THE MAIN DEBUG EPROM

The debug program is meant to aid technicians in debugging and testing the E II. It is especially useful for testing and diagnosing the Main CPU SRAM. When the program runs, it will give a sign on message and wait for commands. To use it, you need a terminal and an RS-232 cable. The terminal must be set for 1 start bit, 7 data bits, 1 stop bit, no parity, auto line feed. It must also be set for 9600 Baud.

The cable must conform to the following:

TERMINAL	E II
pin 1	pin 1
pin 2	pin 2
pin 3	pin 3
pin 4	pin 4
pin 5	pin 5
pin 6	pin 6
pin 20	pin 20

DEBUG COMMAND SUMMARY

HELP
Explains each command.

SET
Sets a single memory location or register to a value.

DISPLAY
Displays single or multiple memory locations or user register set.

FILL
Fills a block of memory with a byte value.

MOVE
Moves a block of data from one area of memory to another.

COMPARE (CP)
Compares the data in two blocks of memory and displays differences.

INPUT
Gets a byte from an input port and displays it.

OUTPUT
Sends a byte to an output port.

CALL
Runs a user entered program.

RETURN
Jumps to a user entered program on NMI or RST.

PUTDISK
Moves a block of data from memory to disk.

GETDISK
Moves a block of data from disk to memory.

TEST
Tests memory and disk drives.

EXERCISE
Exercises disk drives, memory, and I/O ports.

DEBUG COMMANDS

SERVICE NOTE:

Commands are terminated by `RETURN´. All numbers are hexadecimal unless otherwise noted.

HELP — HE [command]

example:
```
HE T      explains the TEST command.
HE S      explains the SET  command.
```

SET
```
S  M  [address]  [data]
S     [register] [data]
```

example:
```
S  M  8000 FF  sets  memory location 8000 to FF.
S  HL FF       sets user HL register pair to FF.
```

SERVICE NOTE:

The E II has OF (Decimal 16) blocks of RAM. Each block is 8000 bytes long (Decimal 32K). The SET command can address any 2 byte address. Addresses below 8000H (32K) are reserved as program area. You should only modify memory above 8000H (32K) or you risk crashing the program. To select a particular segment of RAM, write its segment number into the segment register using the OUTPUT command (O 6B segment number). See Theory of Operation for further explanation of RAM operation. See OUTPUT command, below.

The SET Register command does not actually alter the Z-80 registers. There are RAM locations reserved as user registers. The data in these locations are loaded into Z-80 registers when a CALL command is executed. The previous contents of the Z-80 registers are saved first. When the user program ends with an RST, the original Z-80 register contents are restored.

DISPLAY D M [start address] [end address]
D P [start address]

example: D M 8000 9000 displays memory from 8000 to 9000.
D M 8000 displays a page (100 bytes, 256 Decimal) of memory starting at 8000.

SERVICE NOTE:

The E II has 0F (Decimal 16) blocks of RAM. Each block is 8000 bytes long (Decimal 32K). The DISPLAY command can display any range of addresses from 0000H to FFFFH (Decimal 65K). To select a particular segment of RAM, write its segment number into the segment register using the OUTPUT command, below.

FILL F [start address] [end address] [byte]

example: F 8000 9000 FF fills memory from 8000 to 9000 with FF.

MOVE M [from] [to] [length]

example: M 8000 9000 2F moves a block 2F bytes long from its present location, starting at 8000 to a new location starting at 9000.

COMPARE CP [start] [start] [length]

example: CP 8000 9000 2F compares 2 blocks of memory 2F bytes long, one starting at 8000 and one starting at 9000. Differences will be displayed on the terminal.
NOTE: both memory blocks must be in the same RAM segment.

INPUT I [port #]

example: I 6B reads port 6B and displays its data byte.

OUTPUT O [port #] [byte]

example: O 6B 1A writes 1A to port 6B.

CALL CALL [address]

example: CALL 8000 runs the user routine at address 8000.

RETURN RE [address]

example: RE 8004 runs the routine at address 8004 when a Nonmaskable Interrupt (NMI) or a restart (RST 38) has been executed.

PUTDISK P [track#] [address] [#tracks]

example: P 1 6 000 1 puts 1 track of data (each track holds E00 bytes) onto track 1. The data starts at address 60000 (address 8000 in Segment C). NOTE: there must be a space after the first digit of the address. The debug monitor calculates the segment value for the address you specify (See memory map, p 7-34).

GETDISK G [track#] [address] [#tracks]

example: G 1 6 000 1 gets a track of data (each track holds E00 bytes) from track 1. The data is stored starting at address 60000 (address 8000 in segment C). NOTE: there must be a space after the first digit of the address. The debug monitor calculates the segment value for the address you specify.

SERVICE NOTE:

track# con be from 0 to 9F.

address can be from 0 0000 to 7 FFFF.

#tracks can be from 0 9F.

DO NOT GO BELOW 8000H OR YOU WILL CRASH DEBUG.

TEST T [option] [parameter list]

options:
- D test disk
- B test burst timing
- C test drive's compatibility
- M test memory

Test Disk T D [drive] [#passes]

example T D 0 5 tests drive 0 (the top one) 5 times. #passes can be any number up to FF. FF passes take abut 8 hours to complete. Error counts are displayed as shown below:

CRC:	CR1:	WT:	XFR:
0000	0000	0000	0000

NOTE: CRC means cyclic redundancy check. It is a data validity test. SIO reports a CRC error if the data from the disk is invalid. If it fails on 10 consecutive read attempts, a fatal disk error message is displayed.

CR1 means a CRC error on the first attempt to read data from the disk. This is not unusual as the E II exceeds the drive specifications on a first read. This is done to gain disk speed. If E II gets a CR1, it makes another attempt to read data.

WT means wrong track error. This is usually a drive problem.

WT1 means wrong track on the first try. See CR1, above.

XFR means transfer error. A block of memory is written to the disk, then read from the disk into a different area of memory. The two memory blocks are compared. If they don't match, Debug logs a transfer error.

FATAL DISK ERROR CODES

Sometimes the disk test won't run at all. The fatal error codes help to clarify what went wrong. The display will show:

Fatal Disk Error Cn

(n is the error code as explained below.:)

C2 - Drive not ready. No disk. Unable to read track ID or unable to read sync mark on disk.

C3 - Write protected error. Unable to write to disk because there is a write protect tab on the diskette.

C4 - Not used.

C5 - Read track number error. Misread track number more than twice.

C6 - Fatal CRC error. Read disk incorrectly 10 times.

C7 - Drive not there.

Test Burst T B [drive#]

example: T B tests drive 0 (the top one)

This test displays drive burst (Index) timing. The value is displayed in hexadecimal and must be between 60 and 70. A displayed value of 6E would be within specifications.

Burst Timing Specifications:

Minimum	Typical	Maximum
60	69	70

Burst timing is adjustable. You must have an oscilloscope and a special calibration diskette. In most cases it is much simpler to swap out the disk drive.

SERVICE NOTE:

The burst timing test will fail if you use a diskette formatted on any out of spec drive. Format a diskette on the drive you want to test. See the EXERCISE command.

Test Compatibility T C [drive#]

example: T C 1 tests compatibility of drive 1 (the bottom one).

This test requires a special disk.

Test Memory T M [segment#] (0-F optional)

example: T M B tests memory starting with segment B.

T M tests the entire memory.

Exercise E [device] [location] [data]

example: E D 0 5 exercise disk 0 5 times.

E M 6 0000 exercise memory location 60000.

E I 22 exercise input port 22 (read).

E O 11 FF exercise output port 11 (write FF).

E IO FF exercise port FF (read/write).

NOTE: The disk exercise formats the entire diskette, then verifies it. It repeats the number of times specified in the command. Use this command to format a disk for other tests.

The memory exercise alternates writing AA and 55 to the specified location. The location is exercised continuously.

The port exercises are continuous. You must reboot DEBUG to perform another test.

.pa