Device Introduction

The HP 59307A\(^1\) provides two DC to 500 MHz, 50 ohm switches (4 pole single throw) which are optimized for fast rise time (one nanosecond) pulse waveforms. These switches can be controlled either manually from front-panel push buttons or remotely from the HP-IB.

Under program control, the switches are operated by addressing the 59307A to listen, and then sending either the ASCII character A or B followed by the switch number (1 through 4). This causes the common switch port for switch A or switch B to be connected to the selected switch position. A local RESET push button lets the operator assume front-panel control of the instrument if a local lockout command has not been applied to the 59307A.

The VHF switch is a listen-only device. Data messages may be sent to the device to select input channels, but the device is not capable of returning messages to the computer.

Addressing

Setting the 59307A address is straightforward. The rear panel can be seen in figure 2-1. Viewed from the back, when the box is rotated onto its left side, the switches can be read in binary. Address 25B is set at the factory. As an aid for address setting, the switches are also described on the underside of the box.

System Preparations

Lu Assignment

One LU will be needed for the 59307A. The File Manager command,

\[
:SYLU,22,10,25B
\]

will assign LU 22 to EQT 10. The device address of the 59307A will be 25 octal.

Output Buffering

Place off buffering, until the device is checked out. From File Manager,

\[
:SYEQ,10,UN
\]

will unbuffer EQT 10. Note that if switch timing is critical, the buffering option may cause timing problems and should be left off.

Time-out

Time-out is an error condition for this device. Remember that time-out errors may be optionally evaluated by the operating system or the user’s program by setting the device configuration word. The 59307A will cause a time-out to occur only if the hardware malfunctions, the listen address is set improperly, or the bus is inoperative.

Because operator intervention is usually required to correct these problems, one alternative is to let the operating system process the time-out (i.e., set the 59307A down) when it occurs. The device configuration word defaults to operating system error processing.

The user program can process time-out errors when the E bit of the configuration word is set to one (see figure 2-2). The procedure in this case is to call the subroutine \texttt{IBERR} after each I/O request.\(^2\)

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\(^1\)The 59307A VHF Switch Operating and Service Manual (part number, 59307-90001) contains complete information pertaining to the instrument. This note should also be used in conjunction with Application Note 401-1 (5953-2800).

\(^2\)See the HP-IB User’s Manual (part no. 59310-90064) for more information. Appendix C of that manual describes \texttt{IBERR}, \texttt{REMOTE}, and \texttt{LOCAL}.\n
1. **Fuse:** A 0.5 amp slow-blow fuse is required for either 115-volt operation or 230-volt operation.

2. **Digital Bus 1.0 Loads connector:** A 24-pin connector used to convey data and programming instructions to the 59307A. The "1.0 LOADS" label indicates that the instrument represents the normal allowable standard load for one instrument on the Interface Bus (see Table 1-2).

3. **AC Input Connector:** Ac power receptacle. IEC type with offset pin connected to the chassis. Accepts 115-volts ± 10%, 48 to 440 Hz. Maximum power draw is six volt-amperes.

4. **Address Switches:** The bottom five switches are used to assign an address code to the 59307A. Switches 6 and 7 are not used.

5. **Switch B Input/Output Connectors:** Front-panel switch positions or remote programming determines the connection of connectors 1, 2, 3, or 4 to common connector B.

6. **Switch A Input/Output Connectors:** Front-panel switch positions or remote programming determines the connection of connectors 1, 2, 3, or 4 to common connector A.

Figure 2-1. 59307A Address Switches
Configuration Word

The device configuration word (figure 2-2) will default to the correct format when DMA has not been allocated. This can be assured by setting the D bit to zero. From File Manager,

:CN,22,25B,17000B

specifies no DMA, and system error checking. The File Manager command,

:CN,22,25B,17400B

specifies no DMA, and user program error checking.

Remote

The 59307A must be set to remote before it can be programed. From File Manager the request,

:CN,22,16B

will put the 59307A, LU 22 into remote.¹ From a FORTRAN program,

CALL REMOTE(22)

will put LU 22 into remote.

Front panel operator control may be restored by returning the instrument to local. The File Manager request,

:CN,1BLU,17B

or the FORTRAN request,

CALL LOCAL (1BLU)

will perform the operation.² When returning the bus to local, special care must be taken to insure that other devices on the bus are not affected. The local request is not a device-specific command. When the command is sent, all HP-IB devices in remote and on the same bus will be returned to local.

Programming

NOTE

Because end-of-record terminators must be suppressed, using File Manager for sending data messages to the 59307A is not suggested.

The 59307A is a listen-only device that communicates in ASCII. This means that the instrument will perform useful tasks when programmed with ASCII commands, but is not capable of returning any information to the HP 1000 computer.

| 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 |
| S R D I* J O P* E X X X X X X X X X |
| 0 0 0 1 1 1 1 0 0 0 0 1 0 1 0 1 |
| 0 1 7 0 2 5 |

S=0  I/O REQUEST NOT ABORTED ON AN SRQ.
R=0  NO I/O RESTART ATTEMPT AFTER SRQ.
D=0  DMA IS NOT ALLOCATED FOR THIS DEVICE.
I=1  REQUIRE AN EDI FROM DEVICE WITH THE LAST BYTE.
J=1  D=1  ISSUE AN EDI WITH THE LAST BYTE.
P=1  E=0  HP-IB ERRORS WILL ABORT THE PROGRAM.

Figure 2-2. 59307A Configuration Word Format
The VHF switch is a device which conforms to normal ASCII communication methods except that end-of-record terminators must be suppressed. There is a specific set of ASCII characters which the 59307A recognizes. Other extraneous characters (blanks, commas, carriage returns, linefeeds, etc.) should be avoided.

Table 2-1 shows a complete list of 59307A programming commands. Notice that two channels, A or B are selectable, and that each channel has four switch positions. Figure 2-1 shows a picture of the 59307A rear panel and the switch layouts for channels A and B. Figure 2-3 also shows a schematic diagram. The switch outputs can be connected to one of the four inputs.

To close relay 3 in section A and relay 4 in section B of the VHF switch, the characters "A3B4" should be sent.

Basically the VHF switch operates in one of two modes, Channel A mode or Channel B mode. Once the alphabetic character A is sent, the 59307A remains on Channel "A" until "B" is sent. The numbers 1, 2, 3, or 4 are then sent, changing the switch position. The alphabetic character need not be repeated while selecting 1, 2, 3, or 4 on the same channel.

When a user program must switch back and forth (figure 2-4), the characters "A" and "B" must be sent.

The program in figure 2-4 is one which may be effectively used to rotate both channels A and B to see if they operate properly. The channel must be selected each time a request is made. Note that the underline character is used at the end of each message to suppress EORs (i.e., carriage returns and linefeeds).

![Diagram](image)

**Table 2-1. 59307A Programming Commands**

<table>
<thead>
<tr>
<th>ASCII CODE</th>
<th>59307A RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Programs instrument to connect one of the A group connectors 1, 2, 3, or 4 to common connector A. Specific connection depends on the succeeding code in program sequence.</td>
</tr>
<tr>
<td>B</td>
<td>Programs instrument to connect one of the B group connectors 1, 2, 3, or 4 to common connector B. Specific connection depends on the succeeding code in the program sequence.</td>
</tr>
<tr>
<td>1, 2, 3, 4</td>
<td>These codes select which connector (1, 2, 3, or 4) is to be connected to the appropriate common connector A or B. For example, if an ASCII A is succeeded by an ASCII 2, connector 2 and common connector A are connected together.</td>
</tr>
</tbody>
</table>

**Local Lockout**

The 59307A has on its front panel, a "LOCAL" switch for manually returning the box to front panel control. When the switch is pressed, the 59307A defaults to the Channel A or B positions (1,2,3,4) manually selected on the panel. Note that during this time, the VHF switch will continue accepting HP-IB information, but ignores programming instructions. The front panel button "LOCAL" may be "LOCKED OUT" (disabled) by sending the "LOCAL LOCKOUT" command from FORTRAN,

```
CALL LL0C(1BLU)
```

Note that the message must be sent to the bus logical unit (device address zero) and not the device logical unit. Local Lockout is not a device dependent function. All HP-IB devices (addressed or not addressed) which recognize this message will respond.
Intersecting office...

gramming some other activities you will notice some
program in Figure 2-4. If the computer is multi-
running through the eyes of the mask, then run the
Figure 2-4. Cut out the eyes and head of the mask and
Figure 2-7 is to be used with the test program given in

Figure 2.4. Mask for 593074A

CUT OUT

CUT OUT
Performance

VHF switching response is limited by the speed at which its relays can function. The 59307A specifications indicate that relay settling time is 20 ms, which limits switching to 50 channels per second. This rate may be controlled using HP 1000 software as shown in figure 2-5.

The CALL EXEC statement in line 16 allows the user program to wait for the amount of time determined by IRES and IOF (shown in figure 2-6).

The RTE operating system will schedule B307 again after a time determined by IRES and IOF. The value of IRES is the time resolution (figure 2-6). The value IOF indicates the number of time units determined by IRES. For example, if IRES is set to 2 (i.e., "seconds") and IOF is set to -5, the program will begin execution again in 5 seconds.

Remember that a given offset of time is required to initiate an I/O request in the RTE operating system. Before any 59307A channel may be selected, this "setup" time (typically 2 to 8 ms) will be incurred.

When using the 59307A to switch inputs of a measuring instrument such as a digital voltmeter or time interval counter, the statements to trigger and input a reading to the HP 1000 would be entered after line 16 appearing in the program (figure 2-5).

0001   FTN4,L
0002   PROGRAM A307(3,32767),03-08-79 (0W6) TEST 59307A
0003   INTEGER INPRM,GTDLU
0004   COMMON ILU,ILST,IDLU
0005   COMMON IERROR/YES,NO
0006   IF(INPRM(ID),EQ.YES) GO TO 8 Obtain input parameters.
0007   DNAM=59307.
0008   IN=1
0009   IF(GTDLU(DNAM,IN,IDLU),EQ.NO) STOP Device's model number.
0010   WRITE(ILU,445)IDLU,DNAM Instrument number.
0011   445 FORMAT("DEVICE LU "12 IS ASSIGNED TO THE HP "F5.0") Get the device LU. See AN 401-1 (5953-2800).
0012   8 DO 9 I=2,4
0013   9 DO 12 K=1,5000 Output to the 59307A.
0014   12 CONTINUE
0015   J=5-1
0016   9 WRITE(ILU,10)I,J
0017   10 FORMAT(\"A\"11\"B\"11\"_\") The \"\"_\" is used to suppress the CRLF.
0018   DO 20 J=2,4
0019   20 DO 13 K=1,5000
0020   13 CONTINUE
0021   20 WRITE(ILU,10)I,J
0022   23 GO TO B
0024   999 WRITE(ILU,11)
0025   11 FORMAT(\":RU,A307,ILST,IDLU")
0026   STOP
0027   END

Figure 2-4. 59307A Test Program

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3See the RTE Programmers Manual (for RTE IV, part number 92067-90001).

4See AN201-4, "Performance Evaluation of HP-IB Using RTE Operating Systems."
0001  IFN4,L
0002  PROGRAM B307(3,32767),01-29-79 (6WG) TEST 59307A
0003  INTEGER INPRM,GTDLU,(PRG(3)
0004  COMMON ILU,ILST,IDLU
0005  COMMON /IEROR/YES,NO
0006  C
0007  IF(INPRM(ID).EQ.YES) GO TO 20
0008  DNAM=59307.
0009  IN=1
0010  IF(GTDLU(DNAM,IN,IDLU).EQ.NO)STOP
0011  IRES=1
0012  IF=1
0013  5 DO 10 I=1,20
0014  WRITE(1LU,20)I,1
0015  20 FORMAT("A","B","C","D")
0016  CALL EXEC(12,0,IRES,0,-IOF)
0017  C
0018  10 CONTINUE
0019  WRITE(1LU,30)
0020  30 FORMAT("ENTER: IRES,IOF: ")
0021  READ(1LU,*)IRES,IOF
0022  IF(IRES.LT.0) GO TO 40
0023  GO TO 5
0024  40 STOP
0025  END

Figure 2-5. 59307A Program Scheduling with Offset

CALL EXEC(12,0,IRES,0,-IOF)

<table>
<thead>
<tr>
<th>IRES</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>tens of milliseconds</td>
</tr>
<tr>
<td>2</td>
<td>seconds</td>
</tr>
<tr>
<td>3</td>
<td>minutes</td>
</tr>
<tr>
<td>4</td>
<td>hours</td>
</tr>
</tbody>
</table>

IOF in the range 0-4096

Figure 2-6. Program Scheduling Using Timed Offset