USEFUL SOFTWARE ROUTINES

VMC-8506 monitor program needs various utility functions while using the onboard keyboard and display CRT Terminals as a console. These utility functions (routines) resides in the 4K Bytes of Monitor and so can also be used by the user to simplify his programming task. Some of these utilities are given here.

Address of routine	Label	Description	Registers Affected
030B	CHINP	**Character Input** This routine takes one 8 bit byte from the serial I/o Port and return it to the calling routine in A register. The 16 bit number stored in 27FD (LSB) and 27FE (MSB) decides the baud rate. The number decides the half bit time and is the argument of subroutine DELAY.	A,B,C,D,E, H,L & F/FS
032F	CLEAR	This routine is for keyboard only. Inputs: B-Dot Flat = 1 for a dot in address field. 0 for not dot. Outputs: None.	A,B,C,D,E, H,L & F/FS
033F	CLEAR DISPLAY	This routine clears the display and terminate the command. The inputs and outputs in this routine are none.	All
0366	CNASC	This routine converts a hex nibble to ASCII. The various inputs and outputs in this routine are: Input: C - Hexcode to be converted to ASCII. Output: C - ASCII Code.	A,B,C,H&L

Address of routine	Label	Description	Registers Affected
036E	CNABN	This routine converts an ASCII Character to its Binary value. The various inputs and outputs required are Reg. A-7 Bit ASCII code with parity bit = 0 output, Reg. A: 4 Bit Hex Bibble when Input is any hex numeric 0-F. Reg. A: 10 when Input is $ Reg. A: 1 when Input is SP/CR Reg. A: 3A when Input is :, for any other Input it jumps to error.	All
038A	CHOUT	**Character Output:** This routine takes one byte (8 bit) passed on by the calling routine in register C on the serial I/O Port. The baud rate is decided by the 16 bit number stored in 27FD (LSB) and 27FE (MSB). The number determines the half bit time and is the argument of the subroutine DELAY.	A,B,C,D,E, H,L & F/FS
03B0	DCRNB	**Decrements a Byte** This routine decrements a Byte and if the decremented value is zero it sets the zero flag. Input: None Output: the zero flag gets set if the decremented value = 0 otherwise it is reset.	A & F/FS

Address of routine	Label	Description	Registers Affected
03BC	DELAY	This routine is used to provide delays. It stores the number in register pair D, counts it down to zero and comes back to the calling routine. Total time delay introduced by the routine is (24N + 17) x basic machine cycle. N≠0.	A,D,E & F/FS
03C3	DISPLPC	**DISPLAY PC CONTENT:** This routine displays the PC Content and the first byte of the instruction stored. The inputs and outputs in this case are none.	All
03E2	DMDT	**DISPLAY/MODIFY DATA:** This routine display/modify the data. The Inputs and outputs in this routine are: Inputs: HL - 1 If a memory address was received. - O If no data was received A - Termination Character DE - The data received HL - Same as Input	A,B,C,D,E & F/FS
03FA	ECHO	This routine is used in SIOD mode, when the keyboard is inactive. This routine outputs a single character to the User are Reg. C.	A,B,D & E

Address of routine	Label	Description	Registers Affected
		Character to ECHO to the terminal. Output: Reg. C: Same as Input. This routine examine/modify a memory Block.	
0417	EMM (Common)	The inputs for this routine are HL-first memory location to be examined present address: Outputs: None.	A,B,C,H,L & F/FS
0455	ERROR	This routine displays an error on the display if the system is in Key Board Mode. And if the system is in SIOD Mode, it lists a * and goes to command recognizer. The various inputs and outputs are: Inputs: None Outputs: None	All
0468	RECHEX	**Receive Hex Digits:** If the system is in Keyboard mode, this routine accepts, a hexadecimal number from it, displays it on the display and returns it as a 16 bit number. The routine displays error in case of an invalid terminator. The valid terminators are EXECUTE, NEXT AND PREVIOUS. RST 5.5 should be unmasked first in this operation. The various Inputs and Outputs are Reg.	All

Address of routine	Label	Description	Registers Affected
		Reg.B: 0 - Use address field. Reg.B: 1 - Use data field. Outputs: A - The last character received from the Keyboard. D,E - last 4 hex digits received from the keyboard. Carry - Set if at least one valid hex digit was received else reset. If the system is in SIOD mode then the number is received from the appropriate SIOD and the number is displayed. Valid terminators are $, '.' space and ':'.	
04C5		**HILO (COMMON) DE=DE-HL:** In this routine DE Reg. contents become equal to DE Reg. Content - HL Reg. Contents. CRY Set if DE was <HL and reset if DE was> HL.	A,D,E,F/FS
04EE	RCVCHR	**Receive a character from SIOD** This routine waits for a character to be typed on the SIOD. When the character is typed, it sends it back to the SIOD and returns the ASCII code value to the calling routine in Register A.	A,B,C,D,E, H,L & F/FS

Address of routine	Label	Description	Registers Affected
		Selection of any of the device can be done by changing the content of the location - 27FF. 27FF — Mode 00 — Invalid 01 — TTY 02 — CRT If the MS bit of this code is set, ten there will not be any echo of the character, location 27FD stores half bit time for proper baud rate output - ASCII code received from SIOD.	
0519	INSDG	**Insert Hex Digit:** This routine allows to insert hex digit. The Inputs and Outputs in this routine are: Input: Reg. A - Hexdigit to be Inserted. Reg. DE - Hex Value. Output: Reg. DE - Hex value with digit inserted.	A,D,E,H,L & F/FS
0552	LSTBTE	**List a byte on SIOD** This routine takes a byte from SIOD and converts it into two hexadecimal digits for listing on SIOD. The byte to be listed is stored in Reg. A and the SIOD is selected by changing the contents of the location 27FF.	A,B,C,D,E & F/FS

Address of routine	Label	Description	Registers Affected
		Contents of location (Mode) 27FF = 00 invalid 01 TTY 02 CRT Location 27FF stores half bit time for proper baud rate.	
05AF	New Ad	**Read New Address:** This routine reads keyboard/ SIOD to find out if there is a new address. If the terminator is EXEC, it jumps to clear display. In case of any terminator other than EXEC it gives error. The various Inputs and Outputs are: Input: H1 - Old address. Outputs: CRY: 01 if no new value is received else CRY is resetted. HL: New value of address if received otherwise 00.	All
05D0	OUTPUT	**Display the Character** This routine is used to display a character on the display. If the system is in SIOD Mode, the routine returns without any operation. The various inputs to this routine are given below: Reg.A: 0 - Use Address Field. 1 - Use Data Field.	A,B,C,D,E, F,L&F/FS

Address of routine	Label	Description	Registers Affected
		Reg. B: 0 - No dot to be displayed 1 - Dot at the right edge of the field. Reg. H.L. - Starting address of the Character Code.	

Character Displayed	Character Code
0	00
1	01
2	02
3	03
4	04
5	05
6	06
7	07
8	08
9	09
A	0A
B	0B
C	0C
D	0D
E	0E
F	0F
H	10
L	11
P	12
I	13
R	14
U	15
BLANK	16

Address of routine	Label	Description	Registers Affected
0629	RD KB	**Read the Keyboard** This routine scans the key board for any key to be pressed. When a key is pressed, its value is returned to the calling routine in register A RST 5.5 should be first un-masked for the proper operation.	A,H,L & F/FS
0639	RD HILO	**Read HI and LO** This routine reads the lower limit and higher limit of addresses from the keyboard. If no new address are entered, then the lower and higher limit address are not disturbed. Input: None Output: None	All
0653	REL	**Relocate a Program** This routine relocates a program written for one memory area to another memory area by adding a fixed 16 bit number to all the address references between and including (27EA, 27EB) and (27EC, 27ED). Lower Limit (27F0, 27F1) should point to the starting address of the routine to be relocated and the higher limit (27F2, 27F3) should point to the last location.	All

Address of routine	Label	Description	Registers Affected
06CB	RD2AD	**Read two addresses** This routine reads two addresses from key board or SIOD. The inputs and outputs are: Input: None Output: Reg.BC - Ist address Reg.DE - IInd address Reg.A - Terminator of the IInd address	A,B,C,D,E, H,L & F/FS
06D0	TSRCH	**Search a Table** This routine searches a table for a byte and if the search fails, it gives error. Inputs: A - The byte to be searched. DE - No. of bytes is in each entry. HL - Starting address of the table C - No. of entries in the table. Outputs: HL - address where the comparison was made. C - decremented value of the counter.	C,H,L & F/ FS
06E3	MOD AD	**Modify Address** If the system is under the control of keyboard, it displays 16 bit number stored in 27F4 and 27F5.	A,B,C,D,E, H,L & F/FS

Address of routine	Label	Description	Registers Affected
06FA	MODDT	Input: Reg.B - 0 no dot. 1 dot at the right edge of the field. If the system is in SIOD mode, 4 hex digits are listed on SIOD. **Modify Data** If the system is under the control of keyboard, it displays 8 bit number stored in 27F6. Inputs: Reg.B - 0 no dot. 1 dot at the right edge of the field. If the system is in SIOD mode, 2 hex digits are listed on the SIOD.	A,B,C,D,E, H,L & F/FS

DEVELOPING/DEBUGGING SOFTWARE

VMC-8506 provides software features like Relocate, String, Insert, Delete etc. which find extensive application in developing/debugging software. The various steps involved in developing software are:

1. Define the problem in the form of a flow chart.
2. Write the program in Assembly Language of 8085.
3. Assemble the program using the Reference card provided with the Manual.
4. Enter the program into RAM area and Run it. For running the program use GO Command. It is likely that the program may not run in one shot because some mistake is there in it. The process of finding this mistake and removing it is called the debugging of the program.