

ABSOLUTE BINARY PROGRAM NO. 59310-16001
DATE CODE 1728

HP 59310A/B INTERFACE BUS INTERFACE DIAGNOSTIC

reference manual

For HP 59310A/B Interface Bus Interface

NOTICE

The absolute binary code for this diagnostic is contained on one or more media (e.g., paper tape, cartridge tape, disc, and magnetic tape). The binaries also exist on single as well as multiple files. For the current date code(s) associated with these media, refer to appendix A in the *Diagnostic Configurator Manual*, part no. 02100-90157, dated August 1976 or later.



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1-1. GENERAL

The 59310A/B Interface Bus Interface Diagnostic will test any combination of hardware from one 59310A/B Interface or two 59310A/B Interfaces with or without cabling (including any combination of 10631A, 10631B and/or 10631C). The interface(s) may be configured to any valid select code, MYADDR and SRQID.

A Troubleshooting Module is included to aid the operator in troubleshooting either a 59310 or any IB device using a 59310 as the system controller. If an error halt is encountered while running the diagnostic, the operator must be familiar with Table 3-1 which contains information on the meaning of data either reported on the console and/or in the A and B registers.

Section 3-3 which covers the Troubleshooting Module, assumes the operator is totally familiar with the control and communication operation of the 59310 and the HP-IB structure.

1-2. REQUIRED HARDWARE

The following hardware is required to test the 59310 Interface.

- a. A HP 2100 series computer with a minimum 4K of memory.
- b. An absolute binary loading device (used only to load the Diagnostic).
- c. A console device (optional for message reporting).
- d. DMA or DCPC (optional but highly recommended).
- e. Any of the following hardware configurations:
 - (1) One 59310 interface with or without cabling.
 - (2) Two 59310 interfaces with or without cabling (if cabling is attached it should not exceed 20 meters).

1-3. REQUIRED SOFTWARE

The following software is required to test the 59310 Interface:

- a. Diagnostic Configurator Product No. HP 24296A for equipment configuration and as a console driver. The product includes:

| | |
|--------------------|----------------------|
| Binary Object Tape | Part No. 24296-60001 |
| Manual | Part No. 02100-90157 |

- b. HP 59310 Interface Bus Interface Diagnostic
 - Binary Object Tape Part No. 59310-16001
 - Manual of Diagnostic Part No. 59310-90061
- c. HP 59310 Bus Input/Output Interface Kit
 - Manual Part No. 59310-90007

The Diagnostic Serial Number of this diagnostic is 103122 and resides in Address 126.

1-4. DIAGNOSTIC LIMITATIONS

The diagnostic will not test

- The ability of the 59310 to propagate or generate priority-low (PRL).
- The ability to transmit data over the HP-IB at a rate of approaching one megabyte per second.

The cable test executed in the diagnostic, if selected, is valid only when two 59310 interfaces with different MYADDR settings are under test. However, any cabling attached to the 59310 interface(s) will be tested for shorts between wires because of the nature of the diagnostic itself. Also, there can be no device attached to the cabling during execution of the main tests and cable tests. The devices are attached only during execution of the Troubleshooting Module section.

If DMA (DCPC) is not installed, a relatively large section of the interface logic cannot be tested. It is therefore highly recommended that this option be installed!

If jumper W1 (59310B) is not installed, the diagnostic will not pass the parallel poll test.

1-5. GLOSSARY OF TERMS

A glossary of terms is contained in table 1-1.

Table 1-1. Glossary of Terms

| | |
|---------------|---|
| ATN | - ATTENTION |
| CATN | - CLEAR ATN |
| CG3MC | - CLEAR GROUP 3 MODE CONTROL (BITS 15-7 OF CONTROL WORD= 00000001 BINARY) |
| CLCCF | - CLC IBI,C |
| CLRINTFLG | - CLEAR INTERRUPT FLAGS ISSUED BY CLC IBI,C |
| CRS | - CONTROL RESET TO I-O (GENERATED BY A CLC0,C) |
| DAC | - DATA ACCEPTED |
| DAV | - DATA VALID |
| DMAOUTREQFLG | - A CONDITION SET BY AN INITF. |
| DMARWSEL | - A GROUP 3 MODE CONTROL FOR INPUT OR OUTPUT DMA. DMARWSEL IMPLIES AN INPUT DMA REQUEST. |
| EOI | - END OR IDENTIFY |
| EOR | - END OF RECORD |
| EORFLGEN | - ENABLE FLAG DETECTION OF EOR. |
| GENSRQ | - ENABLE GENERATION OF SRQFLG. |
| IB | - INTERFACE BUS |
| IBI | - INTERFACE BUS INTERFACE CARD |
| IEN | - INTERRUPT ENABLE |
| IFC | - INTERFACE CLEAR |
| IFCFLG | - IFC FLAG |
| IFCOS | - IFC ONE-SHOT |
| INITF | - INITIALIZE FLAGS COMMAND |
| IRL | - INPUT REGISTER LOADED. |
| IRLFLGEN | - ENABLE FLAG DETECTION OF IRL. |
| MYADDR | - INTERFACE BUS TALK AND LISTEN ADDRESS ASSIGNED TO THE INTERFACE (SW2, BITS 1-5). |
| NDMAOUTREQFLG | - A CONDITION SET BY A CLF IBI. |
| NDMARWSEL | - IMPLIES AN OUTPUT DMA REQUEST. |
| OBR | - OUTPUT BYTE REGISTER |
| OBRL | - OUTPUT BYTE REGISTER LOADED. |
| ORA(FLG) | - OUTPUT REGISTER ACCEPTED (FLAG). |
| ORAFLGEN | - ENABLE FLAG DETECTION OF ORA. |
| OWRL | - OUTPUT WORD REGISTER LOADED. |
| PACKEN | - PACK ENABLE CONTROL MODE FOR WORD TRANSFERS. |
| PPLEX | - PARALLEL POLL MODE ENABLE. |
| PPPID | - PARALLEL POLL MODE IDENTIFICATION. |
| PPREQ | - PARALLEL POLL MODE REQUEST. |
| REN | - REMOTE ENABLE. |
| RFD | - READY FOR DATA. |
| SINPD | - SET INPUT DATA COMMAND. |
| SKF | - SKIP FLAG TO I-O |
| SPM(FLG) | - SERIAL POLL MODE (FLAG). |
| SRQFLG | - SERVICE REQUEST FLAG (NOT TO BE CONFUSED WITH SRQ WITH SIGNALS DMA). |
| SRQFLGEN | - ENABLE FLAG DETECTION OF SRQFLG. |
| SRQID | - SERVICE REQUEST IDENTIFICATION. |

PROGRAM ORGANIZATION

SECTION

II

2-1. ORGANIZATION

The diagnostic is separated into four main sections:

Configuration — which allows the operator to enter the select code, MYADDR and service request identification.

Main Test Area — which verifies proper operation of the 59310 interface(s) and that no shorts exist in any connected cabling (see Diagnostic Limitations).

Cable Test Area — which is executed if selected and only if two 59310 interfaces are under test. This section will verify that there are no open signal lines in the cabling. All devices must be disconnected while running the diagnostic.

Troubleshooting Module — which allows the operator to control and monitor the state of a 59310 interface and/or the HP-IB.

The operator may control error reporting and program execution via the switch register. (See table 3-4 for the available Switch Register settings or program options.)

3-1. OPERATING PROCEDURE

A flowchart of the diagnostic operating procedure is provided in figure 3-1. The diagnostic can be executed either with one interface PCA only or with two interface PCA's which must be interconnected to each other with two bus I/O cables, part no. 59310-60002. While running the diagnostic, the bus I/O cable must not be connected to any peripheral devices. Before running the diagnostic, set dip switches SW1 and SW2 on the 59310 interface PCA to the desired test condition and note these settings which will be needed during the configuration of the diagnostic. The switch settings are as follows:

SW1, Switch Nos. 1-8: SRQ ID (Specifies DIO (Data I/O) signal line to be used.)

SW2, Switch Nos. 1-5: MYADDR (Specifies Bus Address.)

Switch No. 6: REN, (Enables PCA to drive bus signal line REN when set.)

Switch No. 7: IFC (Enables PCA to drive bus signal line IFC when set.)

Switch No. 8: SHIELD (Connects shield in bus to common when set.)

Locations of SW1 and SW2 on the PCA are shown in figure 3-2.

3-2. DIAGNOSTIC EXECUTION

The configuration area of the diagnostic will enable the operator to enter the Select Code(s), MYADDR(s) and SRQ ID(s) (These values may be any valid value as defined in the BUS INPUT/OUTPUT INTERFACE KIT 59310A Manual (Part No. 59310-90007)).

Next the main diagnostic area is entered which totally tests the first 59310 interface (designated during configuration) with certain Diagnostic Limitations. (Refer to paragraph 1-4.) Upon completion of the first IBI test a second pass of the main diagnostic is made to test the second IBI if it was designated during configuration.

Upon completion of the main diagnostic area, a test of Switch Register bit 0 is made to determine if the operator wants to execute the cable test. If Bit 0 is set (two IBIs must be under test or the diagnostic will halt with an error), a continuity test is executed on all signal lines in the cabling (a shorted cable is detected in the main diagnostic).

If Switch Register bit 1 or 2 is set, the diagnostic will enter the Troubleshooting Module:

- 1) before diagnostic execution but after configuration (if set when starting at address 100 or 2000),

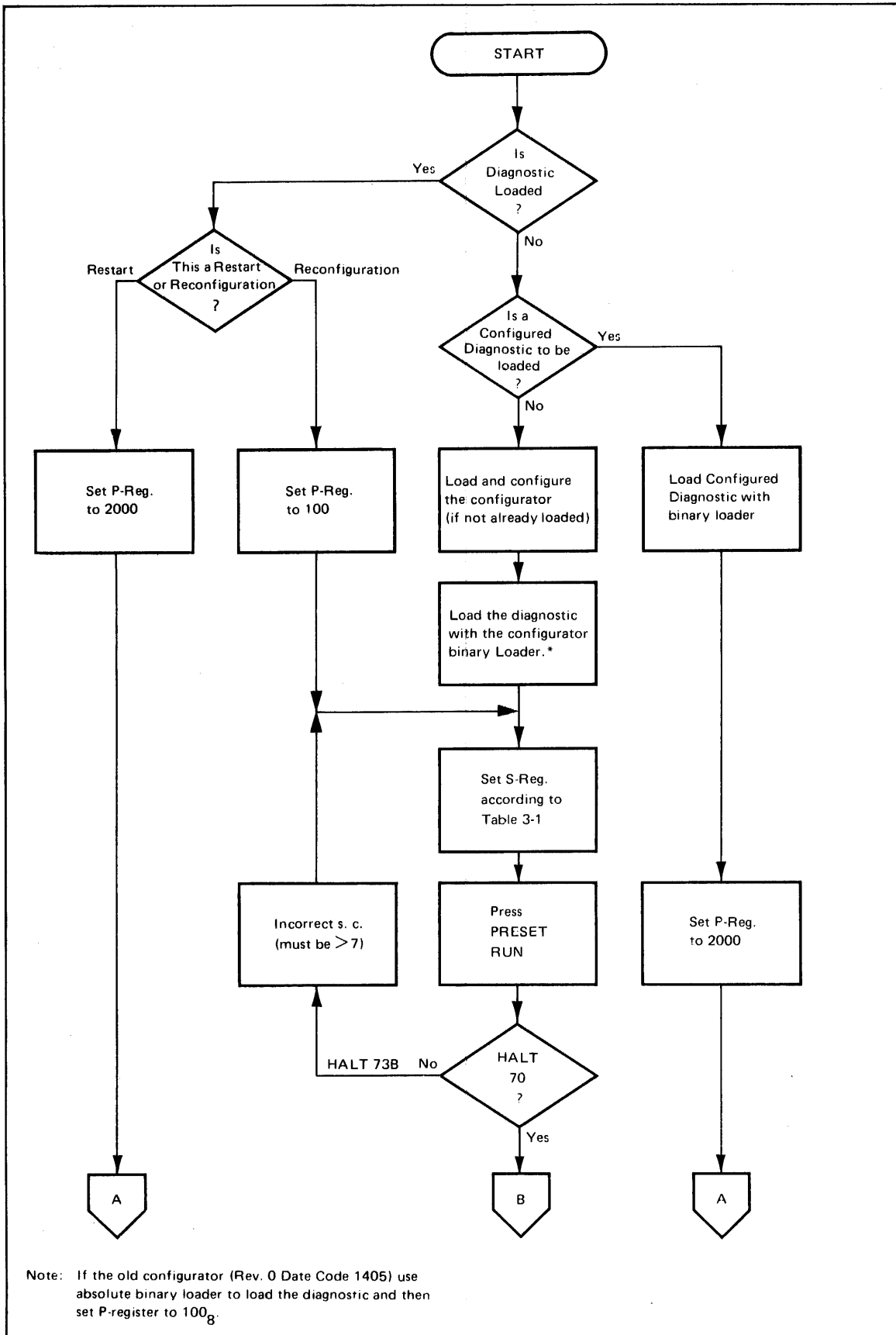


Figure 3-1. Operating Procedure Flowchart (Sheet 1 of 2)

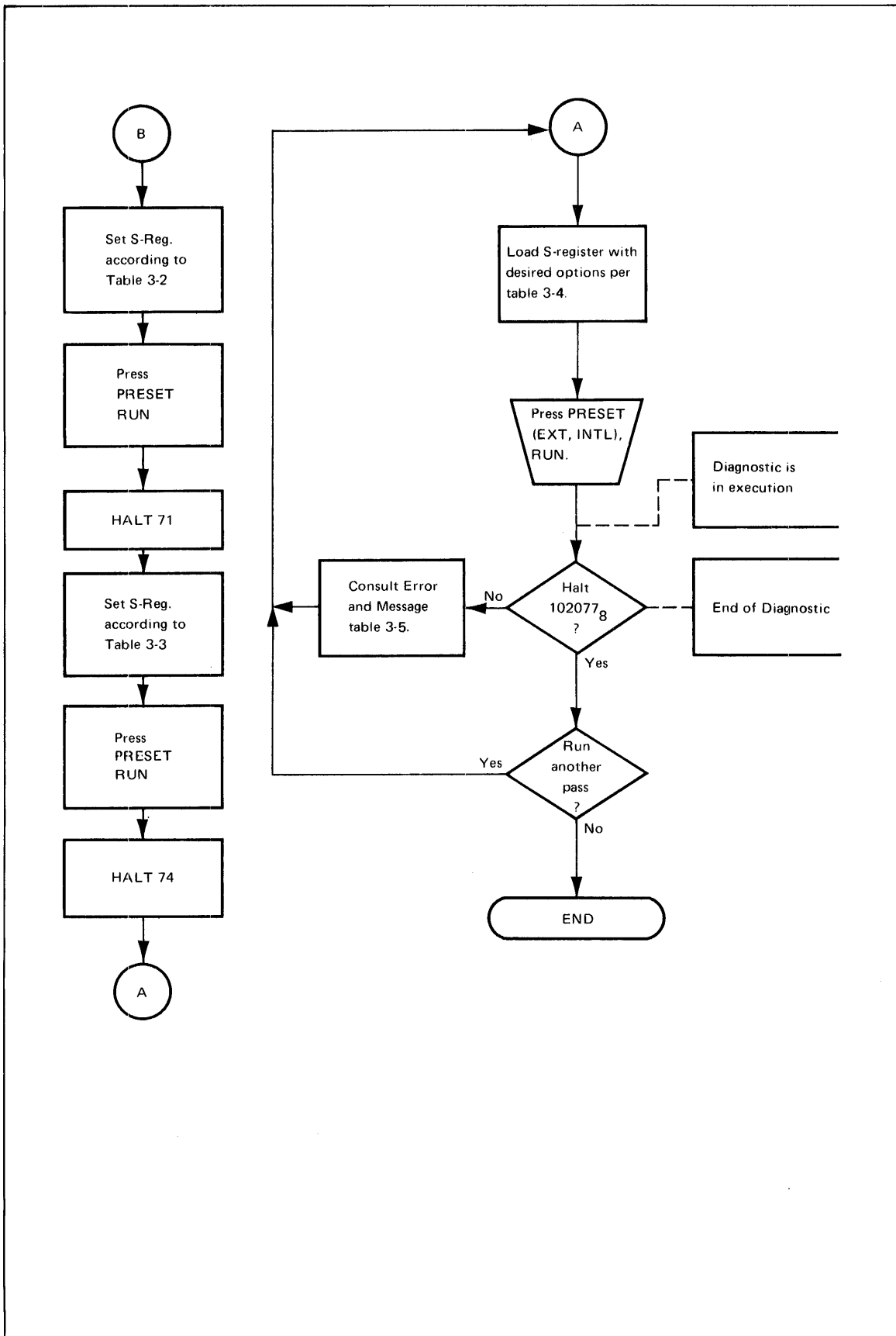
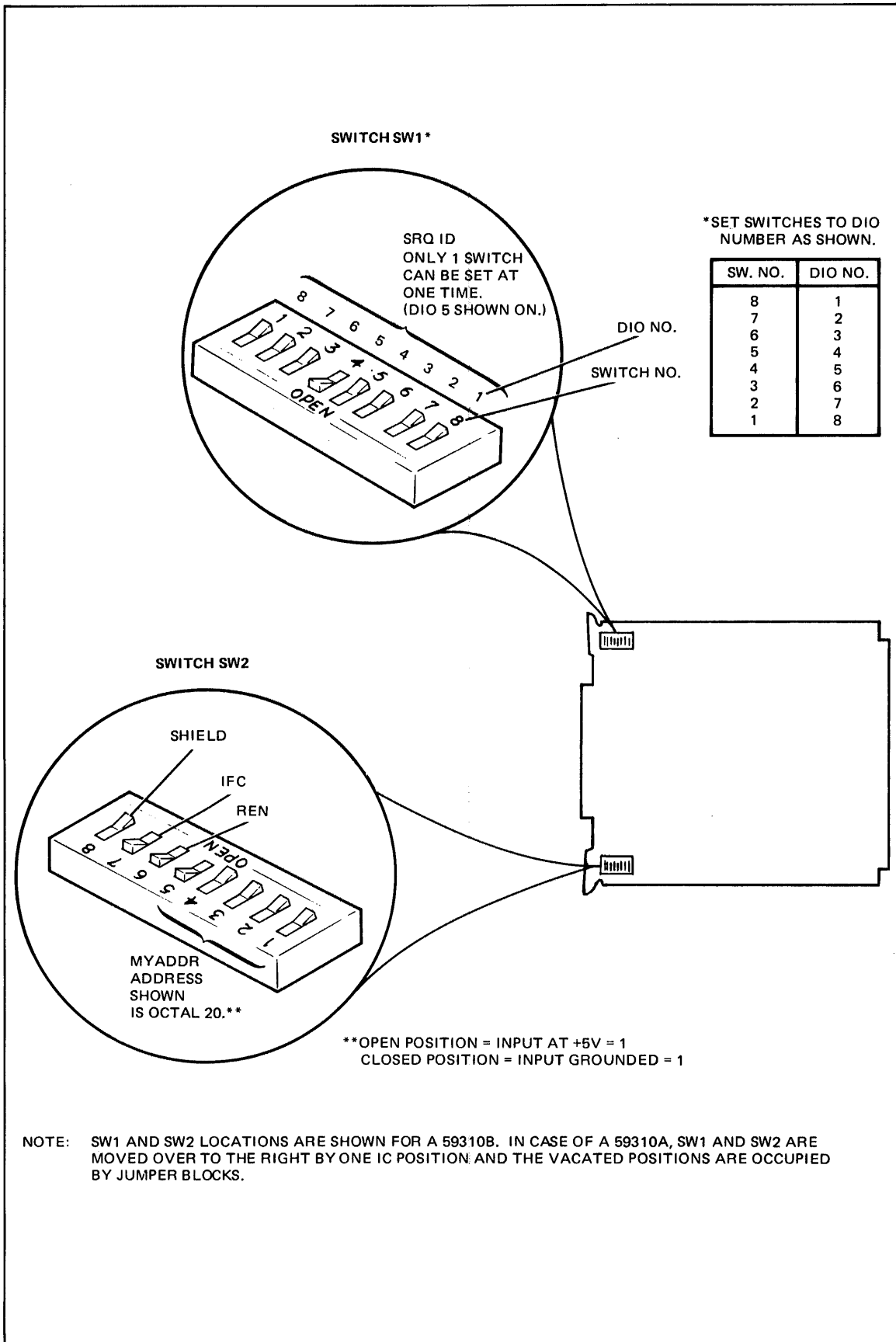


Figure 3-1. Operating Procedure Flowchart (Sheet 2 of 2)



7700-87

Figure 3-2. Locations of SW1 and SW2 on Bus Interface PCA

- 2) after an error halt sequence is finished or
- 3) at the end of a diagnostic pass.

If the operator sets Switch Register bit 2 it overrides any setting of bit 1 and it indicates he wants to use the second IBI as system controller. If Switch Register bit 1 is set (and not bit 2) the first IBI will be used as the system controller. A further discussion of the Troubleshooting Module will be presented in paragraph 3-3.

If switch register bit 3 is set, it indicates the IBI(s) under test is a 59310B, part no. 59310-60101, exclusively. (The 59310A does not have Parallel Poll interrupt request logic.)

The only other exception to the normal Switch Register settings or program options is when Switch Register Bit 10 is set to suppress non-error messages. This option is overridden in the Troubleshooting Module where the only means of communication is through the console.

3-3. TROUBLESHOOTING MODULE

This section was added to enable the operator, via the console, to communicate with an IBI in order to: 1) diagnose the IBI or 2) diagnose a device or devices on the IB.

When the Troubleshooting Module is entered, or when it has executed an operation, it will prompt the console with a colon (:). At this point the operator may utilize several commands:

- A - Abort and exit to the end of the diagnostic.
- S - Will automatically print the status of the IBI as six octal digits
- I - Will automatically print the state of the input register of the IBI (six octal digits).
- C - Allows the operator to input up to six octal numbers which will be interpreted and output to the IBI as a control word.
- D - Allows the operator to input up to six octal numbers which will be interpreted and output to the IBI as a data word.

Any other non-command character input results in an "INPUT ERROR" message.

When using the above set of commands, the operator must be careful to distinguish between commands sent directly to the IBI and commands sent to a device on the bus. Any command sent to the bus must be preceded by C60 (ATN) or C40 (Data Mode), depending on the desired operation. The commands immediately following are prefixed by a "D".

For assistance in programming and inputting on a console, appendixes A through D provide the following:

- a. Device Talk and Listen Addresses
- b. Bus Commands
- c. Control Word to IBI
- d. Status Word Format (binary representation).

The C and D character inputs will 1) not recognize any non-octal character input (i.e., -:C4W5;68 would be interpreted as :C456), 2) require a CR-LF (carriage return line feed) for

normal termination of an input string (the only exception being after six valid characters are entered an automatic return occurs) 3) only be aborted by an E character console input; a Rubout console input with CR-LF has no affect on the input string.

The following four examples should further clarify the module's operation and interaction with devices on the bus. Other programs can be derived from these examples and used as a troubleshooting aid for system problems. For all examples, remember to check that the hardware switch settings on the IBI and associated devices agree with the designated MYADDR listed in the program.

The first example will toggle the IBI Talk Mode.

```

:S022730                (The Talk Bit is Cleared)
:C110(CR-LF)            (Set Talk)
:S022770                (Talk Set-Status)
:C100(CR-LF)            (Clear Talk and Listen)
:S022630                (Talk and Listen Clear-Status)
:A                      (Exit troubleshooting module)

```

The second example will force the IBI to talk to itself.

```

:C1(CR-LF)              (Set IFC)
:C60(CR-LF)             (Set ATN)
:D43(CR-LF)             (Listen Address) } MYADR 3
:D103(CR-LF)            (Talk Address)  } (IBI switch setting)
:C40(CR-LF)             (Set Data Mode)
:D252(CR-LF)           (Output Pattern to IBI)
:I000252               (Get pattern from IBI)
:A                      (Exit troubleshooting module)

```

The third and fourth examples exercise devices as well as the IBI. For these programming examples, equipment used (all HP types) is a 2100 Series Computer, 2600 Series System Console, 59310B IBI, 5340A Counter, 3490A Multimeter, 5150A Thermal Printer, 59400A RS232 TTY Interface, and a pulse generator (non-programmable). The parameters in the following table indicate the switch settings on the IBI and devices used to select the program addresses.

| DEVICE | DEVICE MYADDR SWITCHES (A5-A1) | PROGRAM ADDRESSES | |
|------------|---|-------------------|--------|
| | | TALK | LISTEN |
| IBI | 20 | 120 | 60 |
| Printer | 25 | — | 65 |
| Counter | 16 | 116 | 56 |
| TTY | 1 | 101 | 41 |
| Multimeter | 26 | 126 | 66 |

The third example sets up a counter to make a measurement, and the counter outputs readings to a printer and TTY. The pulse generator is set for a repetition rate of 100 kHz and is connected to the 1 megohm input port of the counter.

COMPUTER AND IBI TALKING TO COUNTER

```

C1      (Set IFC)
C100    (Disable IBI Talk and Listen)
C60     (Set ATN)
C3      (Set REN)
D137    (UNTALK bus command)
D120    (Talk address IBI)
D56     (Listen address counter)
C40     (Set Data Mode)
D117    }
D61     } (Talk-Listen set up between IBI and devices.)
D123    }
D112    }
D114    }
D110    }
C1      (Set IFC)

```

COUNTER TALKING TO PRINTER AND TTY

```

C1      (Set IFC)
C100    (Disable IBI Talk and Listen)
C60     (Set ATN)
C3      (Set REN)
D137    (UNTALK bus command)
D77     (UNLISTEN bus command)
D116    (Talk address counter)
D65     (Listen address printer)
D41     (Listen address TTY)
C40     (Set Data Mode)
.
.
.
.
.
.
.
C1      (Set IFC)
A       (Exit troubleshooting module)

```

The fourth example sets up a multimeter to take a measurement, and the multimeter outputs readings to a printer and TTY. A 121-ohm resistor is used for measurement.

COMPUTER AND IBI TALKING TO MULTIMETER

| | | |
|------|---|--|
| C1 | (Set IFC) | |
| C100 | (Disable IBI Talk and Listen) | |
| C60 | (Set ATN) | } (Talk-Listen set up between IBI and devices.) |
| C3 | (Set REN) | |
| D137 | (UNTALK bus command) | |
| D77 | (UNLISTEN bus command) | |
| D120 | (Talk address IBI) | |
| D66 | (Listen address multimeter) | |
| C40 | (Set Data Mode) | |
| D122 | } (Programming codes sent to multimeter to make measurement.) | |
| D65 | | |
| D106 | | |
| D61 | | |
| D123 | | |
| D60 | | |
| D124 | | |
| D61 | | |
| D115 | | |
| D61 | | |
| D105 | | |
| C1 | (Set IFC) | |

MULTIMETER TALKING TO PRINTER AND TTY

| | | |
|------|---|---|
| C1 | (Set IFC) | |
| C100 | (Disable IBI Talk and Listen) | |
| C60 | (Set ATN) | } (Talk-Listen set up between devices.) |
| C3 | (Set REN) | |
| D137 | (UNTALK bus command) | |
| D77 | (UNLISTEN bus command) | |
| D126 | (Talk address multimeter) | |
| D65 | (Listen address printer) | |
| D41 | (Listen address TTY) | |
| C40 | (Set Data Mode) | |
| . | } (Multimeter puts data on bus; handshaking sequences take over.) | |
| . | | |
| . | | |
| . | | |
| C1 | (Set IFC) | |
| A | (Exit troubleshooting module) | |

3-4. ERROR INFORMATION AND HALT CODES

Error information and halt codes are contained in table 3-5. However, before interpreting error halts and/or messages, read the following information.

All messages printed on the console will indicate the failing select code (in cable test errors, the failing select code may not actually be at fault).

All messages printed on the console may be expanded where applicable, to include:

```
OUTPUT XXXXXX TO SC XX
INPUT XXXXXX FROM SC XX
EXPECTED INPUT = XXXXXX
```

The first string indicates the control word or data last output to the IBI; the second string indicates the status or data word input from the IBI and the third string indicates the expected status or data.

Most error messages will be followed by a coded error halt where the A-reg = input status and the B-reg = expected status.*

If no console is used, every error halt will be followed, after pressing run, by a secondary halt 106067 where the A-reg = the last control or data word output to the IBI and the B-reg = the failing select code.

*Exceptions are:

If the error halt was encountered during a data transmission the A&B registers represent input data and expected data respectively (these halts are marked with an asterisk in the following table).

If an error is caused by an incorrect IBI flag condition the A&B registers will be clear and are therefore irrelevant.

Table 3-1. IBI Select Code

| SWITCH REGISTER BITS | MEANING |
|-------------------------|---|
| 5-0 | First IBI Select Code under test |
| 11-6 | Second IBI select code under test (If a second PCA is being tested) |
| 15-12 | Not applicable |

Table 3-2. IBI MYADDR Switch Setting

| SWITCH REGISTER BITS | MEANING | SWITCH NOS. (SW2 ON PCA) |
|----------------------|-----------------------------------|--------------------------|
| 4-0 | First IBI MYADDR | 5-1 |
| 5 | Not applicable | — |
| 10-6 | Second IBI MYADDR (if applicable) | 5-1 |
| 15-11 | Not applicable | — |

The MYADDR switches (SW2, switches 1-5 on PCA) may be any position except octal 37 where all switches are open. The REN and IFC jumpers must be open (not grounded) and the SHIELD jumper may be open or closed. When using two interfaces the MYADDR can not be the same.

Table 3-3. Service Request Identification Switch Setting

| SWITCH REGISTER BITS | MEANING | SWITCH NOS. (SW1 ON PCA) |
|----------------------|---|--------------------------|
| 7-0 | First Service Request Identification (SRQ ID)* | 1-8** |
| 15-8 | Second Service Request Identification (SRQ ID) (if applicable)* | 1-8** |

*Only one bit per each interface can be used as a Service Request Identification.
**Switch No. 1-8 equals DIO 1-8.

Table 3-4. Switch Register Control Settings

| SWITCH REGISTER BIT | MEANING IF SET |
|------------------------|--|
| 15 | Reserved |
| 14 | Suppress Error Halts |
| 13 | Reserved |
| 12 | Loop on diagnostic |
| 11 | Suppress Error Messages |
| 10 | Suppress Non-Error Messages (not valid for Troubleshooting Module) |
| 9 | Reserved |
| 8 | Suppress Preset Test |
| 7-4 | Reserved |
| 3 | Do Parallel Poll Request Test (59310B only) |
| 2 | Use second IBI select code in the Troubleshooting Module (if selected, this bit precludes and overrides setting switch register bit 1) |
| 1 | Use first IBI select code in the troubleshooting Module (if bit 2 clear) |
| 0 | Execute cable test |

Table 3-5. Error Information and Halt Codes

| HALT CODE | MESSAGE | COMMENTS |
|-----------|-------------------------------------|---|
| NONE | HPIB 59310 DIAGNOSTIC DSN XXXXXX | INTRODUCTORY MESSAGE ONLY. |
| 102000 | E000 SKF | CLCCF DID NOT CLEAR IBI FLAG FF OR ILLEGAL SKF ON SFS WITH FLAG CLEAR. |
| 102001 | E001 SKF | SRQFLG ACTIVE AND SRQFLGEN DID NOT SET IBI FLAGFF, OR ILLEGAL SKF ON SFC WITH FLAG SET, OR IFC SWITCH IN WRONG POSITION. |
| 102002 | E002 SKF | NO SKF ON SFS IBI WITH FLAG SET. |
| 102003 | E003 SKF | NO SKF ON SFC IBI WITH FLAG CLEAR. |
| 102004 | E004 IEN | IEN LOW (OR I/O INSTRUCTION) DID NOT HOLD OFF INTERRUPT. |
| 102005 | E005 SC XTALK | INSTRUCTION IN A-REG CAUSED FLAG TO CLEAR ON IBI. |
| 102006 | E006 CLC | IBI INTERRUPTED AFTER A CLC IBI. |
| 102007 | E007 INT | IBI DID NOT INTERRUPT. |
| 102010 | E010 IAK | IAK DID NOT DISABLE IBI AFTER AN INTERRUPT. |
| 102011 | E011 INITIAL STATUS FAILURE | PRESET STATUS OF IBI WAS INCORRECT. |
| 102012 | E012 ACTIVE | ACTIVE NOT LOW AFTER A CLEAR ACTIVE COMMAND. |
| 102013 | E013 ACTIVE | ACTIVE NOT HIGH AFTER A SET ACTIVE COMMAND. |
| 102014 | E014 REN | REN NOT HIGH AFTER REN COMMAND. |
| 102015 | E015 REN | REN NOT LOW AFTER A LOCAL COMMAND. |
| 102016 | E016 ATN | ATN NOT SET AFTER AN ATN COMMAND. |
| 102017 | E017 ATN | ATN NOT CLEAR AFTER A DATA MODE COMMAND. |
| 102020 | E020 ATN | ATN NOT SET AFTER AN ATN COMMAND. |
| 102021 | E021 ATN | ATN NOT LOW WITH ACTIVE CLEAR. |
| 102022 | E022 ATN | ATN NOT HIGH WITH ACTIVE SET. |
| 102023 | E023 ATN | ATN NOT CLEAR AFTER A DATA MODE COMMAND. |
| 102024 | E024 TALK | TALK NOT HIGH AFTER A SET TALK COMMAND. |
| 102025 | E025 TALK | TALK NOT LOW AFTER A CLEAR TALK COMMAND. |
| 102026 | E026 LISTEN | LISTEN NOT HIGH AFTER A SET LISTEN COMMAND. |

Table 3-5. Error Information and Halt Codes (Continued)

| HALT CODE | MESSAGE | COMMENTS |
|-----------|-----------------|---|
| 102027 | E027 LISTEN | LISTEN NOT LOW AFTER A CLEAR LISTEN COMMAND. |
| 102030 | E030 IFC OS | ACTIVE WAS NOT HIGH AFTER AN IFC. |
| 102031 | E031 IFC OS | IFC OS-DID NOT STAY TRIGGERED AFTER 40 MICROSECONDS. |
| 102032 | E032 IFC OS | IFC OS DID NOT CLEAR AFTER A ONE MILLISECOND DELAY. |
| 102033 | E033 REN OR IFC | EITHER REN WASN'T CLEARED OR IFC WASN'T SET BY CRS. |
| 102034 | E034 EOR | EOR FLAG STATUS LOW AFTER A SINPI WAS EXECUTED WITH ATN AND EOI HIGH. |
| 102035 | E035 EOR | EOR FLAG STATUS HIGH AFTER A SINPD WAS EXECUTED WITH EOI LOW. |
| 102036 | E036 EOR | CLRINTFLG DID NOT CLEAR EOR FLAG. |
| 102037 | E037 EOR | ATN CLEAR DID NOT DISABLE EOI TO EOR FLAG. |
| 102040 | E040 EOR | EOR FLAG STATUS HIGH AFTER A SINPD WAS EXECUTED WITH EOI LOW. |
| 102041 | E041 EOR | IFC DID NOT CLEAR EOI FF. |
| 102042 | E042 I-O FLAG | IBI FLAG SET AFTER A CLCCF. |
| 102043 | E043 I-O FLAG | IBI FLAG SET WITH EOR FLAG HIGH AND EORFLGEN LOW. |
| 102044 | E044 EOR FLAG | IBI FLAG NOT SET WITH EOR FLAG AND EORFLGEN HIGH. |
| 102045 | E045 EOR FLAG | CRS DID NOT CLEAR EORFLGEN. |
| 102046 | E046 EOR FLAG | CG3MC DID NOT CLEAR EORFLGEN. |
| 102047 | E047 EOR FLAG | IBI FLAG SET WITH EOR FLAG LOW AND EORFLGEN HIGH. |
| 102050 | E050 HANDSHAKE | IFC DID NOT FORCE RFD AND DAC HIGH AND DAV LOW. |
| 102051 | E051 HANDSHAKE | RFD FF HIGH AND LISTEN SET DID NOT FORCE RFD, DAC AND DAV LOW. |
| 102052 | E052 HANDSHAKE | RFD FF LOW AND LISTEN SET DID NOT FORCE DAC AND DAV LOW AND RFD HIGH. |
| 102053 | E053 HANDSHAKE | INITF DID NOT SET RFD FF. |

Table 3-5. Information and Halt Codes (Continued)

| HALT CODE | MESSAGE | COMMENTS |
|-----------|----------------|--|
| 102054 | E054 HANDSHAKE | EOR FLAG HIGH AND ATN AND RFD FF LOW DID NOT FORCE RFD, DAC AND DAV LOW. |
| 102055 | E055 HANDSHAKE | ATN AND EOI HIGH DID NOT FORCE DAV AND DAC LOW AND RFD HIGH. |
| 102056 | E056 HANDSHAKE | EOR FLAG CLEAR DID NOT FORCE DAV AND DAV AND DAC LOW AND RFD HIGH. |
| 102057 | E057 HANDSHAKE | RFD FF SET AND LISTEN CLEAR DID NOT FORCE RFD AND DAC HIGH AND DAV LOW. |
| 102060 | E060 HANDSHAKE | LISTEN AND ATN HIGH DID NOT FORCE DAC AND DAV LOW AND RFD HIGH. |
| 102061 | E061 ORA FLAG | INITF DID NOT FORCE ORA FLAG HIGH. |
| 102062 | E062 ORA FLAG | OWRL FF CLEAR DID NOT FORCE ORA FLAG LOW. |
| 102063 | E063 ORA FLAG | IBI FLAG ILLEGALLY SET BY ORA LOGIC. |
| 102064 | E064 ORA FLAG | ORAFLGEN AND ORA FLAG HIGH DID NOT SET THE IBI FLAG. |
| 102065 | E065 ORA FLAG | ORAFLGEN WAS NOT CLEARED BY CG3MC. |
| 102066 | E066 ORA FLAG | CRS DIDN'T CLEAR ORAFLGEN. |
| 102067 | E067 IRL FLAG | IRL FLAG STATUS LOW AFTER SINPD SHOULD HAVE CLOCKED IRL FF HIGH. |
| 102070 | NONE | TEST SELECT CODE(S) HAVE BEEN PROPERLY LOADED. SET S-REG 11-6=SECOND TEST SC MYADDR (IF APPLICABLE) 5-0 = FIRST TEST SC MYADDR. PRESS RUN. |
| 102071 | NONE | MYADDR TEST VALUES HAVE BEEN PROPERLY LOADED. SET S-REG 15-8=SECOND TEST SC MYADDR. PRESS RUN. |
| 102071 | NONE | MYADDR TEST VALUES HAVE BEEN PROPERLY LOADED. SET S-REG 15-8=SECOND TEST SC SRQID (IF APPLICABLE). 7-0 = FIRST TEST SC SRQID. PRESS RUN. |
| 102074 | NONE | HARDWARE CONFIGURATION INPUT COMPLETE. SELECT PROGRAM OPTIONS (SEE TABLE 1-1) AND PRESS RUN. |
| 102073 | NONE | IBI SELECT CODE INPUT ERROR. (SELECT CODE <10) ENTER PROPER VALUE AND PRESS RUN. |
| 102077 | PASS XXXXX | END OF TEST (A NUMBER OF PASSES COMPLETED). |
| 103000 | E100 IRL FLAG | IRL FF WAS NOT CLEARED BY A LIA IBI INSTRUCTION. |

Table 3-5. Error Information and Halt Codes (Continued)

| HALT CODE | MESSAGE | COMMENTS |
|-----------|---------------|--|
| 103001 | E101 IRL FLAG | SINPD DID NOT SET THE IRL FF. |
| 103002 | E102 IRL FLAG | LIA IBI INSTRUCTION AND SINPD DID NOT CLEAR THE IRL FF. |
| 103003 | E103 IRL FLAG | IBI FLAG ILLEGALLY SET BY IRL LOGIC. |
| 103004 | E104 IRL FLAG | IBI FLAG NOT SET WITH IRL FLAG AND IRLFLGEN HIGH. |
| 103005 | E105 IRLFLAG | CRS DIDN'T CLEAR IRLFLGEN. |
| 103006 | E106 IRLFLAG | CG3MC DIDN'T CLEAR IRLFLGEN. |
| 103007 | E107 SRQFLG | SRQFLG STATUS LOW WITH ACTIVE AND THE IFCFLG HIGH. |
| 103010 | E110 SRQFLG | SRQFLG STATUS HIGH WITH ACTIVE CLEAR AND THE IFCFLG HIGH. |
| 103011 | E111 SRQFLG | CG3MC DIDN'T CLEAR SRQ FLGEN. |
| 103012 | E112 SRQFLG | IBI FLAG LOW WITH SRQFLG AND SRQFLGEN HIGH. |
| 103013 | E113 SRQFLG | CRS DIDN'T CLEAR SRQFLGEN. |
| 103014 | E114 SRQFLG | SRQFLGEN ILLEGALLY SET WITH CONTROL WORD BIT 7 LOW. |
| 103015 | E115 SRQFLG | DATA OUTPUT TO IBI WAS INTERPRETED AS A CONTROL WORD. |
| 103016 | E116 SRQFLG | SRQFLGEN NOT SET BY CONTROL WORD OUTPUT. |
| 103017 | E117 SRQFLG | IBI FLAG ILLEGALLY SET WITH IFCFLG AND ACTIVE CLEAR. |
| 103020 | E120 SRQFLG | SRQFLG NOT HIGH WITH LISTEN AND RFD FF LLOW AND GENSRQEN HIGH. |
| 103021 | E121 SRQFLG | SRQFLG NOT LOW WITH TALK AND LISTEN SET. |
| 103022 | E122 SRQFLG | SRQFLG NOT LOW WITH GENSRQEN, RFD FF AND LISTEN LOW. |
| 103023 | E123 SRQFLG | SRQFLG NOT LOW WITH TALK, OBRFLG AND GENSRQEN HIGH. |
| 103024 | E124 SRQFLG | CRS DID NOT GENSRQEN. |
| 103025 | E125 SRQFLG | GENSRQEN ILLEGALLY SET BY MODE CONTROL. |

Table 3-5. Error Information and Halt Codes (Continued)

| HALT CODE | MESSAGE | COMMENTS |
|-----------|---------------|--|
| 103026 | E126 SRQFLG | SRQFLG NOT LOW WITH TALK, OBRLFLG AND GENSRQEN HIGH. |
| 103027 | E127 SRQFLG | SRQFLG NOT HIGH WITH LISTEN AND RFDF LOW AND GENSTRQEN HIGH. |
| 103030 | E130 SRQFLG | SRQFLG NOT HIGH WITH LISTEN AND RFDF LOW AND GENSRQEN HIGH. |
| 103031 | E131 SRQFLG | SRQFLG NOT LOW WITH LISTEN LOW AND RFDF AND GENSRQEN HIGH. |
| 103032 | E132 REN | REN STATUS LOW WITH REN FF HIGH AND SRQ ON THE IB LOW. |
| 103033 | E133 SRQFLG | SRQFLG NOT HIGH WITH TALK LOW AND GENSRQEN AND OBRLFLG HIGH. |
| 103034 | E134 SRQFLG | SRQFLG NOT LOW WITH OBRLFLG AND TALK LOW AND GENSTRQEN HIGH. |
| 103035 | E135 SRQFLG | SRQFLG NOT HIGH WITH TALK LOW AND GENSRQEN AND OBRLFLG HIGH. |
| 103036 | E136 SRQFLG | SRQFLG NOT LOW WITH TALK, GENSRQEN AND OBRLFLG HIGH. |
| 103037 | E137 SRQFLG | SRQFLG NOT LOW WITH TALK AND GENSRQEN LOW AND OBRLFLG HIGH. |
| 103040 | E140 SRQFLG | SRQFLG NOT HIGH WITH SPMFLG SET AND ACTIVE LOW. |
| 103041 | E141 SRQFLG | SRQFLG NOT LOW WITH SPMFLG CLEAR AND ACTIVE LOW. |
| 103042 | E142 SPM FLAG | DATA IN A REGISTER ILLEGALLY SET THE SPMFLG FF. |
| 103043 | E143 SPM FLAG | DATA=30(OCTAL) DID NOT SET THE SPMFLG FF. |
| 103044 | E044 SPM FLAG | DATA=31(OCTAL) DID NOT CLEAR THE SPMFLG FF. |
| 103045 | E145 SRQFLG | SRQFLG HIGH WITH ACTIVE AND SMPFLG FF HIGH. |
| 103046 | E146 PPPID | PPPID ENCODED INCORRECTLY. |
| 103047 | E147 PPPID | IFC DID NOT FORCE PPPID TO 11(OCTAL). |
| 103050* | E150 BUS DATA | DATA ON IB IS NOT ALL ONES WITH DATA BUFFERS DISABLED. |
| 103051* | E151 PPPID | PPPID ON IB DATA LINES WAS NOT EQUAL TO THE EXPECTED PPPID. |

Table 3-5. Error Information and Halt Codes (Continued)

| HALT CODE | MESSAGE | COMMENTS |
|-----------|-----------------|--|
| 103052 | E152 MY ADDR | TALK AND/OR LISTEN WAS SET WITHOUT THE CONTROL BITS 5 AND 6. |
| 103053 | E153 MY ADDR | A TALK AND/OR LISTEN ADDRESS WAS DECODED WHICH DOESN'T EQUAL THE EXPECTED MYADDR. |
| 103054 | E154 MY ADDR | NO LISTEN ADDRESS WAS DECODED. |
| 103055 | E155 MY ADDR | NO TALK ADDRESS WAS DECODED. |
| 103056 | E156 LISTEN | LISTEN WAS NOT CLEARED BY IFC. |
| 103057 | E157 TALK | TALK WAS NOT CLEARED BY IFC. |
| 103060 | E160 TALK | TALK WAS NOT CLEARED BY UNTALK. |
| 103061 | E161 TALK | TALK ILLEGALLY SET WITH PROPER ADDRESS BUT NO DAV. |
| 103062 | E162 TALK | TALK ILLEGALLY CLEARED WITH PROPER ADDRESS BUT NO DAV. |
| 103063 | E163 LISTEN | LISTEN ILLEGALLY SET WITH PROPER ADDRESS BUT NO DAV. |
| 103064 | E164 LISTEN | LISTEN ILLEGALLY CLEARED WITH UNLISTEN ADDRESS BUT NO DAV. |
| 103065* | E165 BUS DATA | DATA OUTPUT TO THE IB AND STROBED BY SINPD DID NOT COMPARE (8-BIT WORD ONLY). |
| 103066* | E166 BUS DATA | DATA OUTPUT TO THE IB AND STROBED TWICE BY SINPD IN THE PACKEN MODE DID NOT COMPARE (16-BIT WORD). |
| 103067* | E167 BUS DATA | PACKEN CLEAR DID NOT CLEAR INPUT REGISTER BITS 15-8. |
| 106000 | E200 ASCII MODE | AN ASCII MODE LOCAL COMMAND DID NOT EXECUTE. |
| 106001 | E201 ASCII MODE | ASCII MODE LOCAL ALLOWED TO EXECUTE ILLEGALLY WITH OBRL FF SET. |
| 106002 | E202 ASCII MODE | OBR BIT 5 DIDN'T DISALLOW AN ASCII MODE LOCAL COMMAND TO EXECUTE. |
| 160003 | E203 ASCII MODE | OBR BIT 6 DIDN'T DISALLOW AN ASCII MODE LOCAL COMMAND TO EXECUTE. |
| 106004 | E204 ASCII MODE | ASCII MODE CONTROL LOW DIDN'T DISALLOW AN ASCII MODE LOCAL COMMAND TO EXECUTE. |
| 106005 | E205 ASCII MODE | CRS DIDN'T CLEAR ASCII MODE CONTROL. |

Table 3-5. Error Information and Halt Codes (Continued)

| HALT CODE | MESSAGE | COMMENTS |
|-----------|-----------------|---|
| 106006 | E206 ASCII MODE | DATA ON IB= 12(OCTAL) DID NOT GENERATE AN ASCII MODE EOI OR HARDWARE EOR. |
| 106007 | E207 ASCII MODE | ASCII MODE LOW DID NOT HOLD OFF ASCII MODE EOI OR HARDWARE EOR. |
| 106010 | E210 ASCII MODE | ILLEGAL DECODE OF ASCII MODE EOI WITH DATA ON IB NOT EQUAL TO 12 (OCTAL) OR 33 (OCTAL). |
| 106011 | E211 EOR | ILLEGAL DECODE OF A HARDWARE EOR WITH DATA ON IB NOT EQUAL TO 12 (OCTAL) OR 33 (OCTAL). |
| 106012 | E212 EOR | ILLEGAL EOR GENERATED FROM IB DATA = 52 (OCTAL). |
| 106013 | E213 EOR | ILLEGAL EOR GENERATED FROM IB DATA = 112 (OCTAL). |
| 106014 | E214 ASCII MODE | DATA NOT EQUAL TO 33 (OCTAL) IN THE OBR GENERATED AN ILLEGAL ASCII MODE IFC. |
| 106015 | E215 ASCII MODE | OBR DATA=33 (OCTAL) DID NOT TRIGGER AN ASCII MODE IFC. |
| 106016 | E216 ASCII MODE | OBR DATA#2 ILLEGALLY GENERATED AN ASCII MODE REMOTE. |
| 106017 | E217 ASCII MODE | OBR DATA=2 DIDN'T GENERATE AN ASCII MODE REMOTE. |
| 106020 | E220 ASCII MODE | OBR DATA#3 ILLEGALLY GENERATED AN ASCII MODE LOCAL. |
| 106021 | E221 ASCII MODE | OBR DATA#16 (OCTAL) OR 33 (OCTAL) ILLEGALLY GENERATED AN ASCII MODE ATN. |
| 106022 | E222 ASCII MODE | OBR DATA=16 (OCTAL) DIDN'T GENERATE AN ASCII MODE ATN. |
| 106023 | E022 ASCII MODE | OBR DATA#17 (OCTAL) ILLEGALLY GENERATED AN ASCII MODE CATN. |
| 106024 | E224 ASCII MODE | OBR DATA=17(OCTAL) DIDN'T GENERATE AN ASCII MODE CATN. |
| 106025 | E225 ASCII MODE | OBR DATA#2,3,16(OCTAL), 17 (OCTAL) OR 33 (OCTAL) GENERATED AN ILLEGAL ASCII MODE DAV. |
| 106026 | E226 ASCII MODE | OBR DATA=2 DIDN'T GENERATE AN ASCII MODE DAV. |
| 106027 | E227 ASCII MODE | OBR DATA=3 DIDN'T GENERATE AN ASCII MODE DAV. |

Table 3-5. Error Information and Halt Codes (Continued)

| HALT CODE | MESSAGE | COMMENTS |
|-----------|-----------------|--|
| 106030 | E230 ASCII MODE | OBR DATA= 16(OCTAL) DIDN'T GENERATE AN ASCII MODE DAV. |
| 106031 | E231 ASCII MODE | OBR DATA= 17 (OCTAL) DIDN'T GENERATE AN ASCII MODE DAV. |
| 106032 | E232 ASCII MODE | OBR DATA= 33 (OCTAL) DIDN'T GENERATE AN ASCII MODE DAV. |
| 106033 | E233 ORA FLAG | THE IBI WHILE TALKING TO ITSELF, DID NOT SET THE ORA FF. |
| 106034 | E234 IRL FLAG | THE IBI WHILE TALKING TO ITSELF, DID NOT SET THE IRL FF. |
| 106035* | E235 HANDSHAKE | THE IBI, WHILE TALKING TO ITSELF, DID NOT TRANSFER PROPER DATA. |
| 106036 | E236 IRL FLAG | WITH LISTEN CLEAR, THE IBI DID AN ILLEGAL HANDSHAKE WHICH SET THE IRL FF. |
| 106037 | E237 ORA FLAG | WITH LISTEN CLEAR, THE IBI DID AN ILLEGAL HANDSHAKE WHICH SET THE ORA FF. |
| 106040* | E240 HANDSHAKE | WITH LISTEN CLEAR, THE IBI DID AN ILLEGAL HANDSHAKE WHICH TRANSFERRED DATA. |
| 106041* | E241 HANDSHAKE | WITH TALK CLEAR, THE IBI DID AN ILLEGAL HANDSHAKE WHICH TRANSFERRED DATA. |
| 106042* | E242 REN | IB DATA BIT 8 LOW DRAGGED REN LOW ON IB. |
| 106043 | E243 DMA | DMA OUTREQFLG AND NDMARWSEL DID NOT GENERATE A DMA SRQ. |
| 106044 | E244 DMA | AN ILLEGAL DMA SRQ WAS GENERATED WITH NDMAOUTREQFLG HIGH AND IRLFLG LOW. |
| 106045 | E245 DMA | AN ILLEGAL DMA SRQ OCCURRED WITH NDMAOUTREQFLG HIGH AND DMARWSEL SET. |
| 106046 | E246 DMA | AN ILLEGAL DMA SRQ OCCURRED WITH IRLFLG SET, NDMARWSEL AND DMAOUTREQ-FLG. |
| 106047 | E247 DMA | IRLFLG AND DMARWSEL DIDN'T GENERATE A DMA SRQ. |
| 106050 | NONE | INFORMATION HALT. A CABLE TEST CANNOT BE EXECUTED WITH ONLY ONE IBI UNDER TEST. (CLEAR SWITCH REGISTER BIT 0 AND PRESS RUN TO CONTINUE). |
| 106051 | E251 CABLE | THE CABLING DID NOT TRANSMIT IFC. |

Table 3-5. Error Information and Halt Codes (Continued)

| HALT CODE | MESSAGE | COMMENTS |
|-----------|-------------------------------|---|
| 106052* | E252 CABLE | THE CABLING DID NOT TRANSMIT DATA OR THE HANDSHAKE SIGNALS (DAV, RFD, DAC) PROPERLY. |
| 106053 | E253 CABLE | THE CABLING DID NOT TRANSMIT REN. |
| 106054 | E254 CABLE | THE CABLING DID NOT TRANSMIT SRQ. |
| 106055 | E255 CABLE | THE CABLING DID NOT TRANSMIT ATN. |
| 106056 | H256 PRESS PRESET(s) AND RUN | INFORMATION HALT. PRESS PRESET(s) AND RUN. |
| 106057 | E257 PRESET DID NOT CLEAR IBI | PRESSING PRESET DIDN'T RESET THE IBI. |
| 106060 | E260 PP REQUEST | IBI FLAG NOT SET WITH PPLEX AND PPREQ HIGH. |
| 106061 | E261 PP REQUEST | IBI FLAG SET WITH PPLEX LOW. ATN, EOI HIGH AND ACTIVE LOW. |
| 106062 | E262 PP REQUEST | IBI FLAG SET WITH PPLEX LOW. ACTIVE, EOI HIGH AND ATN LOW. |
| 106063 | E263 PP REQUEST | IBI FLAG SET WITH PPLEX LOW. ATN, ACTIVE HIGH AND EOI LOW. |
| 106064 | E264 PP REQUEST | IBI FLAG SET WITH PPREQ LOW. |
| 106067 | NONE | SECONDARY HALT TO INITIAL ERROR HALT A-REG=CONTROL OR DATA WORD LAST OUTPUT TO IBI B-REG=SC UNDER TEST WHEN FAILURE OCCURRED. |
| 106077 | NONE | ILLEGAL TRAP CELL HALT. OPERATOR MAY FIND RETURN POINT FROM ILLEGAL INTERRUPT IN THE P-REG. |
| NONE | PASS XXXXX | END OF PASS MESSAGE. |

DEVICE TALK AND LISTEN ADDRESSES

APPENDIX

A

| TALK ADDRESSES | | | DEVICE MYADDR SWITCHES (A5-A1) |
|-----------------------------|---------|------------|--------------------------------|
| Octal | Decimal | ASCII Char | Octal |
| 100 | 64 | @ | 0 |
| 101 | 65 | A | 1 |
| 102 | 66 | B | 2 |
| 103 | 67 | C | 3 |
| 104 | 68 | D | 4 |
| 105 | 69 | E | 5 |
| 106 | 70 | F | 6 |
| 107 | 71 | G | 7 |
| 110 | 72 | H | 10 |
| 111 | 73 | I | 11 |
| 112 | 74 | J | 12 |
| 113 | 75 | K | 13 |
| 114 | 76 | L | 14 |
| 115 | 77 | M | 15 |
| 116 | 78 | N | 16 |
| 117 | 79 | O | 17 |
| 120 | 80 | P | 20 |
| 121 | 81 | Q | 21 |
| 122 | 82 | R | 22 |
| 123 | 83 | S | 23 |
| 124 | 84 | T | 24 |
| 125 | 85 | U | 25 |
| 126 | 86 | V | 26 |
| 127 | 87 | W | 27 |
| 130 | 88 | X | 30 |
| 131 | 89 | Y | 31 |
| 132 | 90 | Z | 32 |
| 133 | 91 | [| 33 |
| 134 | 92 | \ | 34 |
| 135 | 93 |] | 35 |
| 136 | 94 | ^ | 36 |
| 137 | 95 | _ | |
| Used as UNTALK command only | | | |

| LISTEN ADDRESSES | | | DEVICE MYADDR SWITCHES (A5-A1) |
|-------------------------------|---------|------------|--------------------------------|
| Octal | Decimal | ASCII Char | Octal |
| 40 | 32 | SPACE | 0 |
| 41 | 33 | ! | 1 |
| 42 | 34 | " | 2 |
| 43 | 35 | # | 3 |
| 44 | 36 | \$ | 4 |
| 45 | 37 | % | 5 |
| 46 | 38 | & | 6 |
| 47 | 39 | ' | 7 |
| 50 | 40 | (| 10 |
| 51 | 41 |) | 11 |
| 52 | 42 | * | 12 |
| 53 | 43 | + | 13 |
| 54 | 44 | COMMA | 14 |
| 55 | 45 | - | 15 |
| 56 | 46 | . | 16 |
| 57 | 47 | / | 17 |
| 60 | 48 | 0 | 20 |
| 61 | 49 | 1 | 21 |
| 62 | 50 | 2 | 22 |
| 63 | 51 | 3 | 23 |
| 64 | 52 | 4 | 24 |
| 65 | 53 | 5 | 25 |
| 66 | 54 | 6 | 26 |
| 67 | 55 | 7 | 27 |
| 70 | 56 | 8 | 30 |
| 71 | 57 | 9 | 31 |
| 72 | 58 | : | 32 |
| 73 | 59 | ; | 33 |
| 74 | 60 | < | 34 |
| 75 | 61 | = | 35 |
| 76 | 62 | > | 36 |
| 77 | 63 | ? | |
| Used as UNLISTEN command only | | | |

BUS COMMANDS

APPENDIX

B

UNIVERSAL COMMANDS

| Octal | Decimal | ASCII Char | Function |
|-------|---------|------------|-------------------------------|
| 21 | 17 | DC1 | LL0 Local Lockout |
| 24 | 20 | DC4 | DCL Device Clear |
| 25 | 21 | NAK | PPU Parallel Poll Unconfigure |
| 30 | 24 | CAN | SPE Serial Poll Enable |
| 31 | 25 | EB | SPD Serial Poll Disable |

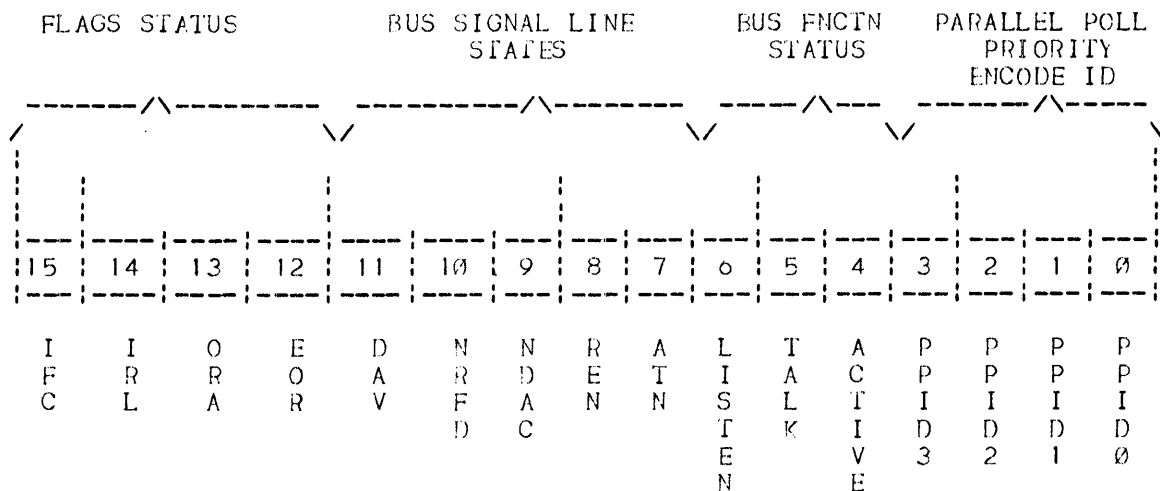
ADDRESSED COMMANDS

| | | | |
|----|---|-----|-----------------------------|
| 1 | 1 | SOH | GIL Go to Local |
| 4 | 4 | EOT | SDC Selective Device Clear |
| 5 | 5 | ENC | PPC Parallel Poll Configure |
| 13 | 8 | BS | GEI Group Execute Trigger |

STATUS WORD FORMAT

APPENDIX

D



Note: Bit 4 is the status of the controller (active or inactive).



HEWLETT-PACKARD COMPANY
11000 WOLFE ROAD, CUPERTINO, CALIFORNIA, 95014

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MICROFICHE PART NO. 59310-90062

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