009B D300                       OUT   INT_LCH
009D 3EFF                       MVI   A,11111111B
009F 321B00                     STA   RAM_BASE +27                  ;
00A2 D300                       OUT   PORT_20
00A4 76                         HLT
00A5 C30000                     JMP   CONT86
0000                            END
---- SYMBOL TABLE ----

CNT_G820 003A   CNT_G827 009A   CONT_G   008A   INT_LCH  0000   PORT_20  0000
CNT_G821 0042   CONT82B  006E   DATA_17  0028   MIC      0000   RAM_BASE 0000
CNT_G822 0047   CONT82C  0080   DATA_19  0029   MIL      0000
CNT_G823 005B   CONT86   0000   DOT      0000   NAN      0000

***** NO ERRORS DETECTED *****

AVOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

SOURCE FILE NAME: G81.ASM

0000                            ,G 8-1 PRGM G-81

0000                            ORG     0000H
```

```
0000            RAM_BASE:       DS      40
0028 00         DATA_17:        DB      00
0029 00         DATA_19:        DB      00
0000            DOT:            EQU     00H
0000            MIL:            EQU     00H
0000            MIC:            EQU     00H
0000            NAN:            EQU     00H
0000            INI_LCH:        EQU     00H
0000            PORT_20:        EQU     00H
0000            CONT86: EQU     0DH
002A 2A2000                     LHLD    RAM_BASE +32        ;BASE DATA 1K P_V
002D 3A1F00                     LDA     RAM_BASE +31        ;DVDT REF PTR
0030 FEFF                       CPI     11111111B
0032 CA3A00                     JZ      CNT_G810
0035 2A1100                     LHLD    RAM_BASE +17        ;BASE DATA 1K P_T
0038 C1                         POP     B
0039 41                         MOV     B,C
003A 97         CNT_G810:       SUB     A
003B 78                         MOV     A,B
003C 87                         ADD     A
003D D24200                     JNC     CNT_G811
0040 24                         INR     H
0041 24                         INR     H
0042 87         CNT_G811:       ADD     A
0043 D24700                     JNC     CNT_G812
0046 24                         INR     H
0047 6F         CNT_G812:       MOV     L,A
0048 4E                         MOV     C,M
0049 23                         INX     H
004A 56                         MOV     D,M
004B 23                         INX     H
004C 5E                         MOV     E,M
004D 212800                     LXI     H,DATA_17           ;BASE DISP PTR V
0050 3A1F00                     LDA     RAM_BASE +31
0053 FE7F                       CPI     11111111B
0055 CA5B00                     JZ      CNT_G813
0058 212900                     LXI     H,DATA_19           ;BASE DISP PTR T
005B 78         CNT_G813:       MOV     A,B
005C FE0D                       CPI     0DH
005E F26E00                     JP      CONT81B
0061 23                         INX     H                   ;G 8-1A
0062 71                         MOV     M,C
0063 23                         INX     H
0064 72                         MOV     M,D
0065 23                         INX     H
0066 73                         MOV     M,E
0067 3E00                       MVI     A,MIL
0069 23                         INX     H
006A 77                         MOV     M,A
006B C38A00                     JMP     CONT_G
006E FE81       CONT81B:        CPI     81H
0070 F28000                     JP      CONT81C
0073 23                         INX     H                   ;G 8-1B
```

```
0074 71                          MOV   M,C
0075 3E00                        MVI   A,DOT
0077 23                          INX   H
0078 77                          MOV   M,A
0079 23                          INX   H
007A 72                          MOV   M,D
007B 23                          INX   H
007C 73                          MOV   M,E
007D C38A00                      JMP   CONT_G
0080 23          CONT81C:        INX   H                    ;G 8-1C
0081 71                          MOV   M,C
0082 23                          INX   H
0083 72                          MOV   M,D
0084 3E00                        MVI   A,DOT
0086 23                          INX   H
0087 77                          MOV   M,A
0088 23                          INX   H
0089 73                          MOV   M,E
008A 3A1F00      CONT_G:         LDA   RAM_BASE +31              ;DVDT REF PTR
008D FEFF                        CPI   11111111B
008F C29A00                      JNZ   CNT_G817
0092 97                          SUB   A
0093 321F00                      STA   RAM_BASE +31              ;DVDT REF PTR
0096 2A0F00                      LHLD  RAM_BASE +15              ;
0099 E9                          PCHL
009A 97          CNT_G817:       SUB   A
009B D300                        OUT   INI_LCH
009D 3EFF                        MVI   A,11111111B
009F 321B00                      STA   RAM_BASE +27              ;
00A2 D300                        OUT   PORT_20
00A4 76                          HLT
00A5 C30000                      JMP   CONT86
0000                             END
---- SYMBOL TABLE ----

CNT_G810 003A  CNT_G817 009A  CONT_G   008A  INI_LCH  0000   PORT_20  0000
CNT_G811 0042  CONT81B  006E  DATA_17  0028  MIC      0000   RAM_BASE 0000
CNT_G812 0047  CONT81C  0080  DATA_19  0029  MIL      0000
CNT_G813 005B  CONT86   0000  DOT      0000  NAN      0000

***** NO ERRORS DETECTED *****

AVOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

SOURCE FILE NAME: G73 ASM

0000                             ;G 7 3 PROM 6, 74

0000                             ORG     D000H
0000             RAM_BASE:       DS      40
0028 00          DATA_17:        DB      00
0029 00          DATA_19:        DB      00
0000             DOT:            EQU     70H
```

```
0077 23                          INX  H                    ;G 7-3B
0078 71                          MOV  M,C
0079 23                          INX  H
007A 72                          MOV  M,D
007B 23                          INX  H
007C 73                          MOV  M,E
007D 3E00                        MVI  A,MIL
007F 23                          INX  H
0080 77                          MOV  M,A
0081 C38E00                      JMP  CONT_G
0084 23          CONT73C:        INX  H                    ;G 7-3C
0085 71                          MOV  M,C
0086 3E00                        MVI  A,DOT
0088 23                          INX  H
0089 77                          MOV  M,A
008A 23                          INX  H
008B 72                          MOV  M,D
008C 23                          INX  H
008D 73                          MOV  M,E
008E 3A1F00      CONT_G:         LDA  RAM_BASE +31              ;DVDT REF PTR
0091 FEFF                        CPI  11111111B
0093 C29E00                      JNZ  CNT_G737
0096 97                          SUB  A
0097 321F00                      STA  RAM_BASE +31              ;DVDT REF PTR
009A 2A0F00                      LHLD RAM_BASE +15              ;
009D E9                          PCHL
009E 97          CNT_G737:       SUB  A
009F D300                        OUT  INI_LCH
00A1 3EFF                        MVI  A,11111111B
00A3 321B00                      STA  RAM_BASE +27              ;
00A6 D300                        OUT  PORT_20
00A8 76                          HLT
00A9 C30000                      JMP  CONT86

0000                             END
---- SYMBOL TABLE ----

CNT_G730 003A  CNT_G737 009E CONT_G   0084  INI_LCH  0000  PORT_20  0000
CNT_G731 0042  CONT73B  0072 DATA_17  0028  MIC      0000  RAM_BASE 0000
CNT_G732 0047  CONT73C  0084 DATA_19  0029  MIL      0000
CNT_G733 005B  CONT86   0000 DOT      0000  NAN      0000

***** NO ERRORS DETECTED *****

AVOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

SOURCE FILE NAME: G72.ASM

0000                             ;G 1 J PRGM G-72

0000                             ORG     0000H
0000             RAM_BASE.       DS      40
```

```
0028 00          DATA_17:        DB      00
0029 00          DATA_19:        DB      00
0000             DOT:            EQU     00H
0000             MIL:            EQU     00H
0000             MIC:            EQU     00H
0000             NAN:            EQU     00H
0000             INI_LCH:        EQU     00H
0000             PORT_20:        EQU     00H
0000             CONT86:         EQU     00H

002A 2A2000                      LHLD    RAM_BASE +32        ,BASE DATA 1K P_V
002D 3A1F00                      LDA     RAM_BASE +31                ;DVDT REF PTR
0030 FEFF                        CPI     11111111B
0032 CA3A00                      JZ      CNT_G720
0035 2A1100                      LHLD    RAM_BASE +17        ;BASE DATA 1K P_T
0038 C1                          POP     B
0039 41                          MOV     B,C
003A 97          CNT_G720:       SUB     A
003B 78                          MOV     A,B
003C 87                          ADD     A
003D D24200                      JNC     CNT_G721
0040 24                          INR     H
0041 24                          INR     H
0042 87          CNT_G721:       ADD     A
0043 D24700                      JNC     CNT_G722
0046 24                          INR     H
0047 6F          CNT_G722:       MOV     L,A
0048 4E                          MOV     C,M
0049 23                          INX     H
004A 56                          MOV     D,M
004B 23                          INX     H
004C 5E                          MOV     E,M
004D 212800                      LXI     H,DATA_17           ,BASE DISP PTR V
0050 3A1F00                      LDA     RAM_BASE +31
0053 FE7F                        CPI     11111111B
0055 CA5B00                      JZ      CNT_G723
0058 212900                      LXI     H,DATA_19           ;BASE DISP PTR T
005B 78          CNT_G723.       MOV     A,B
005C FE06                        CPI     06H
005E F27200                      JP      CONT72B
0061 23                          INX     H                   ,G 7-2A
0062 71                          MOV     M,C
0063 23                          INX     H
0064 72                          MOV     M,D
0065 3E00                        MVI     A,DOT
0067 23                          INX     H
0068 77                          MOV     M,A
0069 23                          INX     H
006A 73                          MOV     M,E
006B 3E00                        MVI     A,MIL
006D 23                          INX     H
006E 77                          MOV     M,A
```

```
006F C38E00                     JMP   CONT_G
0072 FE34       CONT72B:        CPI   34H
0074 F28400                     JP    CONT72C
0077 23                         INX   H                     ,G 7-2B
0078 71                         MOV   M,C
0079 23                         INX   H
007A 72                         MOV   M,D
007B 23                         INX   H
007C 73                         MOV   M,E
007D 3E00                       MVI   A,MIL
007F 23                         INX   H
0080 77                         MOV   M,A
0081 C38E00                     JMP   CONT_G
0084 23         CONT72C:        INX   H                     ;G 7-2C
0085 71                         MOV   M,C
0086 3E00                       MVI   A,DOT
0088 23                         INX   H
0089 77                         MOV   M,A
008A 23                         INX   H
008B 72                         MOV   M,D
008C 23                         INX   H
008D 73                         MOV   M,E
008E 3A1F00     CONT_G:         LDA   RAM_BASE +31                ;DVDT REF PTR
0091 FEFF                       CPI   11111111B
0093 C29E00                     JNZ   CNT_G727
0096 97                         SUB   A
0097 321F00                     STA   RAM_BASE +31                ;DVDT REF PTR
009A 2A0F00                     LHLD  RAM_BASE +15                ;
009D E9                         PCHL
009E 97         CNT_G727:       SUB   A
009F D300                       OUT   INT_LCH
00A1 3EFF                       MVI   A,11111111B
00A3 321B00                     STA   RAM_BASE +27                ;
00A6 D300                       OUT   PORT_20
00A8 76                         HLT
00A9 C30000                     JMP   CONT86
0000                            END
---- SYMBOL TABLE ----

CNT_G720 003A CNT_G727 009E CONT_G   0081  INT_LCH  0000   PORT_20  0000
CNT_G721 0042 CONT72B  0072 DATA_17  0028  MIC      0000   RAM_BASE 0000
CNT_G722 0047 CONT72C  0084 DATA_19  0029  MIL      0000
CNT_G723 005B CONT86   0000 DOT      0000  NAN      0000

***** NO ERRORS DETECTED *****

AVOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

SOURCE FILE NAME: G71.ASM


0000                            ,G 7 7 PRGM G-71
0000                            ORG     0000H
```

```
0000              RAM_BASE:       DS      40
0028 00           DATA_17:        DB      00
0029 00           DATA_19:        DB      00
0000              DOT:            EQU     00H
0000              MIL:            EQU     00H
0000              MIC:            EQU     00H
0000              NAN:            EQU     00H
0000              PORT_20         EQU     00H
0000              INI_LCH:        EQU     00H
0000              CONT86:         EQU     00H
002A 2A2000                       LHLD    RAM_BASE +32      ;BASE DATA 1K P_V
002D 3A1F00                       LDA     RAM_BASE +31       ,DVDT REF PTR
0030 FEFF                         CPI     11111111B
0032 CA3A00                       JZ      CNT_G710
0035 2A1100                       LHLD    RAM_BASE +17       ;BASE DATA 1K P_T
0038 C1                           POP     B
0039 41                           MOV     B,C
003A 97           CNT_G710:       SUB     A
003B 78                           MOV     A,B
003C 87                           ADD     A
003D D24200                       JNC     CNT_G711
0040 24                           INR     H
0041 24                           INR     H
0042 87           CNT_G711:       ADD     A
0043 D24700                       JNC     CNT_G712
0046 24                           INR     H
0047 6F           CNT_G712:       MOV     L,A
0048 4E                           MOV     C,M
0049 23                           INX     H
004A 56                           MOV     D,M
004B 23                           INX     H
004C 5E                           MOV     E,M
004D 212800                       LXI     H,DATA_17         ;BASE DISP PTR V
0050 3A1F00                       LDA     RAM_BASE +31              ;
0053 FE7F                         CPI     11111111B
0055 CA5B00                       JZ      CNT_G713
0058 212900                       LXI     H,DATA_19         ;BASE DISP PTR T
005B 78           CNT_G713:       MOV     A,B
005C FE0D                         CPI     0DH
005E F27200                       JP      CONT71B
0061 23                           INX     H                 ;G 7-1A
0062 71                           MOV     M,C
0063 23                           INX     H
0064 72                           MOV     M,D
0065 3E00                         MVI     A,DOT
0067 23                           INX     H
0068 77                           MOV     M,A
0069 23                           INX     H
006A 73                           MOV     M,E
006B 3E00                         MVI     A,MIL
006D 23                           INX     H
006E 77                           MOV     M,A
006F C38E00                       JMP     CONT_G
```

```
0072 FE81      CONT71B:        CPI   81H
0074 F28400                    JP    CONT71C
0077 23                        INX   H                    ;G 7-1B
0078 71                        MOV   M,C
0079 23                        INX   H
007A 72                        MOV   M,D
007B 23                        INX   H
007C 73                        MOV   M,E
007D 3E00                      MVI   A,MIL
007F 23                        INX   H
0080 77                        MOV   M,A
0081 C38E00                    JMP   CONT_G
0084 23        CONT71C:        INX   H                    ;G 7-1C
0085 71                        MOV   M,C
0086 3E00                      MVI   A,DOT
0088 23                        INX   H
0089 77                        MOV   M,A
008A 23                        INX   H
008B 72                        MOV   M,D
008C 23                        INX   H
008D 73                        MOV   M,E
008E 3A1F00    CONT_G: LDA  RAM_BASE +31                  ;DVDT REF PTR
0091 FEFF                      CPI   11111111B
0093 C29E00                    JNZ   CNT_G717
0096 97                        SUB   A
0097 321F00                    STA   RAM_BASE +31                ;DVDT REF PTR
009A 2A0F00                    LHLD  RAM_BASE +15                ;
009D E9                        PCHL
009E 97        CNT_G717:       SUB   A
009F D300                      OUT   INI_LCH
00A1 3EFF                      MVI   A,11111111B
00A3 321B00                    STA   RAM_BASE +27                ;
00A6 D300                      OUT   PORT_20
00A8 76                        HLT
00A9 C30000                    JMP   CONT86
0000                           END
---- SYMBOL TABLE ----

NT_G710 003A  CNT_G717 009E  CONT_G   008E  INI_LCH  0000  PORT_20  0000
NT_G711 0042  CONT71B  0072  DATA_17  0028  MIC      0000  RAM_BASE 0000
NT_G712 0047  CONT71C  0084  DATA_19  0029  MIL      0000
NT_G713 005B  CONT86   0000  DOT       0000  NAN      0000

***** NO ERRORS DETECTED *****

VOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

OURCE FILE NAME: G63.ASM

0000                           ;G i j PRGM G-63
0000                           ORG     0000H
0000           RAM_BASE:       DS      40
0028 00        DATA_17:        DB      00
```

```
0029 00         DATA_19:        DB      00
 0000           DOT:            EQU     00H
 0000           MIL:            EQU     00H
 0000           MIC:            EQU     00H
 0000           NAN:            EQU     00H
 0000           INI_LCH:        EQU     00H
 0000           PORT_20:        EQU     00H
 0000           CONT86:         EQU     00H

 002A 2A2000                    LHLD RAM_BASE +32    ;BASE DATA 1K P_V
 002D 3A1F00                    LDA  RAM_BASE +31              ;DVDT REF PTR
 0030 FEFF                      CPI  11111111B
 0032 CA3A00                    JZ   CNT_G630
 0035 2A1100                    LHLD RAM_BASE +17     ;BASE DATA 1K P_T
 0038 C1                        POP  B
 0039 41                        MOV  B,C
 003A 97         CNT_G630.      SUB  A
 003B 78                        MOV  A,B
 003C 87                        ADD  A
 003D D24200                    JNC  CNT_G631
 0040 24                        INR  H
 0041 24                        INR  H
 0042 87         CNT_G631:      ADD  A
 0043 D24700                    JNC  CNT_G632
 0046 24                        INR  H
 0047 6F         CNT_G632:      MOV  L,A
 0048 4E                        MOV  C,M
 0049 23                        INX  H
 004A 56                        MOV  D,M
 004B 23                        INX  H
 004C 5E                        MOV  E,M
 004D 212800                    LXI  H,DATA_17       ;BASE DISP PTR V
 0050 3A1F00                    LDA  RAM_BASE +31              ;
 0053 FE7F                      CPI  11111111B
 0055 CA5B00                    JZ   CNT_G633
 0058 212900                    LXI  H,DATA_19       ;BASE DISP PTR T
 005B 78         CNT_G633:      MOV  A,B
 005C FE03                      CPI  03H
 005E F27200                    JP   CONT63B
 0061 23                        INX  H                ;G 6-3A
 0062 71                        MOV  M,C
 0063 3E00                      MVI  A,DOT
 0065 23                        INX  H
 0066 77                        MOV  M,A
 0067 23                        INX  H
 0068 72                        MOV  M,D
 0069 23                        INX  H
 006A 73                        MOV  M,E
 006B 3E00                      MVI  A,MIL
 006D 23                        INX  H
 006E 77                        MOV  M,A
 006F C39200                    JMP  CONT_G
 0072 FE19       CONT63B:       CPI  19H
```

```
0074 F28800                     JP    CONT63C
0077 23                         INX   H                       ;G 6-3B
0078 71                         MOV   M,C
0079 23                         INX   H
007A 72                         MOV   M,D
007B 3E00                       MVI   A,DOT
007D 23                         INX   H
007E 77                         MOV   M,A
007F 23                         INX   H
0080 73                         MOV   M,E
0081 3E00                       MVI   A,MIL
0083 23                         INX   H
0084 77                         MOV   M,A
0085 C39200                     JMP   CONT_G
0088 23         CONT63C:        INX   H                       ;G 6-3C
0089 71                         MOV   M,C
008A 23                         INX   H
008B 72                         MOV   M,D
008C 23                         INX   H
008D 73                         MOV   M,E
008E 3E00                       MVI   A,MIL
0090 23                         INX   H
0091 77                         MOV   M,A
0092 3A1F00     CONT_G: LDA   RAM_BASE +31                    ;DVDT REF PTR
0095 FEFF                       CPI   11111111B
0097 C2A200                     JNZ   CNT_G637
009A 97                         SUB   A
009B 321F00                     STA   RAM_BASE +31                      ,DVDT REF PTR
009E 2A0F00                     LHLD  RAM_BASE +15                      ,
00A1 E9                         PCHL
00A2 97         CNT_G637:       SUB   A
00A3 D300                       OUT   INI_LCH
00A5 3EFF                       MVI   A,11111111B
00A7 321B00                     STA   RAM_BASE +27                      ,
00AA D300                       OUT   PORT_20
00AC 76                         HLT
00AD C30000                     JMP   CONT86
0000                            END
---- SYMBOL TABLE ----

CNT_G630 003A CNT_G637 00A2  CONT_G   0092  INI_LCH  0000  PORT_20  0000
CNT_G631 0042 CONT63B  0072  DATA_17  0028  MIC      0000  RAM_BASE 0000
CNT_G632 0047 CONT63C  0088  DATA_19  0029  MIL      0000
CNT_G633 005B CONT86   0000  DOT       0000  NAN      0000

***** NO ERRORS DETECTED *****

AVOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

SOURCE FILE NAME: G62.ASM

0000                            ;G 1 J PRGM G-62
```

```
0000                            ORG     0000H
0000            RAM_BASE        DS      40
0028 00         DATA_17:        DB      00
0029 00         DATA_19:        DB      00
0000            DOT:            EQU     00H
0000            MIL:            EQU     00H
0000            MIC:            EQU     00H
0000            NAN:            EQU     00H
0000            PORT_20:        EQU     00H
0000            INI_LCH:        EQU     00H
0000            CONT86:         EQU     00H
 002A 2A2000                    LHLD RAM_BASE +32       ;BASE DATA 1K P_V
 002D 3A1F00                    LDA  RAM_BASE +31            ;DVDT REF PTR
 0030 FEFF                      CPI  11111111B
 0032 CA3A00                    JZ   CNT_G620
 0035 2A1100                    LHLD RAM_BASE +17        ;BASE DATA 1K P_T
 0038 C1                        POP  B
 0039 41                        MOV  B,C
 003A 97         CNT_G620:      SUB  A
 003B 78                        MOV  A,B
 003C 87                        ADD  A
 003D D24200                    JNC  CNT_G621
 0040 24                        INR  H
 0041 24                        INR  H
 0042 87         CNT_G621:      ADD  A
 0043 D24700                    JNC  CNT_G622
 0046 24                        INR  H
 0047 6F         CNT_G622:      MOV  L,A
 0048 4E                        MOV  C,M
 0049 23                        INX  H
 004A 56                        MOV  D,M
 004B 23                        INX  H
 004C 5E                        MOV  E,M
 004D 212800                    LXI  H,DATA_17          ;BASE DISP PTR V
 0050 3A1F00                    LDA  RAM_BASE +31                ;
 0053 FE7F                      CPI  1111111B
 0055 CA5B00                    JZ   CNT_G623
 0058 212900                    LXI  H,DATA_19          ;BASE DISP PTR T
 005B 78         CNT_G623:      MOV  A,B
 005C FE06                      CPI  06H
 005E F27200                    JP   CONT62B
 0061 23                        INX  H                  ;G 6-2A
 0062 71                        MOV  M,C
 0063 3E00                      MVI  A,DOT
 0065 23                        INX  H
 0066 77                        MOV  M,A
 0067 23                        INX  H
 0068 72                        MOV  M,D
 0069 23                        INX  H
 006A 73                        MOV  M,E
 006B 3E00                      MVI  A,MIL
 006D 23                        INX  H
 006E 77                        MOV  M,A
```

```
006F C39200                     JMP   CONT_G
0072 FE34       CONT62B:        CPI   34H
0074 F28800                     JP    CONT62C
0077 23                         INX   H                       ;G 6-2B
0078 71                         MOV   M,C
0079 23                         INX   H
007A 72                         MOV   M,D
007B 3E00                       MVI   A,DOT
007D 23                         INX   H
007E 77                         MOV   M,A
007F 23                         INX   H
0080 73                         MOV   M,E
0081 3E00                       MVI   A,MIL
0083 23                         INX   H
0084 77                         MOV   M,A
0085 C39200                     JMP   CONT_G
0088 23         CONT62C:        INX   H                       ;G 6-2C
0089 71                         MOV   M,C
008A 23                         INX   H
008B 72                         MOV   M,D
008C 23                         INX   H
008D 73                         MOV   M,E
008E 3E00                       MVI   A,MIL
0090 23                         INX   H
0091 77                         MOV   M,A
0092 3A1F00     CONT_G:         LDA   RAM_BASE +31                ;DVDT REF PTR
0095 FEFF                       CPI   11111111B
0097 C2A200                     JNZ   CNT_G627
009A 97                         SUB   A
009B 321F00                     STA   RAM_BASE +31                ;DVDT REF PTR
009E 2A0F00                     LHLD  RAM_BASE +15                ;
00A1 E9                         PCHL
00A2 97         CNT_G627:       SUB   A
00A3 D300                       OUT   INI_LCH
00A5 3EFF                       MVI   A,11111111B
00A7 321B00                     STA   RAM_BASE +27                ;
00AA D300                       OUT   PORT_20
00AC 76                         HLT
00AD C30000                     JMP   CONT86
0000                            END
---- SYMBOL TABLE ----

CNT_G620 003A  CNT_G627 00A2  CONT_G   0092  INI_LCH  0000  PORT_20  0000
CNT_G621 0042  CONT62B  0072  DATA_17  0028  MIC      0000  RAM_BASE 0000
CNT_G622 0047  CONT62C  0088  DATA_19  0029  MIL      0000
CNT_G623 005B  CONT86   0000  DOT      0000  NAN      0000

***** NO ERRORS DETECTED *****

AVOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

SOURCE FILE NAME: G61.ASM
```

```
0000                            ;G i j PRGM G-61
0000                            ORG     0000H
0000            RAM_BASE:       DS      40
0028 00         DATA_17:        DB      00
0029 00         DATA_19:        DB      00
0000            DOT:            EQU     00H
0000            MIL:            EQU     00H
0000            MIC:            EQU     00H
0000            NAN:            EQU     00H
0000            PORT_20:        EQU     00H
0000            INI_LCH:        EQU     00H
0000            CONT86: EQU     00H
002A 2A2000                     LHLD RAM_BASE +42       ;BASE DATA 1K P_V
002D 3A1F00                     LDA  RAM_BASE
0030 FEFF                       CPI  11111111B0042 CA3A00
0035 2A1100                     LHLD RAM_BASE +17               ;BASE DATA 1K P_T
0038 C1                         POP  B
0039 41                         MOV  B,C
003A 97         CNT_G610:       SUB  A
003B 78                         MOV  A,B
003C 87                         ADD  A
003D D24200                     JNC  CNT_G611
0040 24                         INR  H
0041 24                         INR  H
0042 87         CNT_G611:       ADD  A
0043 D24700                     JNC  CNT_G612
0046 24                         INR  H
0047 6F         CNT_G612:       MOV  L,A
0048 4E                         MOV  C,M
0049 23                         INX  H
004A 56                         MOV  D,M
004B 23                         INX  H
004C 5E                         MOV  E,M
004D 212800                     LXI  H,DATA_17          ;BASE DISP PTR V
0050 3A1F00                     LDA  RAM_BASE +31                ;
0053 FE7F                       CPI  11111111B
0055 CA5B00                     JZ   CNT_G613
0058 212900                     LXI  H,DATA_19          ;BASE DISP PTR T
005B 78         CNT_G613:       MOV  A,B
005C FE0D                       CPI  0DH
005E F27200                     JP   CONT61B
0061 23                         INX  H                   ,G 6-1A
0062 71                         MOV  M,C
0063 3E00                       MVI  A,DOT
0065 23                         INX  H

AVOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

SOURCE FILE NAME: G61.ASM

0066 77                         MOV  M,A
0067 23                         INX  H
0068 72                         MOV  M,D
```

```
0069 23                          INX  H
006A 73                          MOV  M,E
006B 3E00                        MVI  A,MIL
006D 23                          INX  H
006E 77                          MOV  M,A
006F C39200                      JMP  CONT_G
0072 FE81       CONT61B:         CPI  81H
0074 F28800                      JP   CONT61C
0077 23                          INX  H                    ;G 6-1B
0078 71                          MOV  M,C
0079 23                          INX  H
007A 72                          MOV  M,D
007B 3E00                        MVI  A,DOT
007D 23                          INX  H
007E 77                          MOV  M,A
007F 23                          INX  H
0080 73                          MOV  M,E
0081 3E00                        MVI  A,MIL
0083 23                          INX  H
0084 77                          MOV  M,A
0085 C39200                      JMP  CONT_G
0088 23         CONT61C.         INX  H                    ;G 6-1C
0089 71                          MOV  M,C
008A 23                          INX  H
008B 72                          MOV  M,D
008C 23                          INX  H
008D 73                          MOV  M,E
008E 3E00                        MVI  A,MIL
0090 23                          INX  H
0091 77                          MOV  M,A
0092 3A1F00     CONT_G: LDA  RAM_BASE +31                  ;DVDT REF PTR
0095 FEFF                        CPI  11111111B
0097 C2A200                      JNZ  CNT_G617
009A 97                          SUB  A
009B 321F00                      STA  RAM_BASE +31                ;DVDT REF PTR
009E 2A0F00                      LHLD RAM_BASE +15                ;
00A1 E9                          PCHL
00A2 97         CNT_G617:        SUB  A
00A3 D300                        OUT  INT_LCH
00A5 3EFF                        MVI  A,11111111B
00A7 321B00                      STA  RAM_BASE +27                ;
00AA D300                        OUT  PORT_20
00AC 76                          HLT
00AD C30000                      JMP  CONT86
0000                             END
---- SYMBOL TABLE ----

CNT_G610 003A  CNT_G617 00A2 CONT_G   0092  INT_LCH  0000  PORT_20  0000
CNT_G611 0042  CONT61B  0072 DATA_17  0028  MIC      0000  RAM_BASE 0000
CNT_G612 0047  CONT61C  0088 DATA_19  0029  MIL      0000
CNT_G613 005B  CONT86   0000 DOT      0000  NAN      0000

***** NO ERROKS DETECTED *****
```

```
AVOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

SOURCE FILE NAME: G53.ASM

 0000                           ;G 5 3 PROM G-53
 0000                           ORG     0000H
 0000             RAM_BASE:     DS      40
 0028 00          DATA_17.      DB      00
 0029 00          DATA_19:      DB      00
 0000             DOT:          EQU     00H
 0000             MIL:          EQU     00H
 0000             MIC:          EQU     00H
 0000             NAN:          EQU     00H
 0000             INI_LCH:      EQU     00H
 0000             PORT_20:      EQU     00H
 0000             CONT86:       EQU     00H
 002A 2A2000                    LHLD RAM_BASE +32       ;BASE DATA 1K P_V
 002D 3A1F00                    LDA  RAM_BASE +31               ;DVDT REF PTR
 0030 FEFF                      CPI  11111111B
 0032 CA3A00                    JZ   CNT_G530
 0035 2A1100                    LHLD RAM_BASE +17       ;BASE DATA 1K P_T
 0038 C1                        POP  B
 0039 41                        MOV  B,C
 003A 97          CNT_G530:     SUB  A
 003B 78                        MOV  A,B
 003C 87                        ADD  A
 003D D24200                    JNC  CNT_G531
 0040 24                        INR  H
 0041 24                        INR  H
 0042 87          CNT_G531:     ADD  A
 0043 D24700                    JNC  CNT_G532
 0046 24                        INR  H
 0047 6F          CNT_G532:     MOV  L,A
 0048 4E                        MOV  C,M
 0049 23                        INX  H
 004A 56                        MOV  D,M
 004B 23                        INX  H
 004C 5E                        MOV  E,M
 004D 212800                    LXI  H,DATA_17          ,BASE DISP PTR V
 0050 3A1F00                    LDA  RAM_BASE +31               ;
 0053 FE7F                      CPI  11111112B
 0055 CA5B00                    JZ   CNT_G533
 0058 212900                    LXI  H,DATA_19          ;BASE DISP PTR T
 005B 78          CNT_G534:     MOV  A,B
 005C FE03                      CPI  03H
 005E F26E00                    JP   CONT536
 0061 23                        INX  H                  ;G 5-3A
 0062 71                        MOV  M,C
 0063 23                        INX  H
 0064 72                        MOV  M,D
 0065 23                        INX  H
 0066 73                        MOV  M,E
```

```
0067 3E00                       MVI   A,MIC
0069 23                         INX   H
006A 77                         MOV   M,A
006B C39200                     JMP   CONT_G
006E FE19       CONT53B:        CPI   19H
0070 F28400                     JP    CONT53C
0073 23                         INX   H                       ;G 5-3B
0074 71                         MOV   M,C
0075 3E00                       MVI   A,DOT
0077 23                         INX   H
0078 77                         MOV   M,A
0079 23                         INX   H
007A 72                         MOV   M,D
007B 23                         INX   H
007C 73                         MOV   M,E
007D 3E00                       MVI   A,MIL
007F 23                         INX   H
0080 77                         MOV   M,A
0081 C39200                     JMP   CONT_G
0084 23         CONT53C:        INX   H                       ;G 5-3C
0085 71                         MOV   M,C
0086 23                         INX   H
0087 72                         MOV   M,D
0088 3E00                       MVI   A,DOT
008A 23                         INX   H
008B 77                         MOV   M,A
008C 23                         INX   H
008D 73                         MOV   M,E
008E 3E00                       MVI   A,MIL
0090 23                         INX   H
0091 77                         MOV   M,A
0092 3A1F00     CONT_G: LDA   RAM_BASE +31                    ;DVDT REF PTR
0095 FEFF                       CPI   11111111B
0097 C2A200                     JNZ   CNT_G537
009A 97                         SUB   A
009B 321F00                     STA   RAM_BASE +31                  ;DVDT REF PTR
009E 2A0F00                     LHLD  RAM_BASE +15                  ;
00A1 E9                         PCHL
00A2 97         CNT_G537:       SUB   A
00A3 D300                       OUT   INT_LCH
00A5 3EFF                       MVI   A,11111111B
00A7 321B00                     STA   RAM_BASE +27                  ;
00AA D300                       OUT   PORT_20
00AC 76                         HLT
00AD C30000                     JMP   CONT86
0000                            END
---- SYMBOL TABLE ----

CNT_G530 003A  CNT_G537 00A2  CONT_G   0092 INT_LCH  0000  PORT_20  0000
CNT_G531 0042  CONT53B  006E  DATA_17  0028 MIC      0000  RAM_BASE 0000
CNT_G532 0047  CONT53C  0084  DATA_19  0029 MIL      0000
CNT_G533 005B  CONT86   0000  DOT      0000 NAN      0000
***** NO ERRORS DETECTED *****
```

```
AVOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

SOURCE FILE NAME: G52.ASM

0000                            ;G i j PRGM G-52
0000                            ORG     0000H
0000                RAM_BASE:   DS      40
0028 00             DATA_17:    DB      00
0029 00             DATA_19:    DB      00
0000                DOT.        EQU     00H
0000                MIL:        EQU     00H
0000                MIC.        EQU     00H
0000                NAN:        EQU     00H
0000                INI_LCH:    EQU     00H
0000                PORT_70     EQU     00H
0000                CONT86      EQU     00H
002A 2A2000                     LHLD    RAM_BASE +32        ;BASE DATA 1K P_V
002D 3A1F00                     LDA     RAM_BASE +31        ;DVDT REF PTR
0030 FEFF                       CPI     11111111B
0032 CA3A00                     JZ      CNT_G520
0035 2A1100                     LHLD    RAM_BASE +17        ;BASE DATA 1K P_T
0038 C1                         POP     B
0039 41                         MOV     B,C
003A 97             CNT_G520:   SUB     A
003B 78                         MOV     A,B
003C 87                         ADD     A
003D D24200                     JNC     CNT_G521
0040 24                         INR     H
0041 24                         INR     H
0042 87             CNT_G521:   ADD     A
0043 D24700                     JNC     CNT_G522
0046 24                         INR     H
0047 6F             CNT_G522    MOV     L,A
0048 4E                         MOV     C,M
0049 23                         INX     H
004A 56                         MOV     D,M
004B 23                         INX     H
004C 5E                         MOV     E,M
004D 212800                     LXI     H,DATA_17       ;BASE DISP PTR V
0050 3A1F00                     LDA     RAM_BASE +31            ;
0053 FE7F                       CPI     01111111B
0055 CA5B00                     JZ      CNT_G523
0058 212900                     LXI     H,DATA_19       ;BASE DISP PTR T
005B 78             CNT_G523:   MOV     A,B
005C FE06                       CPI     06H
005E F26E00                     JP      CONT52B
0061 23                         INX     H                   ;G 5-2A
0062 71                         MOV     M,C
0063 23                         INX     H
0064 72                         MOV     M,D
0065 23                         INX     H
0066 73                         MOV     M,E
```

```
0067 3E00                       MVI  A,MIC
0069 23                         INX  H
006A 77                         MOV  M,A
006B C39200                     JMP  CONT_G
006E FE34       CONT52B.        CPI  34H
0070 F28400                     JP   CONT52C
0073 23                         INX  H                      ;G 5-2B
0074 71                         MOV  M,C
0075 3E00                       MVI  A,DOT
0077 23                         INX  H
0078 77                         MOV  M,A
0079 23                         INX  H
007A 72                         MOV  M,D
007B 23                         INX  H
007C 73                         MOV  M,E
007D 3E00                       MVI  A,MIL
007F 23                         INX  H
0080 77                         MOV  M,A
0081 C39200                     JMP  CONT_G
0084 23         CONT52C:        INX  H                      ;G 5-2C
0085 71                         MOV  M,C
0086 23                         INX  H
0087 72                         MOV  M,D
0088 3E00                       MVI  A,DOT
008A 23                         INX  H
008B 77                         MOV  M,A
008C 23                         INX  H
008D 73                         MOV  M,E
008E 3E00                       MVI  A,MIL
0090 23                         INX  H
0091 77                         MOV  M,A
0092 3A1F00     CONT_G:         LDA  RAM_BASE +31           ;DVDT REF PTR
0095 FEFF                       CPI  11111111B
0097 C2A200                     JNZ  CNT_G527
009A 97                         SUB  A
009B 321F00                     STA  RAM_BASE +31           ;DVDT REF PTR
009E 2A0F00                     LHLD RAM_BASE +15           ;
00A1 E9                         PCHL
00A2 97         CNT_G527.       SUB  A
00A3 D300                       OUT  INI_LCH
00A5 3EFF                       MVI  A,11111111B
00A7 321B00                     STA  RAM_BASE +27           ;
00AA D300                       OUT  PORT_20
00AC 76                         HLT
00AD C30000                     JMP  CONT86
0000                            END
---- SYMBOL TABLE  ---

CNT_G520 003A CNT_G527 00A2  CONT_G   0092  INI_LCH  0000  PORT_20  0000
CNT_G521 0042 CONT52B  006E  DATA_17  0028  MIC      0000  RAM_BASE 0000
CNT_G522 0047 CONT52C  0084  DATA_19  0029  MIL      0000
CNT_G523 005B CONT86   0000  DOT      0000  NAN      0000
```

***** NO ERRORS DETECTED *****

SOURCE FILE NAME: G51 ASM

```
0000                                ;G   J PRGM G 51
0000                                ORG     0000H
0000            RAM_BASE:           DS      19
0028 00         DATA_17             DB      00
0029 00         DATA_19             DB      00
0000            DOT:                EQU     00H
0000            MIL:                EQU     00H
0000            MIC:                EQU     00H
0000            NAN:                EQU     00H
0000            INI_LCH:            EQU     00H
0000            PORT_20:            EQU     00H
0000            CONT86:             EQU     00H
002A 2A2000                         LHLD RAM_BASE +32       ;BASE DATA 1K P_V
002D 3A1F00                         LDA  RAM_BASE +31       ;DVDT REF PTR
0030 FEFF                           CPI  11111111B
0032 CA3A00                         JZ   CNT_G510
0035 2A1100                         LHLD RAM_BASE +17       ;BASE DATA 1K P_T
0038 C1                             POP  B
0039 41                             MOV  B,C
003A 97         CNT_G510:           SUB  A
003B 78                             MOV  A,B
003C 87                             ADD  A
003D D24200                         JNC  CNT_G511
0040 24                             INR  H
0041 24                             INR  H
0042 87         CNT_G511:           ADD  A
0043 D24700                         JNC  CNT_G512
0046 24                             INR  H
0047 6F         CNT_G512:           MOV  L,A
0048 4E                             MOV  C,M
0049 23                             INX  H
004A 56                             MOV  D,M
004B 23                             INX  H
004C 5E                             MOV  E,M
004D 212900                         LXI  H,DATA_19          ;BASE DISP PTR T
0050 3A1F00                         LDA  RAM_BASE +31       ;
0053 FE7F                           CPI  1111111B
0055 CA5B00                         JZ   CNT_G513
0058 212900                         LXI  H,DATA_19          ;BASE DISP PTR T
005B 78         CNT_G513:           MOV  A,B
005C FE0D                           CPI  0DH
005E F26E00                         JP   CONT51B
0061 23                             INX  H                  ;G 5-1A
0062 71                             MOV  M,C
0063 23                             INX  H
0064 72                             MOV  M,D
0065 23                             INX  H
0066 73                             MOV  M,E
```

```
0067 3E00                       MVI   A,MIC
0069 23                         INX   H
006A 77                         MOV   M,A
006B C39200                     JMP   CONT_G
006E FE81       CONT51B:        CPI   81H
0070 F28400                     JP    CONT51C
0073 23                         INX   H                       ;G 5-1B
0074 71                         MOV   M,C
0075 3E00                       MVI   A,DOT
0077 23                         INX   H
0078 77                         MOV   M,A
0079 23                         INX   H
007A 72                         MOV   M,D
007B 23                         INX   H
007C 73                         MOV   M,E
007D 3E00                       MVI   A,MIL
007F 23                         INX   H
0080 77                         MOV   M,A
0081 C39200                     JMP   CONT_G
0084 23         CONT51C:        INX   H                       ;G 5-1C
0085 71                         MOV   M,C
0086 23                         INX   H
0087 72                         MOV   M,D
0088 3E00                       MVI   A,DOT
008A 23                         INX   H
008B 77                         MOV   M,A
008C 23                         INX   H
008D 73                         MOV   M,E
008E 3E00                       MVI   A,MIL
0090 23                         INX   H
0091 77                         MOV   M,A
0092 3A1F00     CONT_G: LDA   RAM_BASE +31                    ;DVDT REF PTR
0095 FEFF                       CPI   11111111B
0097 C2A200                     JNZ   CNT_G517
009A 97                         SUB   A
009B 321F00                     STA   RAM_BASE +31                  ,DVDT REF PTR
009E 2A0F00                     LHLD  RAM_BASE +15                  ;
00A1 E9                         PCHL
00A2 97         CNT_G517:       SUB   A
00A3 D300                       OUT   IN1_LCH
00A5 3EFF                       MVI   A,11111111B
00A7 321B00                     STA   RAM_BASE +27                  ;
00AA D300                       OUT   PORT_20
00AC 76                         HLT
00AD C30000                     JMP   CONT86
0000                            END
----- SYMBOL TABLE ---

CNT_G510 003A CNT_G517 00A2 CONT_G   0092  IN1_LCH  0000  PORT_20  0000
CNT_G511 0042 CONT51B  006E DATA_17  0028  MIC      0000  RAM_BASE 0000
CNT_G512 0047 CONT51C  0084 DATA_19  0029  MIL      0000
CNT_G513 005B CONT86   0000 DOT      0000  NAN      0000
***** NO ERRORS DETECTED *****
```

```
AVOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

SOURCE FILE NAME: G43.ASM

0000                                ;G 4 3 PROM G-44
0000                                ORG     0000H
0000                RAM_BASE:       DS      40
0028 00             DATA_17:        DB      00
0029 00             DATA_19:        DB      00
0000                DOT:            EQU     00H
0000                MIL:            EQU     00H
0000                MIC:            EQU     00H
0000                NAN:            EQU     00H
0000                INI_LCH:        EQU     00H
0000                PORT_20:        EQU     00H
0000                CONT86:         EQU     00H
002A 2A2000                         LHLD    RAM_BASE +32        ;BASE DATA 1K P_V
002D 3A1F00                         LDA     RAM_BASE +31        ;DVDT REF PTR
0030 FEFF                           CPI     11111111B
0032 CA3A00                         JZ      CNT_G430
0035 2A1100                         LHLD    RAM_BASE +17        ;BASE DATA 1K P_T
0038 C1                             POP     B
0039 41                             MOV     B,C
003A 97             CNT_G430:       SUB     A
003B 78                             MOV     A,B
003C 87                             ADD     A
003D D24200                         JNC     CNT_G431
0040 24                             INR     H
0041 24                             INR     H
0042 87             CNT_G431:       ADD     A
0043 D24700                         JNC     CNT_G432
0046 24                             INR     H
0047 6F             CNT_G432:       MOV     L,A
0048 4E                             MOV     C,M
0049 23                             INX     H
004A 56                             MOV     D,M
004B 23                             INX     H
004C 5E                             MOV     E,M
004D 212800                         LXI     H,DATA_17       ;BASE DISP PTR V
0050 3A1F00                         LDA     RAM_BASE +31            ;
0053 FE7F                           CPI     1111111B
0055 CA5B00                         JZ      CNT_G433
0058 212900                         LXI     H,DATA_19       ;BASE DISP PTR T
005B 78             CNT_G433:       MOV     A,B
005C FE03                           CPI     03H
005E F27200                         JP      CONT43B
0061 23                             INX     H               ;G 4-3A
0062 71                             MOV     M,C
0063 23                             INX     H
0064 72                             MOV     M,D
0065 3E00                           MVI     A,DOT
0067 23                             INX     H
```

```
0068 77                         MOV  M,A
0069 23                         INX  H
006A 73                         MOV  M,E
006B 3E00                       MVI  A,MIC
006D 23                         INX  H
006E 77                         MOV  M,A
006F C39200                     JMP  CONT_G
0072 FE19       CONT43B:        CPI  19H
0074 F28400                     JP   CONT43C
0077 23                         INX  H                  ;G 4-3B
0078 71                         MOV  M,C
0079 23                         INX  H
007A 72                         MOV  M,D
007B 23                         INX  H
007C 73                         MOV  M,E
007D 3E00                       MVI  A,MIC
007F 23                         INX  H
0080 77                         MOV  M,A
0081 C39200                     JMP  CONT_G
0084 23         CONT43C:        INX  H                  ;G 4-3C
0085 71                         MOV  M,C
0086 3E00                       MVI  A,DOT
0088 23                         INX  H
0089 77                         MOV  M,A
008A 23                         INX  H
008B 72                         MOV  M,D
008C 23                         INX  H
008D 73                         MOV  M,E
008E 3E00                       MVI  A,MIL
0090 23                         INX  H
0091 77                         MOV  M,A
0092 3A1F00     CONT_G:         LDA  RAM_BASE +31               ;DVDT REF PTR
0095 FEFF                       CPI  11111111B
0097 C2A200                     JNZ  CNT_G437
009A 97                         SUB  A
009B 321F00                     STA  RAM_BASE +31               ;DVDT REF PTR
009E 2A0F00                     LHLD RAM_BASE +15               ;
00A1 E9                         PCHL
00A2 97         CNT_G437:       SUB  A
00A3 D300                       OUT  INI_LCH
00A5 3EFF                       MVI  A,11111111B
00A7 321B00                     STA  RAM_BASE +27               ;
00AA D300                       OUT  PORT_20
00AC 76                         HLT
00AD C30000                     JMP  CONT86
0000                            END
---- SYMBOL TABLE ----

CNT_G430 003A CNT_G437 00A2  CONT_G   0092  INI_LCH  0000    PORT_20  0000
CNT_G431 0042 CONT43B  0072  DATA_17  0028  MIC      0000    RAM_BASE 0000
CNT_G432 0047 CONT43C  0084  DATA_19  0029  MIL      0000
CNT_G433 005B CONT86   0000  DOT      0000  NAN      0000
***** NO ERRORS DETECTED *****
```

```
AVOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364
SOURCE FILE NAME: G42.ASM
 0000                           ;G i j PRGM G-42
 0000                           ORG     0000H
 0000             RAM_BASE:     DS      40
 0028 00          DATA_17:      DB      00
 0029 00          DATA_19:      DB      00
 0000             DOT:          EQU     00H
 0000             MIL:          EQU     00H
 0000             MIC:          EQU     00H
 0000             NAN:          EQU     00H
 0000             INI_LCH:      EQU     00H
 0000             PORT_20:      EQU     00H
 0000             CONT86:       EQU     00H
 002A 2A2000                    LHLD RAM_BASE +32      ;BASE DATA 1K P_V
 002D 3A1F00                    LDA  RAM_BASE +31      ;DVDT REF PTR
 0030 FEFF                      CPI  11111111B
 0032 CA3A00                    JZ   CNT_G420
 0035 2A1100                    LHLD RAM_BASE +17      ;BASE DATA 1K P_T
 0038 C1                        POP  B
 0039 41                        MOV  B,C
 003A 97          CNT_G420:     SUB  A
 003B 78                        MOV  A,B
 003C 87                        ADD  A
 003D D24200                    JNC  CNT_G421
 0040 24                        INR  H
 0041 24                        INR  H
 0042 87          CNT_G421:     ADD  A
 0043 D24700                    JNC  CNT_G422
 0046 24                        INR  H
 0047 6F          CNT_G422:     MOV  L,A
 0048 4E                        MOV  C,M
 0049 23                        INX  H
 004A 56                        MOV  D,M
 004B 23                        INX  H
 004C 5E                        MOV  E,M
 004D 212800                    LXI  H,DATA_17          ,BASE DISP PTR V
 0050 3A1F00                    LDA  RAM_BASE +31       ;
 0053 FE7F                      CPI  1111111B
 0055 CA5B00                    JZ   CNT_G423
 0058 212900                    LXI  H,DATA_19           ,BASE DISP PTR T
 005B 78          CNT_G423:     MOV  A,B
 005C FE06                      CPI  06H
 005E F27200                    JP   CONT42B
 0061 23                        INX  H                  ;G 4-2A
 0062 71                        MOV  M,C
 0063 23                        INX  H
 0064 72                        MOV  M,D
 0065 3E00                      MVI  A,00I
 0067 23                        INX  H
 0068 77                        MOV  M,A
 0069 23                        INX  H
```

```
006A 73                          MOV   M,E
006B 3E00                        MVI   A,M.C
006D 23                          INX   H
006E 77                          MOV   M,A
006F C39400                      JMP   CONT_G
0072 FE34       CONT42B:         CPI   34H
0074 FE34                        CPI   34H
0076 F28600                      JP    CONT42C
0079 23                          INX   H                    ;G 4-2B
007A 71                          MOV   M,C
007B 23                          INX   H
007C 72                          MOV   M,D
007D 23                          INX   H
007E 73                          MOV   M,E
007F 3E00                        MVI   A,MIC
0081 23                          INX   H
0082 77                          MOV   M,A
0083 C39400                      JMP   CONT_G
0086 23         CONT42C:         INX   H                    ;G 4-2C
0087 71                          MOV   M,C
0088 3E00                        MVI   A,DOT
008A 23                          INX   H
008B 77                          MOV   M,A
008C 23                          INX   H
008D 72                          MOV   M,D
008E 23                          INX   H
008F 73                          MOV   M,E
0090 3E00                        MVI   A,MIL
0092 23                          INX   H
0093 77                          MOV   M,A
0094 3A1F00     CONT_G: LDA   RAM_BASE + 0                  ;DVDT REF PTR
0097 FEFF                        CPI   11111111B
0099 C2A400                      JNZ   CNT_G427
009C 97                          SUB   A
009D 321F00                      STA   RAM_BASE +31                 ;DVDT REF PTR
00A0 2A0F00                      LHLD RAM_BASE +15                  ;
00A3 E9                          PCHL
00A4 97         CNT_G427:        SUB   A
00A5 D300                        OUT   IN _1CH
00A7 3EFF                        MVI   A,11111111B
00A9 321B00                      STA   RAM_BASE +27                 ;
00AC D300                        OUT   PORT_20
00AE 76                          HLT
00AF C30000                      JMP   CONT86
0000                             END
---- SYMBOL TABLE ----

CNT_G420 003A CNT_G427 00A4  CONT_G   0094  INI_1CH  0000   PORT_20  0000
CNT_G421 0042 CONT42B  0072  DATA_17  0028  MIC      0000   RAM_BASE 0000
CNT_G422 0047 CONT42C  0086  DATA_19  0029  MIL      0000
CNT_G423 005B CONT86   0000  DOT      0000  NAN      0000

***** NO ERRORS DETECTED *****
```

```
VOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1 05M  SERIAL #00364

OURCE FILE NAME: G41 ASM
0000                                ;3 1 J PRGM G-41
0000                                ORG     0000H
0000            RAM_BASE:           DS      40
0028 00         DATA_17:            DB      00
0029 00         DATA_19:            DB      00
0000            DOT:                EQU     00H
0000            MIL:                EQU     00H
0000            MIC:                EQU     00H
0000            NAN:                EQU     00H
0000            INI_LCH:            EQU     00H
0000            PORT_20             EQU     00H
0000            CONT86:             EQU     00H
002A 2A2000                         LHLD RAM_BASE +32       ;BASE DATA 1K P_V
002D 3A1F00                         LDA  RAM_BASE +31       ;DVDT REF PTR
0030 FEFF                           CPI  11111111B
0032 CA3A00                         JZ   CNT_G410
0035 2A1100                         LHLD RAM_BASE +17       ;BASE DATA 1K P_T
0038 C1                             POP  B
0039 41                             MOV  B,C
003A 97         CNT_G410:           SUB  A
003B 78                             MOV  A,B
003C 87                             ADD  A
003D D24200                         JNC  CNT_G411
0040 24                             INR  H
0041 24                             INR  H
0042 87         CNT_G411:           ADD  A
0043 D24700                         JNC  CNT_G412
0046 24                             INR  H
0047 6F         CNT_G412:           MOV  L,A
0048 4E                             MOV  C,M
0049 23                             INX  H
004A 56                             MOV  D,M
004B 23                             INX  H
004C 5E                             MOV  E,M
004D 212800                         LXI  H,DATA_17          ;BASE DISP PTR V
0050 3A1F00                         LDA  RAM_BASE +31       ;
0053 FE7F                           CPI  1111111B
0055 CA5B00                         JZ   CNT_G413
0058 212900                         LXI  H,DATA_19          ;BASE DISP PTR T
005B 78         CNT_G413:           MOV  A,B
005C FE0D                           CPI  0DH
005E F27200                         JP   CONT41B
0061 23                             INX  H                  ;G 4-1A
0062 71                             MOV  M,C
0063 23                             INX  H
0064 72                             MOV  M,D
0065 3E00                           MVI  A,DOT
0067 23                             INX  H
0068 77                             MOV  M,A
0069 23                             INX  H
```

```
006A 73                         MOV   M,E
006B 3E00                       MVI   A,MIC
006D 23                         INX   H
006E 77                         MOV   M,A
006F C39200                     JMP   CONT_G
0072 FE81       CONT41B:        CPI   81H
0074 F28400                     JP    CONT41C
0077 23                         INX   H                     ;G 4-1B
0078 71                         MOV   M,C
0079 23                         INX   H
007A 72                         MOV   M,D
007B 23                         INX   H
007C 73                         MOV   M,E
007D 3E00                       MVI   A,MIC
007F 23                         INX   H
0080 77                         MOV   M,A
0081 C39200                     JMP   CONT_G
0084 23         CONT41C:        INX   H                     ;G 4-1C
0085 71                         MOV   M,C
0086 3E00                       MVI   A,DOT
0088 23                         INX   H
0089 77                         MOV   M,A
008A 23                         INX   H
008B 72                         MOV   M,D
008C 23                         INX   H
008D 73                         MOV   M,E
008E 3E00                       MVI   A,MIL
0090 23                         INX   H
0091 77                         MOV   M,A
0092 3A1F00     CONT_G:         LDA   RAM_BASE +31                  ;DVDT REF PT
0095 FEFF                       CPI   11111111B
0097 C2A200                     JNZ   CNT_G417
009A 97                         SUB   A
009B 321F00                     STA   RAM_BASE +31                  ;DVDT REF PT
009E 2A0F00                     LHLD  RAM_BASE +15                  ;
00A1 E9                         PCHL
00A2 97         CNT_G417:       SUB   A
00A3 D300                       OUT   INT_LCH
00A5 3EFF                       MVI   A,11111111B
00A7 321B00                     STA   RAM_BASE +27                  ;
00AA D300                       OUT   PORT_20
00AC 76                         HLT
00AD C30000                     JMP   CONT86
0000                            END
     SYMBOL TABLE---

CNT_G410 003A  CNT_G417 00A2  CONT_G   0092  INT_LCH  0000   PORT_20  0000
CNT_G411 0042  CONT41B  0072  DATA_17  0028  MIC      0000   RAM_BASE 0000
CNT_G412 0047  CONT41C  0084  DATA_19  0029  MIL      0000
CNT_G413 005B  CONT86   0000  DOT      0000  NAN      0000

***** NO ERRORS DETECTED *****
```

```
AVOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

SOURCE FILE NAME: G33.ASM

0000                                ,G 1  ) PRGM G-33
0000                                ORG     0000H
0000                RAM_BASE:       DS      40
0028 00             DATA_17.        DB      00
0029 00             DATA_19.        DB      00
0000                DOT:            EQU     00H
0000                MIL:            EQU     00H
0000                MIC:            EQU     00H
0000                NAN:            EQU     00H
0000                INI_LCH:        EQU     00H
0000                PORT_20:        EQU     00H
0000                CONT86:         EQU     00H
002A 2A2000                         LHLD RAM_BASE +32   ;BASE DATA 1K P_V
002D 3A1F00                         LDA  RAM_BASE +31   ;DVDT REF PTR
0030 FEFF                           CPI  11111111B
0032 CA3A00                         JZ   CNT_G330
0035 2A1100                         LHLD RAM_BASE +17    ;BASE DATA 1K P_T
0038 C1                             POP  B
0039 41                             MOV  B,C
003A 97             CNT_G330:       SUB  A
003B 78                             MOV  A,B
003C 87                             ADD  A
003D D24200                         JNC  CNT_G331
0040 24                             INR  H
0041 24                             INR  H
0042 87             CNT_G331:       ADD  A
0043 D24700                         JNC  CNT_G332
0046 24                             INR  H
0047 6F             CNT_G332:       MOV  L,A
0048 4E                             MOV  C,M
0049 23                             INX  H
004A 56                             MOV  D,M
004B 23                             INX  H
004C 5E                             MOV  E,M
004D 212800                         LXI  H,DATA_17              ;BASE DISP PTR V
0050 3A1F00                         LDA  RAM_BASE +31                ;
0053 FE7F                           CPI  1111111B
0055 CA5B00                         JZ   CNT_G333
0058 212900                         LXI  H,DATA_19               ,BASE DISP PTR T
005B 78             CNT_G333:       MOV  A,B
005C FE03                           CPI  03H
005E F27200                         JP   CONT33B
0061 23                             INX  H                    ;G 3-3A
0062 71                             MOV  M,C
0063 3E00                           MVI  A,DOT
0065 23                             INX  H
0066 77                             MOV  M,A
0067 23                             INX  H
0068 72                             MOV  M,D
```

```
 0069 23                          INX  H
 006A 73                          MOV  M,E
 006B 3E00                        MVI  A,MIC
 006D 23                          INX  H
 006E 77                          MOV  M,A
 006F C39200                      JMP  CONT_G
 0072 FE19      CONT33B:          CPI  19H
 0074 F28800                      JP   CONT33C
 0077 23                          INX  H                    ;G 3-3B
 0078 71                          MOV  M,C
 0079 23                          INX  H
 007A 72                          MOV  M,D
 007B 3E00                        MVI  A,DOT
 007D 23                          INX  H
 007E 77                          MOV  M,A
 007F 23                          INX  H
 0080 73                          MOV  M,I
 0081 3E00                        MVI  A,MIC
 0083 23                          INX  H
 0084 77                          MOV  M,A
 0085 C39200                      JMP  CONT_G
 0088 23        CONT33C:          INX  H                    ;G 3-3C
 0089 71                          MOV  M,C
 008A 23                          INX  H
 008B 72                          MOV  M,D
 008C 23                          INX  H
 008D 73                          MOV  M,I
 008E 3E00                        MVI  A,MIC
 0090 23                          INX  H
 0091 77                          MOV  M,A
 0092 3A1F00    CONT_G            LDA  RAM_BASE +31              ;DVDT REF PTR
 0095 FEFF                        CPI  11111111B
 0097 C2A200                      JNZ  CNT_G337
 009A 97                          SUB  A
 009B 321F00                      STA  RAM_BASE +31              ;DVDT REF PTR
 009E 2A0F00                      LHLD RAM_BASE +15              ;
 00A1 E9                          PCHL
 00A2 97        CNT_G337:         SUB  A
 00A3 D300                        OUT  INI_LCH
 00A5 3EFF                        MVI  A,11111111B
 00A7 321B00                      STA  RAM_BASE +27              ;
 00AA D300                        OUT  PORT_20
 00AC 76                          HLT
 00AD C30000                      JMP  CONT86
 0000                             END
---- SYMBOL TABLE ----

CNT_G330 003A CNT_G337 00A2 CONT_G   0092  INI_LCH  0000   PORT_20  0000
CNT_G331 0042 CONT33B  0072 DATA_17  0028  MIC      0000   RAM_BASE 0000
CNT_G332 0047 CONT33C  0088 DATA_19  0029  MIL      0000
CNT_G333 005B CONT86   0000 DOT      0000  NAN      0000

***** NO ERRORS DETECTED *****
```

```
AVOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

SOURCE FILE NAME: G32.ASM

0000                              ;G 1 j PRGM G-32
0000                              ORG     0000H
0000                RAM_BASE:     DS      40
0028 00             DATA_17:      DB      00
0029 00             DATA_19:      DB      00
0000                DOT:          EQU     00H
0000                MIL:          EQU     00H
0000                MIC:          EQU     00H
0000                NAN:          EQU     00H
0000                INI_LCH:      EQU     00H
0000                PORT_20:      EQU     00H
0000                CONT86:       EQU     00H
002A 2A2000                       LHLD  RAM_BASE +32        ;BASE DATA 1K P_V
002D 3A1F00                       LDA   RAM_BASE +31        ;DVDT REF PTR
0030 FEFF                         CPI   11111111B
0032 CA3A00                       JZ    CNT_G320
0035 2A1100                       LHLD  RAM_BASE +17        ,BASE DATA 1K P_T
0038 C1                           POP   B
0039 41                           MOV   B,C
003A 97             CNT_G320:     SUB   A
003B 78                           MOV   A,B
003C 87                           ADD   A
003D D24200                       JNC   CNT_G321
0040 24                           INR   H
0041 24                           INR   H
0042 87             CNT_G321:     ADD   A
0043 D24700                       JNC   CNT_G322
0046 24                           INR   H
0047 6F             CNT_G322:     MOV   L,A
0048 4E                           MOV   C,M
0049 23                           INX   H
004A 56                           MOV   D,M
004B 23                           INX   H
004C 5E                           MOV   E,M
004D 212800                       LXI   H,DATA_17         ;BASE DISP PTR V
0050 3A1F00                       LDA   RAM_BASE +31              ;
0053 FE7F                         CPI   11111111B
0055 CA5B00                       JZ    CNT_G323
0058 212900                       LXI   H,DATA_19         ;BASE DISP PTR T
005B 78             CNT_G323:     MOV   A,B
005C FE06                         CPI   06H
005E F27200                       JP    CONT32B
0061 23                           INX   H                  ;G 3-2A
0062 71                           MOV   M,C
0063 3E00                         MVI   A,DOT
0065 23                           INX   H
0066 77                           MOV   M,A
0067 23                           INX   H
0068 72                           MOV   M,D
```

```
0069 23                         INX  H
006A 73                         MOV  M,E
006B 3E00                       MVI  A,MIC
006D 23                         INX  H
006E 77                         MOV  M,A
006F C39200                     JMP  CONT_G
0072 FE34       CONT32B:        CPI  34H
0074 F28800                     JP   CONT32C
0077 23                         INX  H                      ;G 3-2B
0078 71                         MOV  M,C
0079 23                         INX  H
007A 72                         MOV  M,D
007B 3E00                       MVI  A,DOT
007D 23                         INX  H
007E 77                         MOV  M,A
007F 23                         INX  H
0080 73                         MOV  M,E
0081 3E00                       MVI  A,MIC
0083 23                         INX  H
0084 77                         MOV  M,A
0085 C39200                     JMP  CONT_G
0088 23         CONT32C:        INX  H                      ;G 3-2C
0089 71                         MOV  M,C
008A 23                         INX  H
008B 72                         MOV  M,D
008C 23                         INX  H
008D 73                         MOV  M,E
008E 3E00                       MVI  A,MIC
0090 23                         INX  H
0091 77                         MOV  M,A
0092 3A1F00     CONT_G:         LDA  RAM_BASE +31           ;DVDT REF PTR
0095 FEFF                       CPI  11111111B
0097 C2A200                     JNZ  CNT_G327
009A 97                         SUB  A
009B 321F00                     STA  RAM_BASE +31           ;DVDT REF PTR
009E 2A0F00                     LHLD RAM_BASE +15           ;
00A1 E9                         PCHL
00A2 97         CNT_G327:       SUB  A
00A3 D300                       OUT  INI_LCH
00A5 3EFF                       MVI  A,11111111B
00A7 321B00                     STA  RAM_BASE +27           ;
00AA D300                       OUT  PORT_20
00AC 76                         HLT
00AD C30000                     JMP  CONT86
0000                            END
---- SYMBOL TABLE --

CNT_G320 003A CNT_G327 00A7  CONT_G   0092   INI_LCH  0000   PORT_20  0000
CNT_G321 0042 CONT32B  0072  DATA_17  0028   MIC      0000   RAM_BASE 0000
CNT_G322 0047 CONT32C  0088  DATA_19  0029   MIL      0000
CNT_G323 005B CONT86   0000  DOT      0000   NAN      0000

***** NO ERRORS DETECTED *****
```

```
AVOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

SOURCE FILE NAME: G31.ASM

0000                            ;G 3-1 PROM G-31
0000                            ORG     0000H
0000                RAM_BASE:   DS      40
0028 00             DATA_17:    DB      00
0029 00             DATA_19:    DB      00
0000                DOT:        EQU     00H
0000                MIL:        EQU     00H
0000                MIC:        EQU     00H
0000                NAN:        EQU     00H
0000                INI_LCH:    EQU     00H
0000                PORT_20     EQU     00H
0000                CONT86:     EQU     00H
002A 2A2000                     LHLD    RAM_BASE +32        ;BASE DATA 1K P_V
002D 3A1F00                     LDA     RAM_BASE +31        ;DVDT REF PTR
0030 FEFF                       CPI     11111111B
0032 CA3A00                     JZ      CNT_G310
0035 2A1100                     LHLD    RAM_BASE +17        ;BASE DATA 1K P_T
0038 C1                         POP     B
0039 41                         MOV     B,C
003A 97             CNT_G310:   SUB     A
003B 78                         MOV     A,B
003C 87                         ADD     A
003D D24200                     JNC     CNT_G311
0040 24                         INR     H
0041 24                         INR     H
0042 87             CNT_G311:   ADD     A
0043 D24700                     JNC     CNT_G312
0046 24                         INR     H
0047 6F             CNT_G312:   MOV     L,A
0048 4E                         MOV     C,M
0049 23                         INX     H
004A 56                         MOV     D,M
004B 23                         INX     H
004C 5E                         MOV     E,M
004D 212800                     LXI     H,DATA_17           ;BASE DISP PTR V
0050 3A1F00                     LDA     RAM_BASE +31        ;
0053 FE7F                       CPI     01111111B
0055 CA5B00                     JZ      CNT_G313
0058 212900                     LXI     H,DATA_19           ,BASE DISP PTR T
005B 78             CNT_G313:   MOV     A,B
005C FE0D                       CPI     0DH
005E F27200                     JP      CONT31B
0061 23                         INX     H                   ;G 3-1A
0062 71                         MOV     M,C
0063 3E00                       MVI     A,DOT
0065 23                         INX     H
0066 77                         MOV     M,A
0067 23                         INX     H
```

```
0068 72                          MOV   M,D
0069 23                          INX   H
006A 73                          MOV   M,E
006B 3E00                        MVI   A,MIC
006D 23                          INX   H
006E 77                          MOV   M,A
006F C39200                      JMP   CONT_G
 0072 FE81       CONT31B:        CPI   81H
0074 F28800                      JP    CONT31C
0077 23                          INX   H                    ;G 3-1B
0078 71                          MOV   M,C
0079 23                          INX   H
007A 72                          MOV   M,D
007B 3E00                        MVI   A,DOT
007D 23                          INX   H
007E 77                          MOV   M,A
007F 23                          INX   H
0080 73                          MOV   M,E
0081 3E00                        MVI   A,MIC
 0083 23                         INX   H
0084 77                          MOV   M,A
 0085 C39200                     JMP   CONT_G
0088 23          CONT31C:        INX   H                    ;G 3-1C
 0089 71                         MOV   M,C
 008A 23                         INX   H
 008B 72                         MOV   M,D
008C 23                          INX   H
008D 73                          MOV   M,E
008E 3E00                        MVI   A,MIC
 0090 23                         INX   H
0091 77                          MOV   M,A
 0092 3A1F00     CONT_G:         LDA   RAM_BASE +31              ;DVDT REF PTI
 0095 FEFF                       CPI   11111111B
 0097 C2A200                     JNZ   CNT_G317
009A 97                          SUB   A
009B 321F00                      STA   RAM_BASE +31              ;DVDT REF PTI
009E 2A0F00                      LHLD  RAM_BASE +15              ;
00A1 E9                          PCHL
00A2 97          CNT_G317:       SUB   A
00A3 D300                        OUT   INT_LCH
00A5 3EFF                        MVI   A,11111111B
00A7 321B00                      STA   RAM_BASE +27              ;
00AA D300                        OUT   PORT_20
 00AC 76                         HLT
00AD C30000                      JMP   CONT86
0000                             END
---- SYMBOL TABLE  ---

CNT_G310 003A  CNT_G317 00A2  CONT_G   0092  INT_LCH  0000  PORT_20  0000
CNT_G311 0042  CONT31B  0072  DATA_17  0028  MIC      0000  RAM_BASE 0000
CNT_G312 0047  CONT31C  0088  DATA_19  0029  MIL      0000
CNT_G313 005B  CONT86   0000  DOT      0000  NAN      0000
***** NO ERRORS DETECTED *****
```

```
AVOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

SOURCE FILE NAME: G23.ASM


0000                            ;G 2 3 PRGM G-23
0000                            ORG     0000H
0000                RAM_BASE:   DS      40
0028 00             DATA_17:    DB      00
0029 00             DATA_19:    DB      00
0000                DOT:        EQU     00H
0000                MIL:        EQU     00H
0000                MIC:        EQU     00H
0000                NAN:        EQU     00H
0000                INI_LCH:    EQU     00H
0000                PORT_20:    EQU     00H
0000                CONT86:     EQU     00H
002A 2A2000                     LHLD RAM_BASE +32       ;BASE DATA 1K P_V
002D 3A1F00                     LDA  RAM_BASE +31       ;DVDT REF PTR
0030 FEFF                       CPI  11111111B
0032 CA3A00                     JZ   CNT_G230
0035 2A1100                     LHLD RAM_BASE +17       ;BASE DATA 1K P_T
0038 C1                         POP  B
0039 41                         MOV  B,C
003A 97             CNT_G230:   SUB  A
003B 78                         MOV  A,B
003C 87                         ADD  A
003D D24700                     JNC  CNT_G231
0040 24                         INR  H
0041 24                         INR  H
0042 87             CNT_G231:   ADD  A
0043 D24700                     JNC  CNT_G232
0046 24                         INR  H
0047 6F             CNT_G232:   MOV  L,A
0048 4E                         MOV  C,M
0049 23                         INX  H
004A 56                         MOV  D,M
004B 23                         INX  H
004C 5E                         MOV  E,M
004D 212800                     LXI  H,DATA_17          ;BASE DISP PTR V
0050 3A1F00                     LDA  RAM_BASE +31       ;
0053 FE7F                       CPI  11111111B
0055 CA5B00                     JZ   CNT_G233
0058 212900                     LXI  H,DATA_19          ;BASE DISP PTR T
005B 78             CNT_G233:   MOV  A,B
005C FE03                       CPI  03H
005E F26E00                     JP   CONT23B
0061 23                         INX  H                  ,G 2-3A
0062 71                         MOV  M,C
0063 23                         INX  H
0064 72                         MOV  M,D
0065 23                         INX  H
0066 73                         MOV  M,E
```

```
0067 3E00                       MVI   A,NAN
0069 23                         INX   H
006A 77                         MOV   M,A
006B C39200                     JMP   CONT_G
006E FE19       CONT23B:        CPI   19H
0070 F28400                     JP    CONT23C
0073 23                         INX   H                       ;G 2-3B
0074 71                         MOV   M,C
0075 3E00                       MVI   A,DOT
0077 23                         INX   H
0078 77                         MOV   M,A
0079 23                         INX   H
007A 72                         MOV   M,D
007B 23                         INX   H
007C 73                         MOV   M,E
007D 3E00                       MVI   A,MIC
007F 23                         INX   H
0080 77                         MOV   M,A
0081 C39200                     JMP   CONT_G
0084 23         CONT23C:        INX   H                       ;G 2-3C
0085 71                         MOV   M,C
0086 23                         INX   H
0087 72                         MOV   M,D
0088 3E00                       MVI   A,DOT
008A 23                         INX   H
008B 77                         MOV   M,A
008C 23                         INX   H
008D 73                         MOV   M,E
008E 3E00                       MVI   A,MIC
0090 23                         INX   H
0091 77                         MOV   M,A
0092 3A1F00     CONT_G.         LDA   RAM_BASE +31                ;DVDT REF PTI
0095 FEFF                       CPI   11111111B
0097 C2A200                     JNZ   CNT_G237
009A 97                         SUB   A
009B 321F00                     STA   RAM_BASE +31                ;DVDT REF PTI
009E 2A0F00                     LHLD  RAM_BASE +15                ;
00A1 E9                         PCHL
00A2 97         CNT_G237:       SUB   A
00A3 D300                       OUT   INT_LCH
00A5 3EFF                       MVI   A,11111111B
00A7 321B00                     STA   RAM_BASE +27                ;
00AA D300                       OUT   PORT_20
00AC 76                         HLT
00AD C30000                     JMP   CONT86
0000                            END
---- SYMBOL TABLE ---

CNT_G230 003A  CNT_G237 00A2  CONT_G   0092  INT_LCH  0000  PORT_20  0000
CNT_G231 0042  CONT23B  0061  DATA_17  0018  MIC      0000  RAM_BASE 0000
CNT_G232 0047  CONT23C  0084  DATA_19  0029  MIC      0000
CNT_G233 005B  CONT86   0000  DOT      0000  NAN      0000
***** NO ERRORS DETECTED *****
```

```
AVOCET SYSTEMS 8085/780 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

SOURCE FILE NAME: G21.ASM

 0000                                ;G 1 J PRGM G-21
 0000                                ORG     0000H
 0000                RAM_BASE:       DS      40
 0028 00             DATA_17         DB      00
 0029 00             DATA_19.        DB      00
 0000                DOT:            EQU     00H
 0000                MIL             EQU     00H
 0000                MIC:            EQU     00H
 0000                NAN:            EQU     00H
 0000                INI_ICH:        EQU     00H
 0000                PORT_20:        EQU     00H
 0000                CONT86:         EQU     00H
 002A 2A2000                         LHLD RAM_BASE +32     ;BASE DATA 1K P_V
 002D 3A1F00                         LDA  RAM_BASE +31     ;DVDT REF PTR
 0030 FEFF                           CPI  11111111B
 0032 CA3A00                         JZ   CNT_G210
 0035 2A1100                         LHLD RAM_BASE +17     ;BASE DATA 1K P_T
 0038 C1                             POP  B
 0039 41                             MOV  B,C
 003A 97             CNT_G210        SUB  A
 003B 78                             MOV  A,B
 003C 87                             ADD  A
 003D D24200                         JNC  CNT_G211
 0040 24                             INR  H
 0041 24                             INR  H
 0042 87             CNT_G211.       ADD  A
 0043 D24700                         JNC  CNT_G212
 0046 24                             INR  H
 0047 6F             CNT_G212.       MOV  L,A
 0048 4E                             MOV  C,M
 0049 23                             INX  H
 004A 56                             MOV  D,M
 004B 23                             INX  H
 004C 5E                             MOV  E,M
 004D 212800                         LXI  H,DATA_17        ;BASE DISP PTR V
 0050 3A1F00                         LDA  RAM_BASE +31     ;
 0053 FE7F                           CPI  11111111B
 0055 CA5B00                         JZ   CNT_G213
 0058 212900                         LXI  H,DATA_19        ;BASE DISP PTR T
 005B 78             CNT_G213:       MOV  A,B
 005C FE0D                           CPI  0DH
 005E F26E00                         JP   CONT21B
 0061 23                             INX  H                ;G 2-1A
 0062 71                             MOV  M,C
 0063 23                             INX  H
 0064 72                             MOV  M,D
 0065 23                             INX  H
 0066 73                             MOV  M,E
 0067 3E00                           MVI  A,NAN
```

```
0069 23                          INX  H
006A 77                          MOV  M,A
006B C39200                      JMP  CONT_G
006E FE81       CONT21B:         CPI  81H
0070 F28400                      JP   CONT21C
0073 23                          INX  H                      ;G 2-1B
0074 71                          MOV  M,C
0075 3E00                        MVI  A,DOT
0077 23                          INX  H
0078 77                          MOV  M,A
0079 23                          INX  H
007A 72                          MOV  M,D
007B 23                          INX  H
007C 73                          MOV  M,E
007D 3E00                        MVI  A,MIC
007F 23                          INX  H
0080 77                          MOV  M,A
0081 C39200                      JMP  CONT_G
0084 23         CONT21C:         INX  H                      ,G 2-1C
0085 71                          MOV  M,C
0086 23                          INX  H
0087 72                          MOV  M,D
0088 3E00                        MVI  A,DOT
008A 23                          INX  H
008B 77                          MOV  M,A
008C 23                          INX  H
008D 73                          MOV  M,E
008E 3E00                        MVI  A,MIC
0090 23                          INX  H
0091 77                          MOV  M,A
0092 3A1F00     CONT_G           LDA  RAM_BASE +31                ;DVDT REF PTR
0095 FEFF                        CPI  11111111B
0097 C2A200                      JNZ  CNT_G217
009A 97                          SUB  A
009B 321F00                      STA  RAM_BASE +31                ;DVDT REF PTR
009E 2A0F00                      LHLD RAM_BASE +15                ;
00A1 E9                          PCHL
00A2 97         CNT_G217         SUB  A
00A3 D300                        OUT  INI_LCH
00A5 3EFF                        MVI  A,11111111B
00A7 321B00                      STA  RAM_BASE +27                ;
00AA D300                        OUT  PORT_20
00AC 76                          HLT
00AD C30000                      JMP  CONT86
0000                             END
---- SYMBOL TABLE ----

CNT_G210 003A CNT_G217 00A2 CONT_G   0092 INI_LCH  0000 PORT_20  0000
CNT_G211 0042 CONT21B  006E DATA_17  0028 MIC      0000 RAM_BASE 0000
CNT_G212 0047 CONT21C  0084 DATA_19  0029 MIL      0000
CNT_G213 005B CONT86   0000 DOT      0000 NAN      0000

***** NO ERRORS DETECTED *****
```

```
AVOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364

SOURCE FILE NAME: G13.ASM

 0000                           ;G 1 3 PRGM G-13
 0000                           ORG     0000H
 0000             RAM_BASE      DS      40
 0028 00          DATA_17:      DB      00
 0029 00          DATA_19:      DB      00
 0000             DOT:          EQU     00H
 0000             MIL:          EQU     00H
 0000             MIC:          EQU     00H
 0000             NAN:          EQU     00H
 0000             INI_1CH:      EQU     00H
 0000             PORT_20:      EQU     00H
 0000             CONTB6:       EQU     00H
 002A 2A2000                    LHLD RAM_BASE +32       ;BASE DATA 1K P_V
 002D 3A1F00                    LDA  RAM_BASE +31       ,DVDT REF PTR
 0030 FEFF                      CPI  11111111B
 0032 CA3A00                    JZ   CNT_G130
 0035 2A1100                    LHLD RAM_BASE +17       ;BASE DATA 1K P_T
 0038 C1                        POP  B
 0039 41                        MOV  B,C
 003A 97          CNT_G130      SUB  A
 003B 78                        MOV  A,B
 003C 87                        ADD  A
 003D D24200                    JNC  CNT_G131
 0040 24                        INR  H
 0041 24                        INR  H
 0042 87          CNT_G131:     ADD  A
 0043 D24700                    JNC  CNT_G132
 0046 24                        INR  H
 0047 6F          CNT_G132:     MOV  L,A
 0048 4E                        MOV  C,M
 0049 23                        INX  H
 004A 56                        MOV  D,M
 004B 23                        INX  H
 004C 5E                        MOV  E,M
 004D 212800                    LXI  H,DATA_17          ;BASE DISP PTR V
 0050 3A1F00                    LDA  RAM_BASE +31       ;
 0053 FE7F                      CPI  11111111B
 0055 CA5B00                    JZ   CNT_G133
 0058 212900                    LXI  H,DATA_19          ;BASE DISP PTR T
 005B 78          CNT_G133:     MOV  A,B
 005C FE03                      CPI  03H
 005E F27200                    JP   CONT13B
 0061 23                        INX  H                  ;G 1-3A
 0062 71                        MOV  M,C
 0063 23                        INX  H
 0064 72                        MOV  M,D
 0065 3E00                      MVI  A,DOT
 0067 23                        INX  H
 0068 77                        MOV  M,A
```

```
0069 23                          INX  H
006A 73                          MOV  M,E
006B 3E00                        MVI  A,NAN
006D 23                          INX  H
006E 77                          MOV  M,A
006F C39400                      JMP  CONT_G
0072 FE19       CONT13B:         CPI  19H
0074 FE19                        CPI  19H
0076 F28600                      JP   CONT13C
0079 23                          INX  H                    ;G 1-3B
007A 71                          MOV  M,C
007B 23                          INX  H
007C 72                          MOV  M,D
007D 23                          INX  H
007E 73                          MOV  M,E
007F 3E00                        MVI  A,NAN
0081 23                          INX  H
0082 77                          MOV  M,A
0083 C39400                      JMP  CONT_G
0086 23         CONT13C:         INX  H                    ;G 1-3C
0087 71                          MOV  M,C
0088 3E00                        MVI  A,DOT
008A 23                          INX  H
008B 77                          MOV  M,A
008C 23                          INX  H
008D 72                          MOV  M,D
008E 23                          INX  H
008F 73                          MOV  M,E
0090 3E00                        MVI  A,MIC
0092 23                          INX  H
0093 77                          MOV  M,A
0094 3A1F00     CONT_G:          LDA  RAM_BASE +31              ;DVDT REF P
0097 FEFF                        CPI  11111111B
0099 C2A400                      JNZ  CNT_G137
009C 97                          SUB  A
009D 321F00                      STA  RAM_BASE +31              ;DVDT REF P
00A0 2A0F00                      LHLD RAM_BASE +15              ;
00A3 E9                          PCHL
00A4 97         CNT_G137:        SUB  A
00A5 D300                        OUT  INT_LCH
00A7 3EFF                        MVI  A,11111111B
00A9 321B00                      STA  RAM_BASE +27
00AC D300                        OUT  PORT_20
00AE 76                          HLT
00AF C30000                      JMP  CONT86
0000                             END
---- SYMBOL TABLE ----

CNT_G130 003A  CNT_G137 00A4  CONT_G   0094  INT_LCH  0000  PORT_20  0000
CNT_G131 0042  CONT13B  0072  DATA_17  0028  MIC      0000  RAM_BASE 0000
CNT_G132 0047  CONT13C  0086  DATA_19  0029  MIL      0000
CNT_G133 005B  CONT86   0000  DOT      0000  NAN      0000
***** NO ERRORS DETECTED *****
```

AVOCET SYSTEMS 8085/Z80 ASSEMBLER - VERSION 1.05M SERIAL #00364

SOURCE FILE NAME: G12.ASM

```
0000                               ;G 1 ) PRGM G-12
0000                               ORG     0000H
0000             RAM_BASE          DS      40
0028 00          DATA_17:          DB      00
0029 00          DATA_19:          DB      00
0000             DOT:              EQU     00H
0000             MIL:              EQU     00H
0000             MIC:              EQU     00H
0000             NAN:              EQU     00H
0000             INI_LCH:          EQU     00H
0000             PORT_20:          EQU     00H
0000             CONT86:           EQU     00H
002A 2A2000                        LHLD RAM_BASE +32      ;BASE DATA 1K P_V
002D 3A1F00                        LDA  RAM_BASE +31      ;DVDT REF PTR
0030 FEFF                          CPI  11111111B
0032 CA3A00                        JZ   CNT_G120
0035 2A1100                        LHLD RAM_BASE +17      ;BASE DATA 1K P_T
0038 C1                            POP  B
0039 41                            MOV  B,C
003A 97          CNT_G120:         SUB  A
003B 78                            MOV  A,B
003C 87                            ADD  A
003D D24200                        JNC  CNT_G121
0040 24                            INR  H
0041 24                            INR  H
0042 87          CNT_G121:         ADD  A
0043 D24700                        JNC  CNT_G122
0046 24                            INR  H
0047 6F          CNT_G122:         MOV  L,A
0048 4E                            MOV  C,M
0049 23                            INX  H
004A 56                            MOV  D,M
004B 23                            INX  H
004C 5E                            MOV  E,M
004D 212800                        LXI  H,DATA_17         ;BASE DISP PTR V
0050 3A1F00                        LDA  RAM_BASE +31      ;
0053 FE7F                          CPI  11111111B
0055 CA5B00                        JZ   CNT_G123
0058 212900                        LXI  H,DATA_19         ;BASE DISP PTR T
005B 78          CNT_G123:         MOV  A,B
005C FE06                          CPI  06H
005E F27200                        JP   CONT128
0061 23                            INX  H                 ;G 1-2A
0062 71                            MOV  M,C
0063 23                            INX  H
0064 72                            MOV  M,D
0065 3E00                          MVI  A,DOT
0067 23                            INX  H
0068 77                            MOV  M,A
```

```
0069 23                          INX  H
006A 73                          MOV  M,E
006B 3E00                        MVI  A,NAN
006D 23                          INX  H
006E 77                          MOV  M,A
006F C39200                      JMP  CONT_G
0072 FE34       CONT12B:         CPI  34H
0074 F28400                      JP   CONT12C
0077 23                          INX  H                    ;G 1-2B
0078 71                          MOV  M,C
0079 23                          INX  H
007A 72                          MOV  M,D
007B 23                          INX  H
007C 73                          MOV  M,E
007D 3E00                        MVI  A,NAN
007F 23                          INX  H
0080 77                          MOV  M,A
0081 C39200                      JMP  CONT_G
0084 23         CONT12C:         INX  H                    ;G 1-2C
0085 71                          MOV  M,C
0086 3E00                        MVI  A,DOT
0088 23                          INX  H
0089 77                          MOV  M,A
008A 23                          INX  H
008B 72                          MOV  M,D
008C 23                          INX  H
008D 73                          MOV  M,E
008E 3E00                        MVI  A,MIC
0090 23                          INX  H
0091 77                          MOV  M,A
0092 3A1F00     CONT_G: LDA   RAM_BASE +31                 ;DVDT REF PTR
0095 FEFF                        CPI  11111111B
0097 C2A200                      JNZ  CNT_G127
009A 97                          SUB  A
009B 321F00                      STA  RAM_BASE +31                ,DVDT REF PTR
009E 2A0F00                      LHLD RAM_BASE +15                ;
00A1 E9                          PCHL
00A2 97         CNT_G127:        SUB  A
00A3 D300                        OUT  INT_LCH
00A5 3EFF                        MVI  A,11111111B
00A7 321B00                      STA  RAM_BASE +27                ;
00AA D300                        OUT  PORT_20
00AC 76                          HLT
00AD C30000                      JMP  CONT86
 0000                            END
```

---- SYMBOL TABLE ----

```
CNT_G120 003A  CNT_G127 00A2 CONT_G   0092 INT_LCH  0000  PORT_20  0000
CNT_G121 0042  CONT12B  0072 DATA_17  0078 MIC      0000  RAM_BASE 0000
CNT_G122 0047  CONT12C  0084 DATA_19  0029 MIL      0000
CNT_G123 005B  CONT86   0000 DOT      0000 NAN      0000
***** NO ERRORS DETECTED *****
```

4.4. SOFTWARE TESTING :

1) Test on Individual Modules : The test environment has been described in Sec. 2.3. Initially we adopted for individual module test where the requirement of the RAM space on the test and development board 'ILCV-2' (31) will be sufficiently small and manageable with the 8K RAM space, option available with the department.

The common procedure adopted for all these modules is described below -

a) All the keyboard inputs are changed to inputs from preassigned memory location. Therefore 8279 interface routines have been deleted and LDA Reference Memory Address, structures have replaced those positions.

b) The outputs of the module on test data inputs are also diverted to defined memory storage space. Within the program structure a few outputs are already of this nature but the outputs diverted to the display interface are also stored in the RAM space.

c) The various data tables in memory are not duplicated at the time of test but the information relevant with the test data was transferred along with the test routines.

d) Outcome of the test is confirmed by uploading required memory locations with Hex-files. These being totally provisional outputs, no attempt is made to preserve these Hex-files for their faliability.

The modules broken up for this purpose are mentioned below. Actions executed by these modules is transparent through flow chart, listing, I/O and memory mapping tables enclosed within the chapter. Additionally to avoid duplication the .PRN outputs of the test modules were suppressed. [The XASM85 does provide various switches, could be used in combination, to suppress part of its activity (32)].

i) Calculation of the address of the memory channel corresponding to active cursors, calculation of pointers of routines, calculating Δ V and Δ T between active cursors and calculation of corresponding data pages (Flowchart 4.11).

ii) Division of the software flow to enter into Save Mode, Acquisition + Display Mode, Save-Display Mode.

iii) Character information transfer to display RAM and loading parameter from keyboard. These routine are common and occurs for quite a number of times in the software. In a few cases input is a single key while in a few cases it has two input references. These are tested separately.

iv) Using the default values stored in a reference memory, active slot, pretrigger count, save memory bank are outputed to the respective latches. These routines are also tested.

v) The flow of action sequencer in its various roots is also confirmed. For this purpose the test files were inserted with break points and the hardware interrupt keys on ILCV-2 have been used to trigger the desired interrupt. The interrupt routines were mapped in the address vectors specified by the manufacturer (31).

2) **Testing of Integrated Modules** : A Microprocessor Development System [MDS] like PDC85 is required for this purpose and at present our department does not possess it, therefore testing was to proceed on a modulated software file as indicated above. Further this kind of testing would be meaningful at the time of prototyping. For various reasons discussed in Sec. 3.5 prototyping was not feasible within the M.Phil. tenure. Therefore a modulated file operating only for save mode was prepared and tested. The intention behind selection of save mode for this purpose is obvious. The features accomodable in both the acq + display mode and the save display mode do exist in this mode. Therefore if this mode is tested, the software of remaining modes would be through. Additionally it is worth mentioning that no object code optimisation and redesign efforts are performed on the software at present and are left for the future development.