CHAPTER - 4

CHAPTER - 4

Hardware description in chapter-3 will now become meaningful to the reader to develop an insight of the proposed design. It was rather difficult for us to discuss the integrated view of the VCRQ system designed. But we shall discuss the software in such a manner that an integrated perspective of the system becomes transparent.

The chapter is subdivided into five sections starting from the description of keyboard interface to the details of each measurement module.

4.1 : THE KEYBOARD INTERFACE

Before we discuss details of the interface software let us summarise the overall activity of the keyboard.

The keyboard has seventeen different specific function keys. Table(4.1) provides keys and corresponding codes for these. The keys R,V,C are meant to initiate a mode of measurement. The measurement actually begins after the required parameters are correctly entered. After each parameter entry the ENTER key works as a carriage return. Neverthless, a few parameters could be selected as default parameters also. Upon system enters into a measurement, it would continue in the same mode till a RESET key is pressed.

As far as parameter entry is concerned the parameters are entered in the encoded form, using the numeric & symbol key closures. Each mode of measurement uses a very simple encoding scheme, as far as user is concerned.

CONTROL PORT ADDRESS TABLE : 4.2

Sr.No.	CONTROL PORT	ADDRESS
1]	Measurement-selection port (CTRLPRT1)	04H
2]	HELP Port (CTRLPRT2)	08H
3]	ERROR Port (CTRLPRT3)	0CH
4]	Indicator Port (CTRLPRT4)	10H
5]	TC select Port (CTRLPRT5)	14H
6]	DAC Port (CTRLPRT6)	18H
7]	R-latch Port (CTRLPRTR)	1CH
8]	V-latch Port (CTRLPRTV)	20H
9]	C-latch Port (CTRLPRTC)	24H
10]	8279 command port (CTRLPRT8)	01H
11]	8279 Data Port (CTRLPRT9)	00H
12]	High-byte port (CTRLPRTA)	28H
13]	Low-byte port (CTRLPRTB)	2CH

ERROR-MENU TABLE : 4.3a

Sr.No.	Type of Error	Code
1]	Enter Error	02H
2]	Overrange	01H
3]	Parameter	04H
4]	ERROR clear	00H

INDICATOR-MENU TABLE : 4.3b

Sr.No.	Type of Error	Code
1]	R-measurement	01H
2]	V-measurement	02H
3]	C-measurement	04H
4]	Tanδ-measurement	08H
5]	Freq.-measurement	10H

HELP-MENU TABLE : 4.3c

SR.NO.	TYPE OF HELP	EQUIVALENT CODE
1]	ENTER-Help	01H
2]	Parameter-Help	02H
3]	Fmax-Help	04H
4]	Fmin-Help	08H
5]	Width-Help	10H
6]	DASH-Help	20H
7]	Enter-Parameter Help	03H
8]	Help-clear	00H

We wish to emphasise the software description of the keyboard/Display controller 8279 & the associated components. The device can be invoked either in command mode or data mode. Command mode avails the a set of commands, as per his requirements. Various ways of keyboard entry & display formats are possible. But one thing is important to note here that before sending the data for the required action, the required command word should preceed the data.

In our system we initialise the 8279 with the prescalor adjusted to 31, two key lockout mode for keyboard & 8-character right entry mode for display & OOH as the blanking code for the display during blanking period. The prescalar has been adjusted to 31 because the clock frequency of the microcomputer system is nearly 3.1 MHz & the prescalar divides this frequency by 31 so that the scanning rate is 100kHz. The two key lock-out mode has been selected mainly because the keycodes are the single key code entries at a time. The hardware description of the circuit is already discussed in section 3.6.

The command & data is transferred to the controller chip by setting its correct address (sec 3.6). Another important point to be noted is a set of eight LED's, which indicate the error. These LED's are also useful for the user to takeup next step of action. Table 4.3a, gives types of errors indicated by these LED's.

KEY CODES : 4.1

Sr.No.	Key Type	Code
1]	O-Key (-Key-0)	OOH
2]	1-Key (-key-1)	O1H
3]	2-key (-key-2)	O2H
4]	3-key (-key-3)	O3H
5]	4-key (-key-4)	O4H
6]	Reset (-key-5)	O5H
7]	V-measure (-key-6)	O6H
8]	R-measure (-key-7)	O7H
9]	C-measure (-key-8)	O8H
10]	ENTER (-key-9)	O9H
11]	`——' (-key-10)	OAH
12]	1kHz (-key-11)	OBH
13]	10kHz (-key-12)	OCH
14]	100kHz (-key-13)	ODH
15]	1mHz (-key-14)	OEH
16]	10mHz (-key-15)	OFH
17]	Width-8 steps (-key-16)	10H
18]	17steps (-key-17)	11H
19]	35 steps (-key-18)	12H

4.2 : KEY ENTRY FLOWCHART

The keys and their codes are given in table 4.1.

The first step is to initialize the chip 8279. The command word OOH selects the device 8279 in the keyboard/display format as per the requirements, discussed earlier. The command word 3FH adjusts the prescalar to the base value 31, while the command word COH selects the blanking format for blanking of the display. In our system, an output active low turns off the segment. So OOH is the blanking format used.

Before going to the measurement procedure user has to select the mode of measurement. The measurement mode is selected by using the symbol keys. But unless & until the carriage return (using ENTER key) is pressed the system is not invoked in actual measurement procedure. If the keys other than the carriage return are pressed, the system displays the type of error & also initializes the help to the user for correct action. Also if the key other than function-select key is pressed it indicates the "parameter error" & initiates the help to the user for the correct entry. The selection of type of measurement is carried out by comparing the key pressed with the keycodes of the function keys.

4.3 : V-MEASUREMENT SOFTWARE

As the V-measurement set up is designed around multichannel thermocouple input system, the mode selection of the thermocouple (ref.table 3.4) by the user, is the first part in measurement process. Only numeric key entries

are allowed for thermocouple selection. No default TC mode selection is allowed in this case. If the user attempts to make wrong entry, error routine is initialized to glow the correct error on the LED's.

Upon correct TC selection, the system is invoked for actual measurement procedure. The control words for TC selection are in an array from the base address BADDRTC. From encoded keycodes the correct number of TC mode is determined & is latched in the control port-5 (CTRLPRT5).

We shall discus the software aspects of autoranging (Hardware aspects are already discussed in chapter-3). Autoranging means, to adjust the measurement system in the correct range of the measurand. This is achieved as follows.

We know that the maximum input voltage accepted by the system is 4.096V (for ADC ref.of 2V). So the range corresponding to this particular voltage should be selected first. In otherwords we start with the highest range & step down the ranges until overflow occurs. The overflow is the indication to the autoranger that the input measurand is in the range just above the present range & hence the system steps upward for the in-range. The procedure is so designed that the ADC is always protected from the permanent damage.

As shown in the flowchart, after selecting the highest range if the input value is $4.096 < Vin < 5V$, overrange occurs. Overrange is confirmed by detecting the overflow flag. The system has an access to the overflow flag through the output from the ADC. Overflow flag is read along with

the four MSB's of the ADC, denoted as Hbyte. & then comparing it with the overflow bit. So if overflow occurs in the highest range itself, it is called "OVERRANGE". The system indicates the overrange by glowing the overrange LED. If the overrange occurs in a range, which is not highest range, the range is stepped towards the higher range. If the overflow flag is not set then it will compare the ADC output with the binary value 0190H. If the ADC output is greater than 400 (190H) then it will find itself in-range & call the display routine. On the otherhand if the ADC output is less than 400, then the system will step to the lowerrange. The control words of range switching are accessed from an array at BADDRV knowing the range numbers. Range numbers are indicated in table 3.3.

One important thing to be noted here is, while stepping down the ranges, the system first checks itself, for the lowest range & if it is in the lowest range it will display the answer in the lowest range, as it is. We are going to devote one complete section for the display & binary to BCD conversion. So in the present discussion it is assumed that the answer is displayed in its correct form.

After displaying the answer, the measurement system resumes in the same range & repeats the sequence.

4.4 : R-MEASUREMENT SOFTWARE

On the parallel lines we can discuss the R-measurement software. The "parameter selection" software, as for V-measurement, is not required for R-measurement. The table

3.2b shows the control-word format of R-measurement, for various ranges. The total number of ranges allowed in this measurement is seven with the lowest range, at 40 ohms & the highest at 4-meg ohm,in decades. The ranges vary in decades.

As usual, the highest range of 4mΩ is set initially. The value 4 is of particularly selected because for the range 4 meg ohms, the current source sources 1 microampere current through 4 megohm resistor so as to develop the maximum voltage drop of 4.0 volts across the unknown resistor (in this case 4 megohm).

When the range switches from 4 megohm to 400 kilo ohms, the sourcing current requirement increase by a factor of ten. i.e. 10 micro ampere. For the last range of 4Ohms, it may appear that, the current generator will have to source the current of value one ampere. Although, logically it is true but in this case, we switch the measurement range of the ADC from 0 - ± 4V to 0 - ± 400 mV. In this ADC range, the maximum input voltage of 400 mV will produce the full-scale output. Thus for the lowest range of 4 ohms the sourcing current requirements become 100 mA to produce the full-scale output of 400 mV. That is why we select the last three-ranges of 400Ω, 40Ω & 4Ω, in the ADC range of 0 to ± 400 mV, while the first four ranges are select the ADC range of 0 to ± 4.0 volts (table 3.2b).

The autoranging scheme for R-measurement is similar to that for V-measurement. We a firm that in V-measurement ADC output is checked for overflow flag to switch to the higher

range or the comparision with 400 (0190H) selects the lower range. In R-measurement the same strategy is used, as we are to represent the resistance in terms of the corrosponding voltage itself. The only difference in the autoranging scheme for R-measurement from that of V-measurement scheme is the total number of ranges. In V-measurement we have four ranges, while in R-measurement we have seven ranges. So the base-address for R-measurement BADDRR, has to increment seven times, at the most, to approach the lowest range. The control word format for the R-measurement is shown in table.3.2b.The lower range is stepped by incrementing the bare-address BADDRR, by one. But before stepping down from any range the system always checks that it is not in the last. It it is range, the system displays the answer in the last range itself. While stepping up the system checks whether it is in the highest range or not. If it is in the highest range then the overrange of the reading is indicated. The system displays answer only when it is a in range. After displaying the answer, the system goes back for reading the ADC & displays the in range output.

4.5 : C-MEASUREMENT SOFTWARE

The C-measurement software is subdivided into two groups 1] Parameter Entry Software 2] The measurement software.

1] PARAMETER ENTRY SOFTWARE :

Refer to the flow chart no.4. The required parameters for C-measurement are 1] Selection of the frequency range i.e. minimum frequency range Fmin & maximum frequency range Fmax, of interest 2] Width count, to specify the number of steps, the system should take while sweeping through the frequency range. Both these parameters are either user-selected or these are treated as default parameters by the system. Even the facility is provided to select one parameter as default, while the other parameter as user specified. Every parameter entry is accepted only if there is a carriage return (ENTER key). As shown in the flowchart no.4, initially the system asks for Fmin using the encoded numeric keys or instruct the system to consider it as the default parameter, by pressing the carriage return. Then the system asks for the 2nd & the 3rd parameter Fmax & width count. The entry mode is same as that for Fmin. Upon selecting the width parameter, the system loads the width-decrement count specific to the width count (table 4.4). Upon carriage return the system proceeds for the measurement.

2] MEASUREMENT SOFTWARE :

The parameter values are stored in the memory area allotted for it. The C-measurement is selected by sending a control word (C-select) to the function selector latch. As shown in the flowchart no.5, the measurement starts from the Fmin selected. From table 3.6e, it is apparent that for

each frequency decade the allowed values of capacitance ranges are different. So also the control words for the same capacitance range is different for each frequency decade. Initially the Fcount is selected to decimal 180. FCount at 180 will select the minimum frequency in that decade e.g. 100 Hz, for the frequency range selection of 1kHz (table 4.4). The width count & width decrement count is also appropriately set to sweep the frequency in the frequency range selected. The Fcount value is sent as a word to the D/A converter via latch LS373 (IC21), which in turn provides the sweep voltage to the VCO (XR-205) as already discussed in section 3.7 & 3.7.1. The Crange value (initially Cmax) is passed as a control word to the C-latch IC22. Referring to table.. we find that C-range control word performs two actions. One, selection of the capacitor for setting the free-running frequency of the VCO & second is, the selection of current limit resistance R, for the desired range of frequency & capacitance.

Now the ADC is read by the microcomputer system through the control ports A & B. Control port A (CTRLPRTA) is used to read Highbyte, while CTRLPRTB is used to read the Lowbyte. The Highbyte includes the state of polarity & overflow flag. If overflow is detected, the software checks whether it is highest C-range for the frequency range. If it is the highest Crange, then the system exits out of the C-measurement procedure otherwise the software follows autoranging scheme. If there is no overflow, the system checks whether the underrange conditions. If there exists

possible lower range, it jumps to the lower range. The possibility is checked by comparing the ADC output with the decimal value of 400. If ADC output is greater than the base value it means the system is in range. Before selecting the lower range the system checks itself for the lowest range. If it is the lowest range, the system displays the reading as it is encountered.

If the ADC value is in range the display routine for `C' is initiated. It displays the value of `C' along with its unit. Upon carriage-return the system displays the value of frequency & upon accepting next carriage-return the system displays tanδ value.

During tanδ measurement, the analog multiplexing switch, IC49 connects the tanδ measurement output to the ADC input. As we known in tanδ measurement we measure the inphase component of the complex impedance. After displaying the tanδ value the system waits for the carriage return from the user to resume the measurement procedure. The system first checks the widthcount value (i.e. number of frequency steps in a frequency decade). If the widthcount value has not decremented to zero then next frequency value Fcount is set & the procedure is repeated. If the width count has decremented to zero then the system sets the next frequency range & checks whether it has exceeded the value Fmax specified by the user. If it has exceeded Fmax, it will come out of the measurement procedure otherwise it will set the next frequency range. It determines the appropriate Cmin & Cmax ranges for the next frequency decade & enters

into the measurement procedure again.

4.6 : DISPLAY SOFTWARE

The display software for each of the measurements is discussed separately in this section. The overall structure of the display software includes (1) Binary to BCD conversion (2) BCD to seven segment code conversion (3) Display of the units (4) Display of the answer.

4.6.1 : V & R MEASUREMENT DISPLAY SOFTWARE

The first step is to convert the binary answer from the ADC into an equivalent BCD form. This is achieved as follows. Firstly the binary value is checked for greater than 1000. If it is greater, it is divided by 1000 till it is less than 1000. During division a counter is set. The counter holds BCD3. When the binary value is a hundred's multiple it is divided by 100 till it is less than 100. Again a counter is set to hold BCDO. Then the remainder is divided by 10 using the similar steps & the counter holds the BCD1 while remainder is BCD. These BCD values are called unpacked BCDS. The BCD values are converted to equivalent segment codes & are stored in the memory area reserved for display information.[BUFFLOC]

Depending upon the range, the unit & dot point logic is selected. For exaple in case of V-measurement if the range is 03H, then as shown in table 3.3 it corrosponds to 40mV's range (39.99mV). So the dot appear on the right side of the 2nd digit, while the unit "mV" will appear on the

alphanumeric displays. The dot logic & unit for each range is fixed. So the microcomputer's job is to check the range of the answer of measurement & load the dot logic & unit in the memory area reserved for display information. [BUFFLOC]

The display information is transferred to the display controller using the software routine BUFFOUT which initializes the 8279 in load Display-RAM mode & transfers the display information.

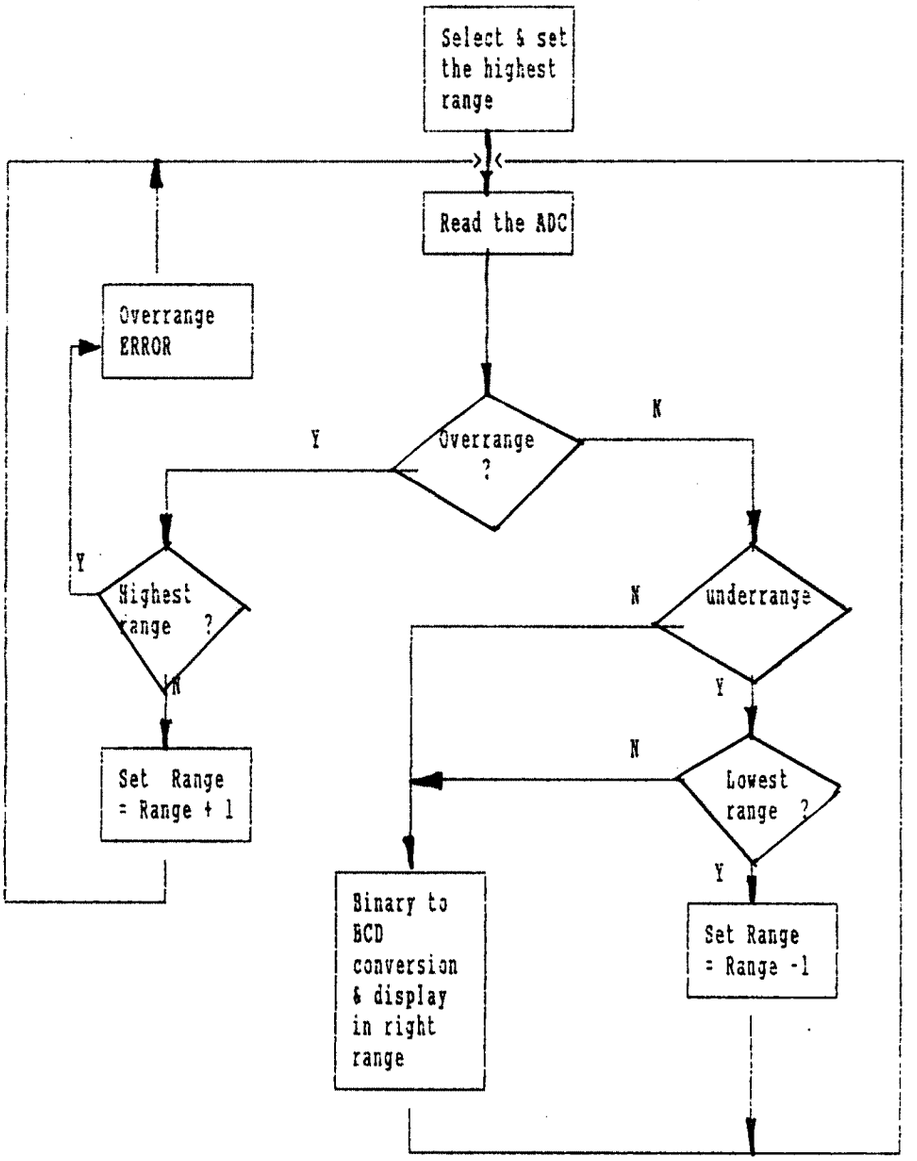
C-MEASUREMENT DISPLAY SOFTWARE

It includes the display softwares for frequency display, capacitance display & tanδ display.

The capacitance display format is similar to that of the V & R measurement display format. For the frequency display, instead of directly displaying the frequency value, the system displays the values of the Frange, the Fcount & the width count. From the display, user can look for the correct value of frequency in the look-up table.... A point to be noted here is that the value of ADC in case of capacitance measurement is corrected to its right BCD form using a lookup table in memory. Instead of calculating the value of capacitor from the ADC value, we have preferred this choice. This would lead to faster capacitance measurement, or infact any other form of reactance value. This point is further discussed in conclusion-section.

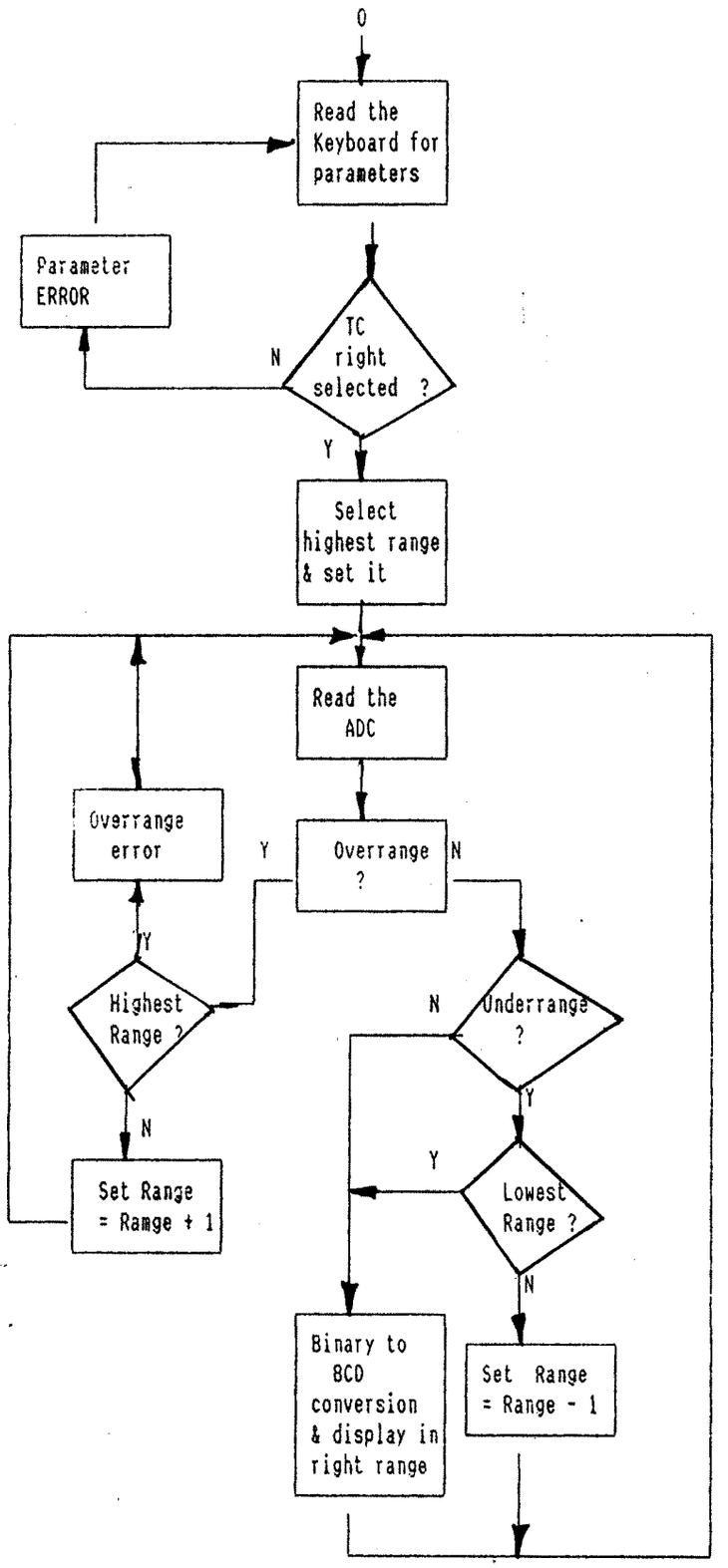
Flow Chart No.2

R-measurement Starts



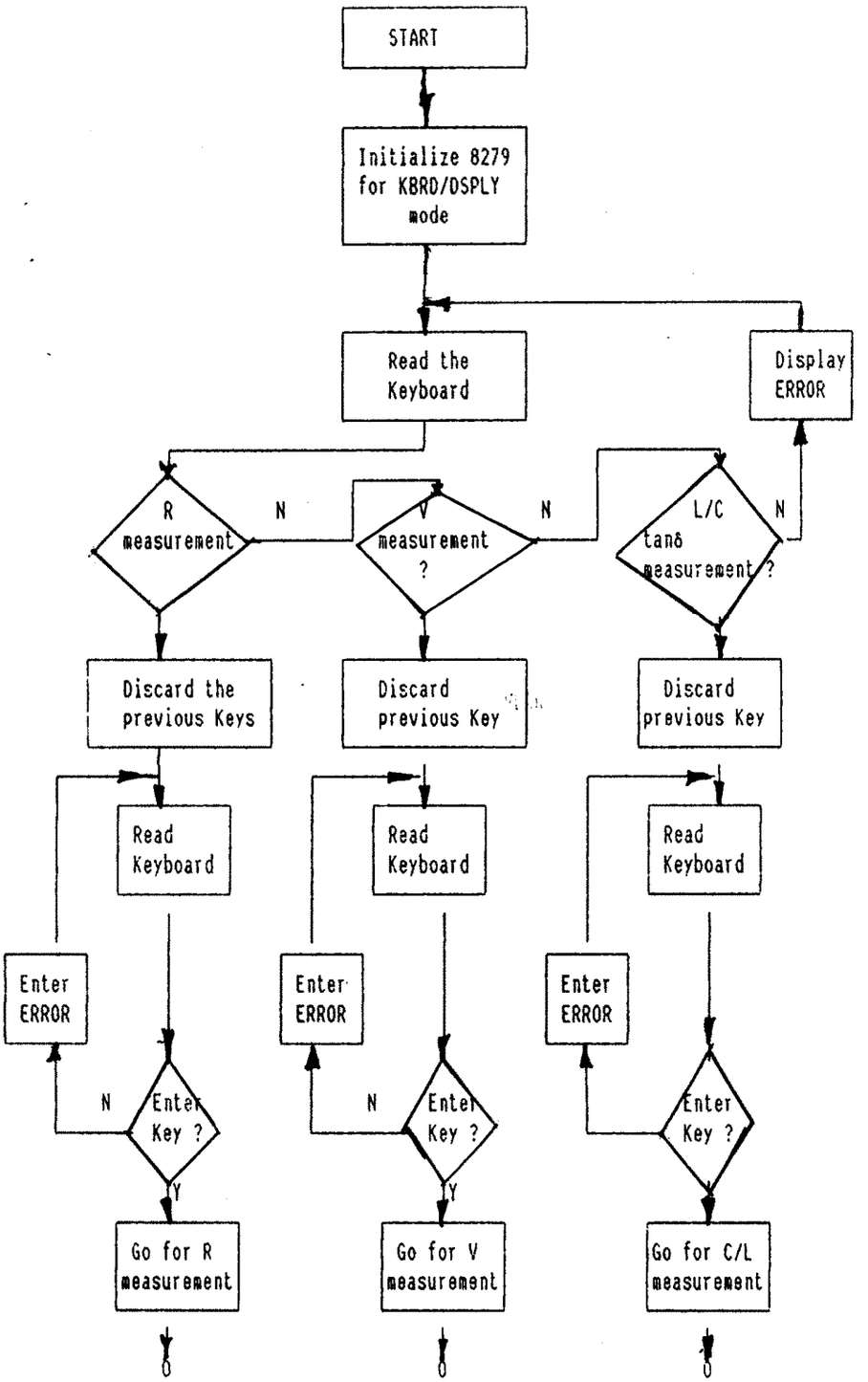
Flow Chart No.3

V-measurement Starts



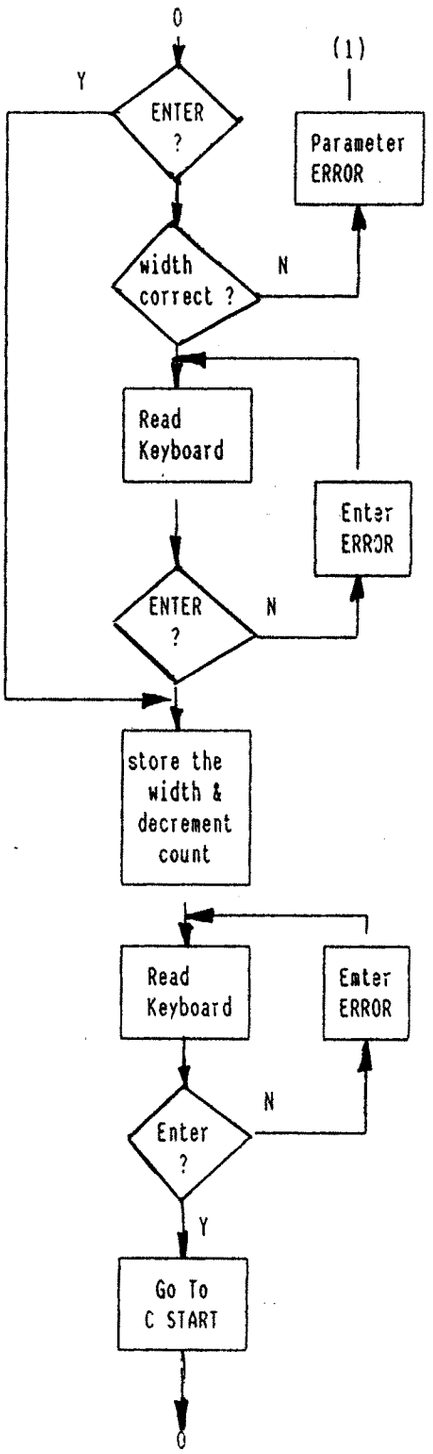
Flow Chart No.1

KEY ENTRY FLOW CHART FOR VLCRQ METER



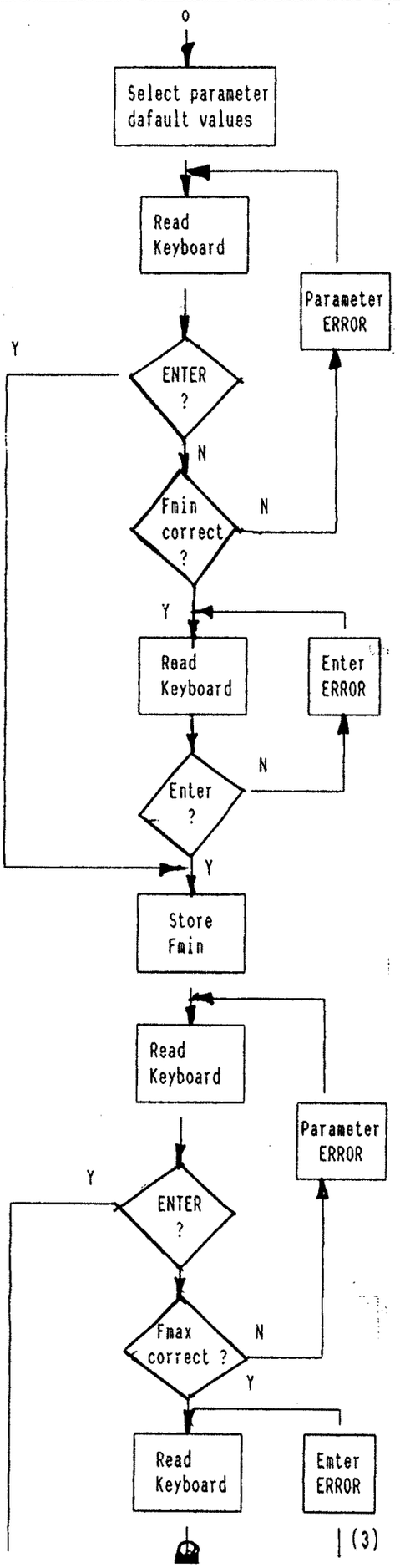
Flow Chart No.4

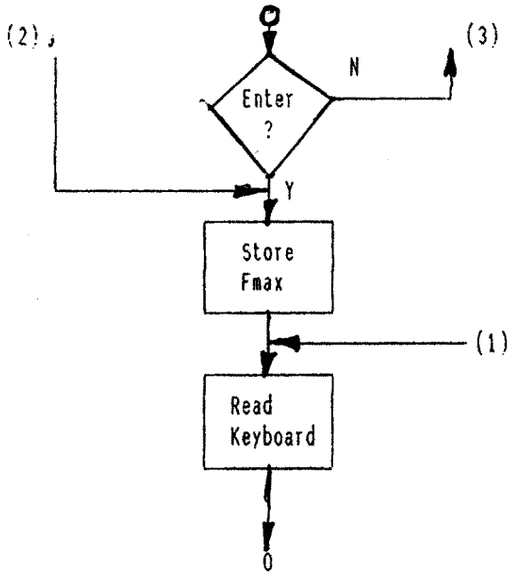
C-measurement



Flow Chart No.4

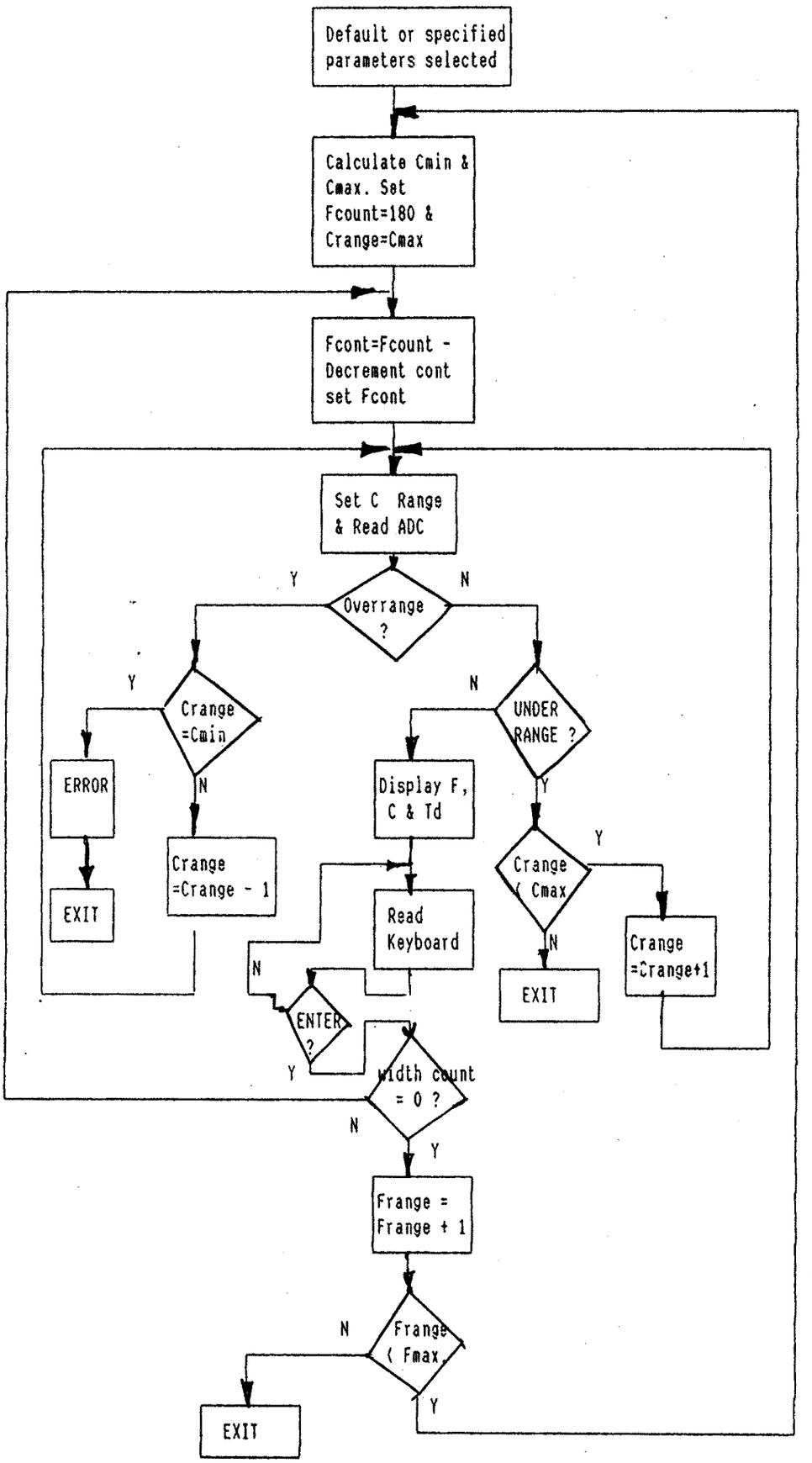
L/C-MEASUREMENT PARAMETERS SELECTION FLOW CHART




(2)
Enter
?
N
(3)
Y
Store
Fmax
(1)
Read
Keyboard
0

Flow Chart No.5

C measurement Starts



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

SOURCE FILE NAME: VLCRQI.ASM

```
                ;MEASUREMENT SYSTEM TO MEASURE THE PARAMETERS
                ;
                ;V, R, C & Td.
                ;
                ;
0001            ENT__HLP:       EQU     01H             ; help  menu
                ;
0002            PARA_HLP:       EQU     02H
                ;
0004            FMAX_HLP:       EQU     04H
                ;
0008            FMIN_HLP:       EQU     08H
                ;
0010            WID__HLP:       EQU     10H
                ;
0020            DASH_HLP:       EQU     20H
                ;
0003            ENPA_HLP:       EQU     03H
                ;
0000            HLP__CLR:       EQU     00H
                ;
                ;                                       ; error  menu
                ;
0002            ENTERR__:       EQU     02H
                ;
0001            OVRERR__:       EQU     01H
                ;
0004            PARAERR_:       EQU     04H
                ;
0000            ERRCLR__:       EQU     00H
                ;                                       ; measurement  ind
                ;
0001            RMEASLED:       EQU     01H
                ;
0002            VMEASLED:       EQU     02H
                ;
0004            CMEASLED:       EQU     04H
                ;
0008            TDMESLED:       EQU     08H
                ;
0010            FMEASLED:       EQU     10H
                ;
                ;                                       ; control  ports
                ;
0026            CTRLPRT1:       EQU     26H     ; selection  port
                ;
0021            CTRLPRT2:       EQU     21H     ; help  port
                ;
                CTRLPRT3:       EQU     20H     ; error  port
                ;
                CTRLPRT4:       EQU     22H     ; indicator  port
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
0023                    CTRLPRT5:       EQU     23H     ; TC  select  port
                        ;
0024                    CTRLPRT6:       EQU     24H     ; DAC  port
0025                    CTRLPRTV:       EQU     25H     ; meas. range & ADC range
                        ;                               ; select port V
                        ;
0000                    CTRLPRTR:       EQU     00H     ; meas. range & ADC range
                        ;                               ; select port R
                        ;
0000                    CTRLPRTC:       EQU     00H     ; meas. range &
                        ;                               ; ADC range portC
                        ;
0019                    CTRLPRT8:       EQU     19H     ; command/status port 8
                        ;
0018                    CTRLPRT9:       EQU     18H     ; data word port 8279
                        ;
0027                    CTRLPRTA:       EQU     27H     ; H_Byte from ADC
                        ;
0028                    CTRLPRTB:       EQU     28H     ; L_Byte from ADC
                        ;
0000                    ___KEY_0:       EQU     00H     ; numeric  keys
                        ;
0001                    ___KEY_1:       EQU     01H
                        ;
0002                    ___KEY_2:       EQU     02H
                        ;
0003                    ___KEY_3:       EQU     03H
                        ;
0004                    ___KEY_4:       EQU     04H
                        ;
0005                    ___KEY_5:       EQU     05H     ; reset  key
                        ;
0006                    ___KEY_6:       EQU     06H     ; V-Measure  key
                        ;
0007                    ___KEY_7:       EQU     07H     ; R-Measure  key
                        ;
0008                    ___KEY_8:       EQU     08H     ; C-Measure  key
                        ;
0009                    ___KEY_9:       EQU     09H     ; Enter  key
                        ;
000A                    __KEY_10:       EQU     0AH     ; " ___ "  key
                        ;
000B                    __KEY_11:       EQU     0BH     ; 1 KHz  parameter
                        ;
000C                    __KEY_12:       EQU     0CH     ; 10 KHz  parameter
                        ;
                        __KEY_13:       EQU     0DH     ; 100 KHz  parameter
                        ;
                        __KEY_14:       EQU     0EH     ; 1 mHz  parameter
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
000F                    __KEY_15:       EQU     0FH  ; 10 MHz  parameter
                        ;
0010                    __KEY_16:       EQU     10H  ; width-8 step
                        ;
0011                    __KEY_17:       EQU     11H  ; width-17 step
                        ;
                        ;
                        ;                            ; measurement  selection
                        ;
0001                    R_SELECT:       EQU     01H  ; control  words
                        ;
0002                    V_SELECT:       EQU     02H
                        ;
0003                    C_SELECT:       EQU     03H
                        ;
0004                    TDSELECT:       EQU     04H
                        ;
FFF8                    CMPLMNT1:       EQU     0FFF8H ; 2's  complement of 10(
                        ;
009C                    CMPLMNT2:       EQU     009CH  ; 2's complement of 100
                        ;
0000                    SEGCODV1:       EQU     00H    ; 7-segment codes to dis
                        ;
0000                    SEGCODV2:       EQU     00H
                        ;
0000                    SEGCODR1:       EQU     00H    ;codes to display Ohm.
                        ;
0000                    SEGCODR2:       EQU     00H
                        ;
0000                    SEGCODF1:       EQU     00H   ; codes to display freq.
                        ;
0000                    SEGCODF2:       EQU     00H
                        ;
0000                    SEGCOD00:       EQU     00H   ; codes to display " 0 "
                        ;
0000                    SEGCOD01:       EQU     00H
                        ;
0000                    SEGCOD10:       EQU     00H   ; codes to display " 1 "
                        ;
0000                    SEGCOD11:       EQU     00H
                        ;
0000                    SEGCOD20:       EQU     00H  ; codes  to  isplay  "2"
                        ;
0000                    SEGCOD21:       EQU     00H
                        ;
0008                    WIDTH__1:       EQU     08H  ; width  count
                        ;
                        WIDTH_2;        EQU     11H
                        ;
                        WIDTH_3;        EQU     23H
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
0014                    DCRCNT_1:       EQU     14H     ; decrement  count
                        ;
000A                    DCRCNT_2:       EQU     0AH
                        ;
0005                    DCRCNT_3:       EQU     05H
                        ;
2000                    RESETLOC:       EQU     2000H   ; on reset jump to
                        ;                                       ;  start of the program
                        ;
0000 00000000           BADDR_TC:       DB      00, 00 , 00 ,00, 00, 00, 00, 00,
000B 00000000                           DB      00 ,00 ,00, 00, 00, 00, 00, 00, C
                        ;
0014 00000000           BADDR__V:       DB      00, 00, 00 ,  00
                        ;
0018 00000000           BADDR__R:       DB      00, 00 ,00 , 00, 00, 00
                        ;
001E 00000000           BADDR__C:       DB      00, 00, 00, 00, 00, 00, 00, 00,
                        ;
002A 00000000           CRNGCWRD:       DB      00, 00, 00, 00, 00, 00, 00, 00
                        ;
0034 00000000                           DB      00, 00, 00, 00, 00, 00, 00, 00,
                        ;
003E 00000000                           DB      00, 00, 00, 00, 00, 00, 00, 00,
                        ;
0048 0000                               DB      00, 00
                        ;
004A 00000000           LOOK_TAB:       DB      00, 00, 00, 00, 00, 00, 00, 00,
                        ;
0054                    BADDRROM:       DS      4096H
                        ;
0054                    BUFFLOC:        DS      08H
                        ;
0054                    TEMPLOC:        DS      07H
                        ;
005B                    DFALTLOC:       DS      04H
                        ;
005F 0000               UNIT1:          DB      00,00           ; Blank  Codes
                        ;
0061 0000               UNIT2:          DB      00,00
                        ;
0063 0000               UNIT3:          DB      00,00
                        ;
0065 0000               UNIT4:          DB      00,00
                        ;
0067 0000               UNIT5:          DB      00,00
                        ;
                        CRNG1 :         DB      00,00,00,00
                        ;
                        CRNG2 :         DB      00,00,00,00
```

```
AVOCET SYSTEMS 8085/Z80 ASSEMBLER -  VERSION 1.05M  SERIAL #00364
SOURCE FILE NAME: VLCRQI.ASM

                        ;
0071 00000000           CRNG3:          DB      00,00,00,00
                        ;
0075 00000000           TDUNIT:         DB      00,00,00,00     ; Blank  Codes
                        ;
0079                                    DS      100
                        ;
00DD                    STACKPTR:       DS      00H
                        ;
00DD C30020                             JMP     RESETLOC        ; go to origin of
                        ;                                        the measurement prog
                        ;
                        ;
                        ;
00E0                    ORG   2000H
                        ;
                        ;MEASUREMENT  ROUTINE
                        ;
                        ; LABEL          OPCODE    OPERAND             COMMENTS
                        ;
00E0 31DD00                             LXI       SP,STACKPTR
                        ;
00E3 AF                                 XRA       A
                        ;
00E4 D319                               OUT       CTRLPRT8
                        ;
00E6 3E3F                               MVI       A,3FH
                        ;
00E8 D319                               OUT       CTRLPRT8
                        ;
00EA 3EC0                               MVI       A,0C0H
                        ;
00EC D319                               OUT       CTRLPRT8
                        ;
00EE 3E02               START:          MVI       A,PARA_HLP
                        ;
00F0 D321                               OUT       CTRLPRT2
                        ;
00F2 DB18               KYCHK:          IN        CTRLPRT9
                        ;
00F4 E601                               ANI       01H
                        ;
00F6 CAF200                             JZ        KYCHK
                        ;
00F9 3E40                               MVI       A,40H
                        ;
00FB D319                               OUT       CTRLPRT8
                        ;
                                        IN        CTRLPRT9
                                        ANI       3FH
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                ;
0101 FE06                       CPI     ___KEY_6
                ;
0103 CA1701                     JZ      VMEASURE
                ;
0106 FE07                       CPI     ___KEY_7
                ;
0108 CA5D02                     JZ      RMEASURE
                ;
010B FE08                       CPI     ___KEY_8
                ;
010D CAC803                     JZ      CMEASURE
                ;
0110 3E04                       MVI     A,PARAERR_
                ;
0112 D320                       OUT     CTRLPRT3
0114 C3F200                     JMP     KYCHK
                ;
                ;-----------------------------------------------------
                ;
                ;VMEASUREMENT  STARTS
                ;
0117 3E01       VMEASURE:               MVI     A,ENT__HLP
                ;
0119 D321                       OUT     CTRLPRT2
                ;
011B DB19       KYCHK0:                 IN      CTRLPRT8
                ;
011D E601                       ANI     01H
                ;
011F CA1B01                     JZ      KYCHK0
                ;
0122 3E40                       MVI     A,40H
                ;
0124 D319                       OUT     CTRLPRT8
                ;
0126 DB18                       IN      CTRLPRT9
                ;
0128 E63F                       ANI     3FH
                ;
012A FE09                       CPI     ___KEY_9
                ;
012C CA3601                     JZ      KYCHK1
                ;
012F 3E02                       MVI     A,ENTERR__
                ;
0131 D320                       OUT     CTRLPRT3
                ;
                                jmp     KYCHK0
                ;
                KYCHK1:                 mvi     A,ERRCLR__
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
0138 D320               OUT     CTRLPRT3
                        ;
013A 3E02               MVI     A,PARA_HLP
                        ;
013C D321               OUT     CTRLPRT2
                        ;
013E 3E02               MVI     A,VMEASLED
                        ;
0140 D322               OUT     CTRLPRT4
                        ;
0142 DB19       KYCHK2: IN      CTRLPRT8
                        ;
0144 E601               ANI     01H
                        ;
0146 CA4201             JZ      KYCHK2
                        ;
0149 3E40               MVI     A,40H
                        ;
                        ;
014B DB18               IN      CTRLPRT9
                        ;
014D E63F               ANI     3FH
                        ;
014F FE01               CPI     01H
                        ;
0151 F25B01             JP      KYCHK3
                        ;
0154 3E04       ERROR1: MVI     A,PARAERR_
                        ;
0156 D320               OUT     CTRLPRT3
                        ;
0158 C34201             JMP     KYCHK2
                        ;
015B FE05       KYCHK3: CPI     05H
                        ;
015D FA6301             JM      KYCHK4
                        ;
0160 C35401             JMP     ERROR1
                        ;
0163 87         KYCHK4: ADD     A
                        ;
0164 87                 ADD     A
                        ;
0165 47                 MOV     B,A
                        ;
0166 3E00               MVI     A,ERRCLR__
                        ;
                        OUT     CTRLPRT3
                        MVI     A,DASH_HLP
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
016C D321               OUT     CTRLPRT2
                        ;
016E DB19       KYCHK5: IN      CTRLPRT8
                        ;
0170 E601               ANI     01H
                        ;
0172 CA6E01             JZ      KYCHK5
                        ;
0175 3E40               MVI     A,40H
                        ;
0177 D319               OUT     CTRLPRT8
                        ;
0179 DB18               IN      CTRLPRT9
                        ;
017B E63F               ANI     3FH
                        ;
017D FE0A               CPI     __KEY_10
                        ;
017F CA8901             JZ      KYCHK6
                        ;
0182 3E04               MVI     A,PARAERR_
0184 D320               OUT     CTRLPRT3
                        ;
0186 C36E01             JMP     KYCHK5
                        ;
0189 3E00       KYCHK6: MVI     A,ERRCLR__
                        ;
018B D320               OUT     CTRLPRT3
                        ;
018D 3E02               MVI     A,PARA_HLP
                        ;
018F D321               OUT     CTRLPRT2
                        ;
0191 DB19       CHECK6: IN      CTRLPRT8
                        ;
0193 E601               ANI     01H
                        ;
0195 CA9101             JZ      CHECK6
                        ;
0198 3E40               MVI     A,40H
                        ;
019A D319               OUT     CTRLPRT8
                        ;
019C DB18               IN      CTRLPRT9
                        ;
019E E63F               ANI     3FH
                        ;
                        CPI     01H
                        JP      KYCHK7
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
01A5 3E04       ERROR2: ;               MVI     A,PARAERR_
01A7 D320               ;               OUT     CTRLPRT3
01A9 C39101             ;               JMP     CHECK6
                        ;
01AC FE05       KYCHK7: ;               CPI     05H
01AE FAB401             ;               JM      AHEAD
01B1 C3A501             ;               JMP     ERROR2
                        ;
01B4 80         AHEAD:  ;               ADD     B
01B5 210000             ;               LXI     H,BADDR_TC
01B8 85                 ;               ADD     L
01B9 6F                 ;               MOV     L,A
01BA 7E                 ;               MOV     A,M
01BB D323               ;               OUT     CTRLPRT5
                        ;
                        ;
01BD D326               ;               OUT     CTRLPRT1
01BF 3E00               ;               MVI     A,ERRCLR__
01C1 D320               ;               OUT     CTRLPRT3
01C3 211400             ;               LXI     H,BADDR__V
                        ;
01C6 7E         NXTRNG: ;               MOV     A,M
01C7 D325               ;               OUT     CTRLPRTV
                        ;
01C9 DB28       ADCIN:  ;               IN      CTRLPRTB
01CB 4F                 ;               MOV     C,A
01CC DB27               ;               IN      CTRLPRTA
01CE 47                 ;               MOV     B,A
01CF E610               ;               ANI     10H
                        ;               JZ      CHKUNDR
                                        mov     A,L
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
01D5 FE00               ;                       CPI     00H
                        ;
01D7 C2DF01             ;                       JNZ     CHNGRNG
                        ;
01DA 3E01               ;                       MVI     A,OVRERR__
                        ;
01DC C3C901             ;                       JMP     ADCIN
                        ;
01DF 2D                 CHNGRNG:                DCR     L
                        ;
01E0 C3C601             ;                       JMP     NXTRNG
                        ;
01E3 79                 CHKUNDR:                MOV     A,C
                        ;
01E4 FEE8               ;                       CPI     0E8H
                        ;
01E6 F2F401             ;                       JP      CHKMSB1
                        ;
01E9 78                 ;                       MOV     A,B
                        ;
01EA E60F               ;                       ANI     0FH
                        ;
01EC FE04               ;                       CPI     04H
                        ;
01EE F20602             ;                       JP      INRNG
                        ;
01F1 C3FC01             ;                       JMP     LWRRNG
01F4 78                 CHKMSB1:                MOV     A,B
                        ;
01F5 E60F               ;                       ANI     0FH
                        ;
01F7 FE03               ;                       CPI     03H
                        ;
01F9 F20602             ;                       JP      INRNG
                        ;
01FC 7D                 LWRRNG:                 MOV     A,L
                        ;
01FD FE03               ;                       CPI     03H
                        ;
01FF CA0602             ;                       JZ      INRNG
                        ;
0202 2C                 ;                       INR     L
                        ;
0203 C3C601             ;                       JMP     NXTRNG
                        ;
0206 78                 INRNG:                  MOV     A,B
                        ;
                                                ANI     0FH
                                                STA     TEMPLOC+6
```

AVOCET SYSTEMS 8085/Z80 ASSEMBLER - VERSION 1.05M SERIAL #00364
SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
020C 79                 ;                       MOV     A,C
                        ;
020D 325900             ;                       STA     TEMPLOC+5
                        ;
0210 CD1602             ;                       CALL    VDISPLAY
                        ;
0213 C3C901             ;                       JMP     ADCIN
                        ;
0216 E5         VDISPLAY:                       PUSH    H
                        ;
0217 CD5203             ;                       CALL    BCDCNVRT
                        ;
021A 215B00             ;                       LXI     H,BUFFLOC+7
                        ;
021D 3E00               ;                       MVI     A,SEGCODV1
                        ;
021F 77                 ;                       MOV     M,A
                        ;
0220 23                 ;                       INX     H
                        ;
0221 3E00               ;                       MVI     A,SEGCODV2
                        ;
0223 77                 ;                       MOV     M,A
                        ;
0224 E1                 ;                       POP     H
                        ;
0225 E5                 ;                       PUSH    H
                        ;
0226 7D                 ;                       MOV     A,L
                        ;
                        ;
0227 CA3C02             ;                       JZ      LDRNG1
                        ;
022A FE01               ;                       CPI     01H
                        ;
022C CA4502             ;                       JZ      LDRNG2
                        ;
022F FE02               ;                       CPI     02H
                        ;
0231 CA4E02             ;                       JZ      LDRNG3
                        ;
0234 FE03               ;                       CPI     03H
                        ;
0236 CA5702             ;                       JZ      LDRNG4
                        ;
0239 C3C601             ;                       JMP     NXTRNG
                        ;
                LDRNG1:                         LXI     D,UNIT1
                                                LXI     H,BUFFLOC
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
0242 C34603             ;                       JMP     ACTION
                        ;
0245 116100     LDRNG2: ;                       LXI     D,UNIT2
                        ;
0248 215600             ;                       LXI     H,BUFFLOC+2
                        ;
024B C34603             ;                       JMP     ACTION
                        ;
024E 116100     LDRNG3: ;                       LXI     D,UNIT2
                        ;
0251 215500             ;                       LXI     H,BUFFLOC+1
                        ;
0254 C34603             ;                       JMP     ACTION
                        ;
0257 116100     LDRNG4: ;                       LXI     D,UNIT2
                        ;
025A 210000             ;                       LXI     H,BUFFLOC
                        ;
025C C34603             ;                       JMP     ACTION
                        ;
                        ;RMEASUREMENT STARTS HERE
                        ;
025D 3E01       RMEASURE:                       MVI     A,ENT__HLP
                        ;
025F D321               ;                       OUT     CTRLPRT2
                        ;
0261 DB08       CHKKY1: ;                       IN      CTRLPRT8
                        ;
0262 E601               ;                       ANI     01H
                        ;
0263 CA6102             ;                       JZ      CHKKY1
                        ;
0266 3E40               ;                       MVI     A,40H
0268 D319               ;                       OUT     CTRLPRT8
                        ;
026A DB18               ;                       IN      CTRLPRT9
                        ;
026C E63F               ;                       ANI     3FH
                        ;
026E FE09               ;                       CPI     ___KEY_9
                        ;
0270 CA7A02             ;                       JZ      AHEAD1
                        ;
0273 3E02               ;                       MVI     A,ENTERR__
                        ;
0275 D320               ;                       OUT     CTRLPRT3
                        ;
                        ;                       JMP     CHKKY1
                        ;
                        AHEAD1:                 MVI     A,RMEASLED
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
027C D304               ;                       OUT     CTRLPRT4
                        ;
027D 3E01               ;                       MVI     A,R_SELECT
                        ;
027E D326               ;                       OUT     CTRLPRT1
                        ;
0280 3E00               ;                       MVI     A,HLP__CLR
                        ;
0282 D321               ;                       OUT     CTRLPRT2
                        ;
0284 3E00               ;                       MVI     A,ERRCLR__
                        ;
0286 D320               ;                       OUT     CTRLPRT3
                        ;
0288 211800             ;                       LXI     H,BADDR__R
                        ;
028B 7E                 NXTRNG1:                MOV     A,M
                        ;
028C D300               ;                       OUT     CTRLPRTR
                        ;
028E DB28               ADCIN1:                 IN      CTRLPRTB
                        ;
0290 4F                 ;                       MOV     C,A
                        ;
0291 DB27               ;                       IN      CTRLPRTA
                        ;
0293 47                 ;                       MOV     B,A
                        ;
0294 E610               ;                       ANI     10H
                        ;
0296 CAA702             ;                       JZ      CHKUNDR1
                        ;
0299 7D                 ;                       MOV     A,L
                        ;
029A FE00               ;                       CPI     00H
                        ;
                        ;
029C 3E01               ;                       MVI     A,OVRERR__
                        ;
029E D320               ;                       OUT     CTRLPRT3
                        ;
02A0 C38E02             ;                       JMP     ADCIN1
                        ;
02A3 2D                 CHNGRNG1:               DCR     L
                        ;
02A4 C38B02             ;                       JMP     NXTRNG1
                        ;
                        CHKUNDR1:               mov     A,C
                                                CPI     0E8H
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
02A9 F2B702             ;                       JP      CHKMSB2
                        ;
02AC 78                 ;                       MOV     A,B
                        ;
02AD E60F               ;                       ANI     0FH
                        ;
02AF FE04               ;                       CPI     04H
                        ;
02B1 F2C602             ;                       JP      INRNG1
                        ;
02B4 C3BC02             ;                       JMP     LWRRNG1
                        ;
02B7 78                 CHKMSB2:                MOV     A,B
                        ;
02B8 E60F               ;                       ANI     0FH
                        ;
02BA FE03               ;                       CPI     03H
                        ;
02BC CAC602             ;                       JP      INRNG1
                        ;
02BC 7D                 LWRRNG1:                MOV     A,L
                        ;
02BD E606               ;                       ANI     06H
                        ;
02BF CAC602             ;                       JZ      INRNG1
                        ;
02C2 2C                 ;                       INR     L
                        ;
02C3 C38B02             ;                       JMP     NXTRNG1
                        ;
02C6 78                 INRNG1:                 MOV     A,B
                        ;
02C7 E60F               ;                       ANI     0FH
                        ;
02C9 325A00             ;                       STA     TEMPLOC+6
                        ;
02CC 79                 ;                       MOV     A,C
                        ;
02CD 325900             ;                       STA     TEMPLOC+5
02D0 CDD602             ;                       CALL    RDISPLAY
                        ;
02D3 C38E02             ;                       JMP     ADCIN1
                        ;
02D6 E5                 RDISPLAY:               PUSH    H
                        ;
02D7 CD5203             ;                       CALL    BCDCNVRT

                                                LXI     H,BUFFLOC+7
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
02DD 3E00                       MVI     A,SEGCODR1
                        ;
02DF 77                         MOV     M,A
                        ;
02E0 23                         INX     H
                        ;
02E1 3E00                       MVI     A,SEGCODR2
                        ;
02E3 77                         MOV     M,A
                        ;
02E4 E1                         POP     H
                        ;
02E5 E5                         PUSH    H
                        ;
02E6 7D                         MOV     A,L
                        ;
02E7 E60F                       ANI     0FH
                        ;
02E9 CA3D03                     JZ      LDRNG11
                        ;
02EC FE01                       CPI     01H
                        ;
02EE CA3403                     JZ      LDRNG10
                        ;
02F1 FE02                       CPI     02H
                        ;
02F3 CA2B03                     JZ      LDRNG9
                        ;
02F6 FE03                       CPI     03H
                        ;
02F8 CA2203                     JZ      LDRNG8
                        ;
02FB FE04                       CPI     04H
                        ;
02FD CA1903                     JZ      LDRNG7
                        ;
0300 FE05                       CPI     05H
                        ;
0302 CA1003                     JZ      LDRNG6
                        ;
0305 FE06                       CPI     06H
                        ;
0306 CA0000                     JZ      LDRNG5
                        ;
                        ;
030A 215400                     LXI     H,BUFFLOC
                        ;
030D C34603                     JMP     ACTION
                        ;
                        LDRNG6:         LXI     [illegible]
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
0313 215500                     LXI     H,BUFFLOC+1
                        ;
0316 C34603                     JMP     ACTION
                        ;
0319 116700     LDRNG7:         LXI     D,UNIT5
                        ;
031C 215600                     LXI     H,BUFFLOC+2
                        ;
031F C34603                     JMP     ACTION
                        ;
0322 116500     LDRNG8:         LXI     D,UNIT4
                        ;
0325 215400                     LXI     H,BUFFLOC
                        ;
0328 C34603                     JMP     ACTION
                        ;
032B 116500     LDRNG9:         LXI     D,UNIT4
                        ;
032E 215500                     LXI     H,BUFFLOC+1
                        ;
0331 C34603                     JMP     ACTION
                        ;
0334 116500     LDRNG10:        LXI     D,UNIT4
                        ;
0337 215600                     LXI     H,BUFFLOC+2
                        ;
033A C34603                     JMP     ACTION
                        ;
033D 116300     LDRNG11:        LXI     D,UNIT3
                        ;
0340 215400                     LXI     H,BUFFLOC
                        ;
0343 C34603                     JMP     ACTION
                        ;
0346 3E01       ACTION:         MVI     A,01H
                        ;
0348 B6                         ORA     M
                        ;
0349 77                         MOV     M,A
                        ;
034A CDA603                     CALL    UNITDSP
                        ;
034D CDB603                     CALL    BUFFOUT
                        ;
0350 E1                         POP     H
                        ;
0351 C9                         RET
0352 2A5900     BCDCNVRT:       LHLD    TEMPLOC+5
                                LXI     D,(illegible)
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
0358 0E00                ;
035A 19          THOUSND:
                         ;
035B D26203              JNC     ADJUST1
                         ;
035E 0C                  INR     C
                         ;
035F C35A03              JMP     THOUSND
                         ;
0362 11E803      ADJUST1:
                         ;
0365 19                  DAD     D
                         ;
0366 79                  MOV     A,C
                         ;
0367 325400              STA     BUFFLOC
                         ;
036A 119C00              LXI     D,CMPLMNT2
                         ;
036D 0E00                MVI     C,00H
                         ;
036F 19          HUNDRED:
                         ;
0370 D27703              JNC     ADJUST2
                         ;
0373 0C                  INR     C
                         ;
0374 C36F03              JMP     HUNDRED
                         ;
0377 116400      ADJUST2:
                         ;
037A 19                  DAD     D
                         ;
037B 79                  MOV     A,C
                         ;
037C 325500              STA     BUFFLOC+1
                         ;
037F 7D                  MOV     A,L
                         ;
0380 0E00                MVI     C,00H
                         ;
0382 FE0A        TENS:
                         ;
0384 FA8A03              JM      ZEROS
                         ;
0387 0C                  INR     C
                         ;
                         SUI     0AH
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
038A 325700     ZEROS:
                ;
038D 79                                 MOV     A,C
                ;
038E 325600                             STA     BUFFLOC+2
                ;
0391 115400                             LXI     D,BUFFLOC
                ;
0394 214A00                             LXI     H,LOOK_TAB
                ;
0397 0E04                               MVI     C,04H
                ;
0399 E5         CNVRT:
                ;
039A 1A                                 LDAX    D
                ;
039B 85                                 ADD     L
                ;
039C 6F                                 MOV     L,A
                ;
039D 7E                                 MOV     A,M
                ;
039E 12                                 STAX    D
                ;
039F 13                                 INX     D
                ;
03A0 E1                                 POP     H
                ;
03A1 0D                                 DCR     C
                ;
03A2 C29903                             JNZ     CNVRT
                ;
03A5 C9                                 RET
                ;
03A6 0602       UNITDSP:                MVI     B,02H
                ;
03A8 215800                             LXI     H,BUFFLOC+4
                ;
03AB EB         AGAIN:                  XCHG
                ;
03AC 7E                                 MOV     A,M
                ;
03AD EB                                 XCHG
                ;
03AE 77                                 MOV     M,A
                ;
03AF 13                                 INX     D
                ;
                                        INX     H
                                        DCR     B
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
03B2 C2AB03                             JNZ     AGAIN
03B5 C9                                 RET
                        ;
03B6 3E90       BUFFOUT:                MVI     A,90H
                        ;
03B8 D319                               OUT     CTRLPRT8
                        ;
03BA 0606                               MVI     B,06H
                        ;
03BC 215400                             LXI     H,BUFFLOC
                        ;
03BF 7E         NEXT:                   MOV     A,M
                        ;
03C0 D318                               OUT     CTRLPRT9
                        ;
03C2 23                                 INX     H
                        ;
03C3 05                                 DCR     B
                        ;
03C4 C2BF03                             JNZ     NEXT
                        ;
03C7 C9                                 RET
                        ;
                        ;-----------------------------------------------
                        ;
                        ;C_MEASUREMENTE STARTS
                        ;
03C8 3E04       CMEASURE:               MVI     A,CMEASLED
                        ;
03CA D322                               OUT     CTRLPRT4
                        ;
03CC 3E00       START2:                 MVI     A,00H
                        ;
03CE 325B00                             STA     DFALTLOC
                        ;
03D1 3E04                               MVI     A,04H
                        ;
03D3 325C00                             STA     DFALTLOC+1
                        ;
03D6 3E08                               MVI     A,08H
                        ;
03D8 325D00                             STA     DFALTLOC+2
                        ;
03DB 3E14                               MVI     A,14H
                        ;
03DD 325E00                             STA     DFALTLOC+3
                        ;
                                        MVI     A,EMT_HLP
                                        OUT     CTRLPRT2
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
03E4 DB19       RDKBRD1:                IN      CTRLPRT8
                        ;
03E6 E601                               ANI     01H
                        ;
                        ;
03E8 3E40                               MVI     A,40H
                        ;
03EA D319                               OUT     CTRLPRT8
                        ;
03EC DB18                               IN      CTRLPRT9
                        ;
03EE E63F                               ANI     3FH
                        ;
03F0 FE09                               CPI     ___KEY_9
                        ;
03F2 CA1A04                             JZ      PULLUP1
                        ;
03F5 FE0B                               CPI     __KEY_11
                        ;
03F7 CA1504                             JZ      SAVE1
                        ;
03FA FE0C                               CPI     __KEY_12
                        ;
03FC CA1504                             JZ      SAVE1
                        ;
03FF FE0F                               CPI     __KEY_15
                        ;
0401 CA1504                             JZ      SAVE1
                        ;
0404 FE0D                               CPI     __KEY_13
                        ;
0406 CA1504                             JZ      SAVE1
                        ;
0409 FE0E                               CPI     __KEY_14
                        ;
040B CA1504                             JZ      SAVE1
                        ;
040E 3E04                               MVI     A,PARAERR_
                        ;
0410 D320                               OUT     CTRLPRT3
                        ;
0412 C3E403                             JMP     RDKBRD1
                        ;
0415 D60B       SAVE1:                  SUI     0BH
                        ;
0417 325B00                             STA     DFALTLOC
                        ;
                PULLUP1:                mvi     A, ERRCLR__
                                        OUT     CTRLPRT3
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
041E 3E01                                   MVI     A,ENT__HLP
                        ;
0420 D321                                   OUT     CTRLPRT2
                        ;
0422 DB19               RDKBRD2:            IN      CTRLPRT8
                        ;
0424 E601                                   ANI     01H
0426 CA2204                                 JZ      RDKBRD2
                        ;
0429 3E40                                   MVI     A,40H
                        ;
042B D319                                   OUT     CTRLPRT8
                        ;
042D DB18                                   IN      CTRLPRT9
                        ;
042F E63F                                   ANI     3FH
                        ;
0431 FE09                                   CPI     ___KEY_9
                        ;
0433 CA3D04                                 JZ      AGAIN1
                        ;
0436 3E02                                   MVI     A,ENTERR__
                        ;
0438 D320                                   OUT     CTRLPRT3
                        ;
043A C32204                                 JMP     RDKBRD2
                        ;
043D 3E00               AGAIN1:             MVI     A,ERRCLR__
                        ;
043F D320                                   OUT     CTRLPRT3
                        ;
0441 3E02                                   MVI     A,PARA_HLP
                        ;
0443 D321                                   OUT     CTRLPRT2
                        ;
0445 DB19               RDKBRD3:            IN      CTRLPRT8
                        ;
0447 E601                                   ANI     01H
                        ;
0449 CA4504                                 JZ      RDKBRD3
                        ;
044C 3E40                                   MVI     A,40H
                        ;
044E D319                                   OUT     CTRLPRT8
                        ;
0450 DB18                                   IN      CTRLPRT9
                        ;
                                            ANI     3FH
                                            CPI     __KEY_9
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
0456 CA8804             ;                       JZ      PULLUP2
                        ;
0459 FE0B               ;                       CPI     __KEY_11
                        ;
045B CA7704             ;                       JZ      SAVE2
                        ;
045E FE0C               ;                       CPI     __KEY_12
                        ;
0460 CA7704             ;                       JZ      SAVE2
                        ;
                        ;
0463 CA7704             ;                       JZ      SAVE2
                        ;
0466 FE0E               ;                       CPI     __KEY_14
                        ;
0468 CA7704             ;                       JZ      SAVE2
                        ;
046B FE0F               ;                       CPI     __KEY_15
                        ;
046D CA7704             ;                       JZ      SAVE2
                        ;
0470 3E04               ;                       MVI     A,PARAERR_
                        ;
0472 D320               ;                       OUT     CTRLPRT3
                        ;
0474 C34504             ;                       JMP     RDKBRD3
                        ;
0477 D60B               SAVE2:                  SUI     0BH
                        ;
0479 4F                 ;                       MOV     C,A
                        ;
047A 3A5B00             ;                       LDA     DFALTLOC
                        ;
047D B9                 ;                       CMP     C
                        ;
047E FA8404             ;                       JM      NEXT1
                        ;
0481 C3CC03             ;                       JMP     START2
                        ;
0484 79                 NEXT1:                  MOV     A,C
                        ;
0485 325C00             ;                       STA     DFALTLOC+1
                        ;
0488 3E00               PULLUP2:                MVI     A,ERRCLR__
                        ;
048A D320               ;                       OUT     CTRLPRT3
                        ;
                                                MVI     A, ENT_HLP
                                                OUT     CTRLPRT2
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
0490 DB19       RDKBRD4:                IN      CTRLPRT8
                        ;
0492 E601                               ANI     01H
                        ;
0494 CA9004                             JZ      RDKBRD4
                        ;
0497 3E40                               MVI     A,40H
                        ;
0499 D319                               OUT     CTRLPRT8
                        ;
049B DB18                               IN      CTRLPRT9
                        ;
049D E63F                               ANI     3FH
049F FE09                               CPI     ___KEY_9
                        ;
04A1 CAAB04                             JZ      AGAIN2
                        ;
04A4 3E02                               MVI     A,ENTERR__
                        ;
04A6 D320                               OUT     CTRLPRT3
                        ;
04A8 C39004                             JMP     RDKBRD4
                        ;
04AB 3E00       AGAIN2:                 MVI     A,ERRCLR__
                        ;
04AD D320                               OUT     CTRLPRT3
                        ;
04AF 3E02                               MVI     A,PARA_HLP
                        ;
04B1 D321                               OUT     CTRLPRT2
                        ;
04B3 DB19       RDKBRD5:                IN      CTRLPRT8
                        ;
04B5 E601                               ANI     01H
                        ;
04B7 CAB304                             JZ      RDKBRD5
                        ;
04BA 3E40                               MVI     A,40H
                        ;
04BC D319                               OUT     CTRLPRT8
                        ;
04BE DB18                               IN      CTRLPRT9
                        ;
04C0 E63F                               ANI     3FH
                        ;
04C2 FE09                               CPI     ___KEY_9
                        ;
                                        JZ      POLLOP3
                                        CPI     __KEY_16
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
04C9 CA0000             ;                       JZ      SAVE3
                        ;
04CC FE11               ;                       CPI     __KEY_17
                        ;
04CE CAEC04             ;                       JZ      SAVE4
                        ;
04D1 FE00               ;                       CPI     __KEY_18
                        ;
04D3 CAFD04             ;                       JZ      SAVE5
                        ;
04D6 3E04               ;                       MVI     A,PARAERR_
                        ;
04D8 D320               ;                       OUT     CTRLPRT3
                        ;
04DA C3B304             ;                       JMP     RDKBRD5
                        ;
                        ;
04DD D303               ;                       OUT     CTRLPRT3
                        ;
04DF 3E08               ;                       MVI     A,WIDTH__1
                        ;
04E1 325D00             ;                       STA     DFALTLOC+2
                        ;
04E4 3E14               ;                       MVI     A,DCRCNT_1
                        ;
04E6 328600             ;                       STA     DFALTLOC+43
                        ;
04E9 C30B05             ;                       JMP     PULLUP3
                        ;
04EC 3E00               SAVE4:                  MVI     A,ERRCLR__
                        ;
04EE D320               ;                       OUT     CTRLPRT3
                        ;
04F0 3E11               ;                       MVI     A,WIDTH__2
                        ;
04F2 325D00             ;                       STA     DFALTLOC+2
                        ;
04F5 3E0A               ;                       MVI     A,DCRCNT_2
                        ;
04F7 325E00             ;                       STA     DFALTLOC+3
                        ;
04FA C30B05             ;                       JMP     PULLUP3
                        ;
04FD 3E00               SAVE5:                  MVI     A,ERRCLR__
                        ;
04FF D320               ;                       OUT     CTRLPRT3
                        ;
                                                MVI     A,WIDTH__3
                                                STA     DFALTLOC+2
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
0506 3E05               ;                       MVI     A,DCRCNT_3
                        ;
0508 325E00             ;                       STA     DFALTLOC+3
                        ;
050B 3E01               PULLUP3:                MVI     A,ENT__HLP
                        ;
050D D321               ;                       OUT     CTRLPRT2
                        ;
050F DB19               RDKBRD6:                IN      CTRLPRT8
                        ;
0511 E601               ;                       ANI     01H
                        ;
0513 CA0F05             ;                       JZ      RDKBRD6
                        ;
0516 3E40               ;                       MVI     A,40H
                        ;
                        ;
0518 D319               ;                       OUT     CTRLPRT8
                        ;
                        ;
051A E63F               ;                       ANI     3FH
                        ;
051C FE09               ;                       CPI     ___KEY_9
                        ;
051E CA2805             ;                       JZ      CSTART
                        ;
0521 3E02               ;                       MVI     A,ENTERR__
                        ;
0523 D320               ;                       OUT     CTRLPRT3
                        ;
0525 C30F05             ;                       JMP     RDKBRD6
                        ;
0528 3E00               CSTART:                 MVI     A,ERRCLR__
                        ;
052A D320               ;                       OUT     CTRLPRT3
                        ;
052C 3E03               ;                       MVI     A,C_SELECT
                        ;
052E D326               ;                       OUT     CTRLPRT1
                        ;
0530 3A5E00             ;                       LDA     DFALTLOC+3
                        ;
0533 325600             ;                       STA     TEMPLOC+2
                        ;
0536 3A5D00             ROUND:                  LDA     DFALTLOC+2
                        ;
0539 325700             ;                       STA     TEMPLOC+3
                                                LXI     H, BADDR__C
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
053F 3A5B00                ;       LDA     DFALTLOC
0542 87                    ;       ADD     A
0543 85                    ;       ADD     L
0544 6F                    ;       MOV     L,A
0545 7E                    ;       MOV     A,M
0546 325400                ;       STA     TEMPLOC
0549 23                    ;       INX     H
054A 7E                    ;       MOV     A,M
054B 325500                ;       STA     TEMPLOC+1
054E 1EB4                  ;       MVI     E,0B4H
0550 3A5400                ;       LDA     TEMPLOC
0553 57                    ;       MOV     D,A
0554 215600                ;REPEAT:LXI     H,TEMPLOC+2
0557 7B                    ;       MOV     A,E
0558 96                    ;       SUB     M
0559 5F                    ;       MOV     E,A
055A 3A5700                ;       LDA     TEMPLOC+3
055D 3D                    ;       DCR     A
055E 325700                ;       STA     TEMPLOC+3
0561 7B                    ;       MOV     A,E
0562 D324                  ;       OUT     CTRLPRT6
0564 212A00                ;CONT3: LXI     H,CRNGCWRD
0567 7A                    ;       MOV     A,D
0568 85                    ;       ADD     L
                                   mov     L,A
                                   mov     A,m
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
056B D300               OUT     CTRLPRTC
                        ;
056D DB28               IN      CTRLPRTB
                        ;
056F 4F                 MOV     C,A
                        ;
0570 DB27               IN      CTRLPRTA
                        ;
0572 47                 MOV     B,A
                        ;
0573 E610               ANI     10H
                        ;
0575 CA8A05             JZ      CONT1
                        ;
0578 3A5400             LDA     TEMPLOC
                        ;
057B BA                 CMP     D
                        ;
057C C28605             JNZ     CONT2
                        ;
057F 3E01               MVI     A,OVRERR__
                        ;
0581 D320               OUT     CTRLPRT3
                        ;
0583 C35405             JMP     REPEAT
0586 15         CONT2:  DCR     D
                        ;
0587 C36405             JMP     CONT3
                        ;
058A 78         CONT1:  MOV     A,B
                        ;
058B E60F               ANI     0FH
                        ;
058D CA9E05             JZ      CONT4
                        ;
0590 FE01               CPI     01H
                        ;
0592 C29B05             JNZ     CONT5
                        ;
0595 79                 MOV     A,C
                        ;
0596 FE90               CPI     90H
                        ;
0598 FA9E05             JM      CONT4
                        ;
059B C3B105     CONT5:  JMP     DISPLAY
                        ;
                CONT4:  LDA     TEMPLOC + 1
                        CMP     D
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
                        ;
 05A2 C2AC05            ;                      JNZ     CONT6
                        ;
 05A5 3E01              ;                      MVI     A,OVRERR__
                        ;
                        ;
 05A7 D320              ;                      OUT     CTRLPRT3
                        ;
 05A9 C30706            ;                      JMP     SETFRNG
                        ;
 05AC 7A        CONT6:  ;                      MOV     A,D
                        ;
 05AD 14                ;                      INR     D
                        ;
 05AE C36405            ;                      JMP     CONT3
                        ;
 05B1 78        DISPLAY:;                      MOV     A,B
                        ;
 05B2 E60F              ;                      ANI     0FH
                        ;
 05B4 325A00            ;                      STA     TEMPLOC+6
                        ;
 05B7 79                ;                      MOV     A,C
                        ;
 05B8 325900            ;                      STA     TEMPLOC+5
                        ;
 05BB CD1606            ;                      CALL    CDSPLY
                        ;
 05BE DB19      RDENT1: ;                      IN      CTRLPRT8
 05C0 E601              ;                      ANI     01H
                        ;
 05C2 CABE05            ;                      JZ      RDENT1
                        ;
 05C5 3E40              ;                      MVI     A,40H
                        ;
 05C7 D319              ;                      OUT     CTRLPRT8
                        ;
 05C9 DB18              ;                      IN      CTRLPRT9
                        ;
 05CB E63F              ;                      ANI     3FH
                        ;
 05CD FE09              ;                      CPI     ___KEY_9
                        ;
 05CF C2BE05            ;                      JNZ     RDENT1
                        ;
 05D2 CDBD06            ;                      CALL    FDSPLY
                        ;
 05D5 DB19      RDENT2  ;                      IN      CTRLPRT8
                                               ANI     01H
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
05D9 CAD505                         JZ      RDENT2
                    ;
05DC 3E40                           MVI     A,40H
                    ;
05DE D319                           OUT     CTRLPRT8
                    ;
05E0 DB18                           IN      CTRLPRT9
                    ;
05E2 E63F                           ANI     3FH
                    ;
05E4 FE09                           CPI     ___KEY_9
                    ;
05E6 C2D505                         JNZ     RDENT2
                    ;
05E9 CD1407                         CALL    TDDSPLY
                    ;
05EC DB19           RDENT3:         IN      CTRLPRT8
                    ;
05EE E601                           ANI     01H
                    ;
05F0 CAEC05                         JZ      RDENT3
                    ;
05F3 3E40                           MVI     A,40H
                    ;
05F5 D319                           OUT     CTRLPRT8
                    ;
05F7 DB18                           IN      CTRLPRT9
                    ;
05F9 E63F                           ANI     3FH
                    ;
05FB FE09                           CPI     ___KEY_9
                    ;
                    ;
05FD 3A5700                         LDA     TEMPLOC+3
                    ;
0600 3D                             DCR     A
                    ;
0601 325700                         STA     TEMPLOC+3
                    ;
0604 C25405                         JNZ     REPEAT
                    ;
0607                SETFRNG :       LDA     DFALTLOC
                    ;
0607 3C                             INR     A
                    ;
0608 325B00                         STA     DFALTLOC
                    ;
060B 47                             MOV     B,A
                                    LDA     DFALTLOC+1
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
060F B8                 ;               CMP     B
0610 FA3605             ;               JM      ROUND
0613 C3EE00             ;               JMP     START
0616 E5         CDSPLY: ;               PUSH    H
0617 D5                 ;               PUSH    D
0618 2A5900             ;               LHLD    TEMPLOC+5
061B EB                 ;               XCHG
061C 215400             ;               LXI     H,BADDRROM
061F 19                 ;               DAD     D
0620 19                 ;               DAD     D
0621 115400             ;               LXI     D,BUFFLOC
0624 7E                 ;               MOV     A,M
0625 E60F               ;               ANI     0FH
0627 12                 ;               STAX    D
0628 13                 ;               INX     D
0629 7E                 ;               MOV     A,M
062A E6F0               ;               ANI     0F0H
062C 12                 ;               STAX    D
062D 23                 ;               INX     H
062E 13                 ;               INX     D
062F 7E                 ;               MOV     A,M
0630 E60F               ;               ANI     0FH
0632 12                 ;               STAX    D
0633 13                 ;               INX     D
0634 7E                 ;               MOV     A,M
                                        ANI     0F0 H
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
0637 12                 ;       STAX    D
0638 CD3607             ;       CALL    SEGCNVRT
063B D1                 ;       POP     D
063C D5                 ;       PUSH    D
063D 3A5B00             ;       LDA     DFALTLOC
0640 47                 ;       MOV     B,A
0641 04                 ;       INR     B
0642 0E06               ;       MVI     C,06H
0644 3E56               ;       MVI     A,CMPLMNT3
0646 81         TRACK:  ;       ADD     C
0647 05                 ;       DCR     B
0648 C24606             ;       JNZ     TRACK
064B 47                 ;       MOV     B,A
064C 7A                 ;       MOV     A,D
064D 90                 ;       SUB     B
064E FE00               ;       CPI     00H
0650 CA6A06             ;       JZ      CUNIT1
0653 FE01               ;       CPI     01H
0655 CA7306             ;       JZ      CUNIT2
                        ;       ;
0658 CA7C06             ;       JZ      CUNIT3
065B FE03               ;       CPI     03H
065D CA8506             ;       JZ      CUNIT4
0660 FE04               ;       CPI     04H
0662 CA8E06             ;       JZ      CUNIT5
                                CPI     05H
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
0667 CA9706                ;                JZ      CUNIT6
066A 116900      CUNIT1:   ;                LXI     D,CRNG1
066D 215500                ;                LXI     H,BUFFLOC+1
0670 C3A006                ;                JMP     ACTION1
0673 116D00      CUNIT2:   ;                LXI     D,CRNG2
0676 215400                ;                LXI     H,BUFFLOC
0679 C3A006                ;                JMP     ACTION1
067C 116D00      CUNIT3    ;                LXI     D,CRNG2
067F 215600                ;                LXI     H,BUFFLOC+2
0682 C3A006                ;                JMP     ACTION1
0685 116D00      CUNIT4:   ;                LXI     D,CRNG2
0688 215500                ;                LXI     H,BUFFLOC+1
068B C3A006                ;                JMP     ACTION1
068E 116D00      CUNIT5:   ;                LXI     D,CRNG2
0691 215400                ;                LXI     H,BUFFLOC
0694 C3A006                ;                JMP     ACTION1
0697 117100      CUNIT6:   ;                LXI     D,CRNG3
069A 215600                ;                LXI     H,BUFFLOC+2
069D C3A006                ;                JMP     ACTION1
06A0 3E01        ACTION1:  ;                MVI     A,01H
06A2 B6                    ;                ORA     M
06A3 77                                     MOV     M,A
06A4 CDAD06                ;                CALL    UNITDSP1
06A7 CDB603                ;                CALL    BUFFOUT
06AA D1                    ;                POP     D
                                            POP     H
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
06AC C9                 ;                       RET
06AD 0604       UNITDSP1:                       MVI     B,04H
                ;
06AF 215800             ;                       LXI     H,BUFFLOC+4
06B2 EB         AGAIN3:                         XCHG
                ;
06B3 7E                 ;                       MOV     A,M
06B4 EB                 ;                       XCHG
06B5 77                 ;                       MOV     M,A
06B6 13                 ;                       INX     D
06B7 23                 ;                       INX     H
06B8 05                 ;                       DCR     B
06B9 C2B206             ;                       JNZ     AGAIN3
06BC C9                 ;                       RET
06BD E5         FDSPLY:                         PUSH    H
                ;
06BE D5                 ;                       PUSH    D
06BF 215400             ;                       LXI     H,BUFFLOC
06C2 3A5B00             ;                       LDA     DFALTLOC
06C5 47                 ;                       MOV     B,A
06C6 E6F0               ;                       ANI     0F0H
06C8 77                 ;                       MOV     M,A
06C9 23                 ;                       INX     H
06CA 78                 ;                       MOV     A,B
06CB E60F               ;                       ANI     0FH
                ;
06CD 23                 ;                       INX     H
06CE 3A5700             ;                       LDA     TEMPLOC+3
                                                mov     B,A
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
06D2 E6F0                       ANI     0F0H
                        ;
06D4 77                         MOV     M,A
                        ;
06D5 23                         INX     H
                        ;
06D6 78                         MOV     A,B
                        ;
06D7 E60F                       ANI     0FH
                        ;
06D9 77                         MOV     M,A
                        ;
06DA 3A5600                     LDA     TEMPLOC+2
                        ;
06DD 23                         INX     H
                        ;
06DE FE05                       CPI     05H
                        ;
06E0 C27A02                     JNZ     AHEAD1
                        ;
06E3 3E00                       MVI     A,SEGCOD00
                        ;
06E5 77                         MOV     M,A
                        ;
06E6 23                         INX     H
                        ;
06E7 3E00                       MVI     A,SEGCOD01
                        ;
06E9 77                         MOV     M,A
                        ;
06EA C30307                     JMP     LASTFILD
                        ;
06ED FE0A               AHEAD1: CPI     0AH
                        ;
06EF C2FC06                     JNZ     AHEAD2
                        ;
06F2 3E00                       MVI     A,SEGCOD10
                        ;
06F4 77                         MOV     M,A
                        ;
06F5 23                         INX     H
                        ;
06F6 3E00                       MVI     A,SEGCOD11
                        ;
06F8 77                         MOV     M,A
                        ;
06F9 C30307                     JMP     LASTFILD
06FC 3E00               AHEAD2: MVI     A,SEGCOD20
                                mov     m,a
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
06FF 23                         INX     H
                        ;
0700 3E00                       MVI     A,SEGCOD21
                        ;
0702 77                         MOV     M,A
                        ;
0703 3E00               LASTFILD:       MVI     A,SEGCODF1
                        ;
0705 23                         INX     H
                        ;
0706 77                         MOV     M,A
                        ;
0707 23                         INX     H
                        ;
0708 3E00                       MVI     A,SEGCODF2
                        ;
070A 77                         MOV     M,A
                        ;
070B CD3607                     CALL    SEGCNVRT
                        ;
070E CDB603                     CALL    BUFFOUT
                        ;
0711 D1                         POP     D
                        ;
0712 E1                         POP     H
                        ;
0713 C9                         RET
                        ;
                        ;TDMEASUREMENT
                        ;
0714 E5                 TDDSPLY:        PUSH    H
                        ;
0715 D5                         PUSH    D
                        ;
0716 3E04                       MVI     A,TDSELECT
                        ;
0718 D326                       OUT     CTRLPRT1
                        ;
071A DB27                       IN      CTRLPRTA
                        ;
071C 325A00                     STA     TEMPLOC+6
                        ;
071F DB28                       IN      CTRLPRTB
                        ;
0721 E60F                       ANI     0FH
                        ;
0723 325900                     STA     TEMPLOC+5
                        ;
                                CALL    BCDCNVRT
```

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

SOURCE FILE NAME: VLCRQI.ASM

```
0729 CDAD06                     CALL    UNITDSP1
                ;
072C CDB603                     CALL    BUFFOUT
                ;
072F 3E03                       MVI     A,C_SELECT
                ;
0731 D326                       OUT     CTRLPRT1
                ;
0733 D1                         POP     D
                ;
0734 E1                         POP     H
                ;
0735 C9                         RET
                ;
0736 115400     SEGCNVRT:       LXI     D,BUFFLOC
                ;
0739 214A00                     LXI     H,LOOK_TAB
                ;
073C 0E02                       MVI     C,02H
                ;
073E E5         CNVRT1:         PUSH    H
                ;
073F 1A                         LDAX    D
                ;
0740 85                         ADD     L
                ;
0741 6F                         MOV     L,A
                ;
0742 7E                         MOV     A,M
                ;
0743 12                         STAX    D
                ;
0744 13                         INX     D
                ;
0745 E1                         POP     H
                ;
0746 0D                         DCR     C
                ;
0747 C23E07                     JNZ     CNVRT1
                ;
074A C9                         RET
                ;
                ;-----------------------------------------------------
0000                    END ;This stmnt inserted by assembler
```