Service Guide

HP 70341A

Frequency Extension

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CAUTION	The *CAUTION* sign denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in damage to or destruction of the product or the user's work. Do not proceed beyond a *CAUTION* sign until the indicated conditions are fully understood and met.
WARNING	**The *WARNING* sign denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury to the user. Do not proceed beyond a *WARNING* sign until the indicated conditions are fully understood and met.**
DANGER	**The *DANGER* sign denotes an imminent hazard to people. It warns the reader of a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a *DANGER* sign until the indicated conditions are fully understood and met.**

General Safety Considerations

WARNING

- **The instructions in this document are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing unless you are qualified to do so.**
- **The opening of covers or removal of parts is likely to expose dangerous voltages. Disconnect the instrument from all voltage sources while it is being opened.**
- **The power cord is connected to internal capacitors that may remain live for five seconds after disconnecting the plug from its power supply.**
- **This is a Safety Class 1 Product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the instrument is likely to make the instrument dangerous. Intentional interruption is prohibited.**
- **For continued protection against fire hazard, replace fuse only with same type and ratings, (type nA/nV). The use of other fuses or materials is prohibited.**

WARNING

- **Before this instrument is switched on, make sure it has been properly grounded through the protective conductor of the ac power cable to a socket outlet provided with protective earth contact.**

  Any interruption of the protective (grounding) conductor, inside or outside the instrument, or disconnection of the protective earth terminal can result in personal injury.
- **Before this instrument is switched on, make sure its primary power circuitry has been adapted to the voltage of the ac power source.**

  Failure to set the ac power input to the correct voltage could cause damage to the instrument when the ac power cable is plugged in.

The HP 70341A Frequency Extension

The HP 70341A frequency extension, referred to as "Signal Generator" througout this book, is a single-wide MMS module, designed to be used with an HP 70340A synthesized signal generator, extending the frequency range of both units from 10 MHz to 20 MHz. Complete specification information can be found in the *HP 70341A Installation Guide*.

In This Book

This book provides the information needed to repair the HP 70341A signal generator to the assembly level. Information is divided into chapters as follows:

- **Chapter 1, Identifying a Failed Assembly,** provides information needed to identify the HP 70340A or 70341A as being the failed instrument.

  Also, chapter 1 provides information needed to identify the assembly that is not functioning properly. This includes the block diagram of the instrument.

- **Chapter 2, Replacement Procedures,** contains electrostatic discharge precautions, and instructions for the removal and replacement of all major assemblies.

- **Chapter 3, Obtaining the Replacement Assembly/Part,** contains information needed to order assemblies for the Signal Generator. Included are part lists, illustrated part breakdown diagrams, and locator diagrams for cables and assemblies.

Other Books

The *HP 70341A Component-Level Information Package (CLIP)* provides component-level information for the repair of individual instrument assemblies. It contains component-level information Assemblies for selected assemblies. The component-level information consists of component-level schematics, a component parts list, and illustrations for component location.

The *HP 70340/41A Calibration Kit* provides the information and software needed to adjust and calibrate the HP 70340/41A.

Serial Numbers

Attached to this instrument is a serial number plate. The serial number is in the form: 0000A00000. The first four digits and the letter are the serial number prefix. The last five digits are the suffix. The prefix is the same for identical instruments; it changes only when a configuration change is made to the instrument. The suffix however, is assigned sequentially and is different for each instrument. The contents of this manual apply directly to instruments having the serial number prefixes listed under SERIAL NUMBERS on the title page.

An instrument manufactured after the printing of this manual may have a serial number prefix that is not listed on the title page. This unlisted serial number prefix indicates that the instrument is different from those documented in this manual.

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Identifying the Failed Assembly

Introduction

This chapter contains troubleshooting procedures that isolate problems to the assembly level. You always begin troubleshooting by following the procedure titled "Main Troubleshooting." At the start of the main troubleshooting procedure, run the Signal Generator internal self-test. Depending on the error messages generated by the self-test routine, continue troubleshooting with either this manual or the HP 70340A Service Guide. If no error is detected by the internal self-tests, verify the failure with the performance tests given in the HP 70340A/41A Calibration Guide. Table 1-1 is a symptom-to-possible-failures list.

Prior to Beginning Troubleshooting

The following paragraphs present information that you must understand prior to beginning troubleshooting. This information is important to know regardless of the path taken by the troubleshooting.

Set Correct MSIB Address

Check the address for the HP 70341A. See the HP 70341A Installation Guide for information about setting the proper address. If necessary, run the MSIB (Modular System Interface Bus) confidence check resident in the MMS (Modular Measurement System) display firmware.

Attempt Performance Tests and Adjustments

Error messages can be generated if the HP 73040A/41A is out of adjustment. Run the performance tests and attempt the adjustments given in the HP 70340A/41A Calibration Guide before attempting to troubleshoot.

The Service Position

To access many of the measurement points on an assembly, the assembly must be installed in the service position. Refer to procedures in Chapter 2, "Replacing the Failed Assembly" for instructions on how to install a given assembly in the service position. These procedures are grouped by assembly. The individual troubleshooting procedures note when it is necessary to install an assembly in the service position.

ESD Precautions

There are several components including MOS, CMOS, and microwave devices that can be damaged by electrostatic discharge (ESD). A sensitive assembly should be stored in an anti-static container whenever it is not installed. Use a static free work area and a properly grounded wrist strap. Refer to "Preparing a Static-Safe Work Station" in Chapter 2 for further information.

Failure Table

The purpose of the following table is to alert you to the possible causes for failures in your instrument. Not all of the possible symptoms are listed. Always verify the failure symptom starting with Main Troubleshooting in this manual.

Table 1-1. Failure Table

Symptom	Possible Failure
HP 70341A not on MMS Address Map	HP 70341A MSIB Address Incorrect. (See Installation Guide.) HP 70341A A3 Power Mod failure MSIB failure (Run display confidence check)
HP 70341A fails to power up, HP 70340A ERR LED flashes	HP 70341A MSIB address incorrect or same as other module. (Installation Guide.) HP 70341A fuse blown HP 70341A A3 Power Mod failure
ACT / ERR unlit	HP 70341A MSIB Address Incorrect. (See Installation Guide.) Power failure HP 70341A A1 Front Panel failure HP 70341A A3 Power Mod failure
Fails Power Perf. Tests .01 - 1 GHz	HP 70340A/41A out of adjustment (run auto adjustments in Calibration Guide) HP 70340A ALC failure (See HP 70340A Service Guide) HP 70341A ALC failure
Fails Harmonics Perf. Test .01 - 1 GHz	HP 70341A A4 Divide and Level failure
Fails Pulse Perf. Test .01 - 1 GHz	HP 70340A Pulse Failure HP 70341A A3 Power Mod failure
Fails SSB Phase Noise Perf. Test	HP 70340A LO Assy (See HP 70340A Service Guide) HP 70340A YO Offset Assy (See HP 70340A Service Guide) HP 70340A YIG Oscillator Assy (See HP 70340A Service Guide)
Fails FM Perf. Test	HP 70340A YO Offset Assy (See HP 70340A Service Guide) HP 70340A YIG Oscillator (See HP 70340A Service Guide)
Fails AM Depth .01 to 1 GHz	HP 70341A A3 Power Mod Failure

After Repair Calibration

Once the Signal Generator is repaired, it may be necessary to calibrate the instrument. Refer to the *HP 70340A/41A Calibration Guide* to determine when it is necessary to use the performance tests and adjustments.

Table 1-2. Recommended Test Equipment

Equipment	Critical Specifications	Recommended Model	Use[1]
Function Generator	Frequency: 100 kHz Amplitude: 0 to 5 Vp-p	HP 8116A	T
Multimeter		HP 3458A	T
Oscilloscope		HP 54111D	T
Power Meter	Accuracy: 0.02 dB Frequency range: 100 MHz	HP 437B	T
Power Sensor	Power Meter compatible	HP 8482A	T
Power Supply	Range: −10 V to +10 V	HP 6235A	T
Spectrum Analyzer		HP 8566B	T

1 A = Adjustments, P = Performance, T = Troubleshooting, O = Operational Verification

Main Troubleshooting

1. Run the instrument self-test.

   a. Press `Misc`

   b. Press `SELF TEST`

   As the self-test is running, the messages "PRESETTING INSTRUMENT" and "SELF TESTING!" will appear on the display. If the self-test does not detect a failure, the message "Self-Test passed" will appear on the display. If the self-test does detect a failure, the display will show numbers in the form "X = Y".

   If no failure is detected, go to the procedure entitled "Symptom Troubleshooting" to continue. If a failure is detected, continue with the next step.

Note "X" references a test group. Each test within a test group is given a unique number. "Y" is the hexadecimal sum of all test numbers within a test group that failed. The self-test aborts upon completion of a test group that reports test failures.

2. Decode the numerical self-test result to determine the component error messages indicated by the result.

Note It is not necessary to decode the error messages if doing so provides no further information. For example, if multiple errors in error group 8 are decoded, the resultant error text for all error numbers would be identical ("Data Readback from LO Assembly").

   a. Search through the tables titled "Error Groups Covered" that are at the beginning of the procedures on the following pages to find the first number of the error display ("X" in "X = Y").

      For example, if "22 = fc" is displayed as the result of running the self-test, search through the tables in the following procedures and find the error messages that begin with 22.

   b. If the second number of the error display matches any of the error numbers in the error lists included in the procedure, that is the only error message reported. If the second number does not match, it must be decoded.

   c. To decode the error display, find the number in the list of error messages that is the largest number that can be subtracted from the displayed number and subtract it. For example, if 22 = fc is displayed, subtract 80 from fc (80 is the largest hexadecimal number from the list of "22 = Y" errors that can be subtracted from fc). One of the errors is 22 = 80 and the result of the subtraction leaves 7c.

   d. Continue this subtraction process until the result is zero. For example, the result 22 = fc, when fully decoded, will yield 22 = 80, 22 = 40, 22 = 20, 22 = 10, 22 = 8, and 22 = 4.

3. Follow the procedure that follows the applicable list of error messages and continue troubleshooting. Begin at the procedure appropriate for the messages reported.

Determining HP 70340A vs HP 70341A Failure

If the error message displayed is one of the following error groups in Table 1-3, the failure is with low band (0.01 to 1 GHz) functionality. The cause of the failure, however, could be with either the HP 70341A or the HP 70340A.

Table 1-3. Low Band (.01 to 1 GHz) Error Groups

Error Group	Description
7 = *Y*	.01 GHz Failure
31 = 2	.01 GHz Failure, Input bias
31 = 4	.01 GHz Failure, Output bias
40 = *Y*	Minimum Vernier Leveled Error at .01 GHz
45 = *Y*	Low Band Low Vernier/Low Frequency Errors
46 = *Y*	Low Band Low Vernier/High Frequency Errors
47 = *Y*	Low Band High Vernier/Low Frequency Errors
48 = *Y*	Low Band High Vernier/High Frequency Errors
49 = *Y*	Low Band Modulator Error

Note Error messages *other* than those listed in Table 1-3 pertain to high band (1 to 20 GHz) functionality. The HP 70341A depends on signals from the HP 70340A to function properly. You must resolve all error messages pertaining to high band functionality before you attempt to troubleshoot the HP 70341A. These errors are covered in the HP 70340A Service Manual.

The purpose of the following tests are to determine which instrument is the cause of the failure. They should be performed with the covers intact while the instruments are installed in the MMS. Do not remove the instruments from the MMS. You will need rear panel access.

The HP 70341A receives 4 signal inputs from the HP 70340A: Pulse, AM, ALC, and .5 to 1 GHz CW. In the following tests you will check HP 70340A output compared to HP 70341A output to determine which instrument has failed. It is up to you to check proper functioning of wire connector assemblies. The procedures assume that the MMS is functioning properly and that the HP 70340A/41A are addressed properly. See the HP 70341A Installation Guide for addressing procedure. If you determine the HP 70340A is at fault, see the HP 70340A Service Manual for further troubleshooting. If you determine the HP 70341A has failed, continue troubleshooting with Assembly Level Troubleshooting in this manual.

ALC Check

Recommended Equipment

HP 8566B Spectrum Analyzer
HP 8116A Function Generator
HP 6235A Power Supply

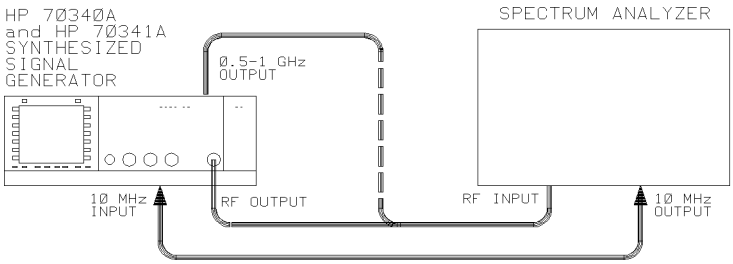

Figure 1-1. ALC Troubleshooting Test Setup 1

CAUTION Turn OFF the MMS before removing or replacing cables and assemblies or the instrument or the MMS could be damaged.

1. Press PRESET, then select the HP 70340A Signal Generator from the MMS display.
2. Set the HP 70340A Signal Generator (referred to as Signal Generator) to a frequency of 10 MHz with an amplitude of −10.0 dBm.
   a. If the HP 70341A front panel ACT light is ON, continue troubleshooting with the next numbered step (3).
   b. If the front panel ACT light is not lit, re-check HP 70341A address and run the MSIB confidence check. If the ACT light remains dark, proceed to HP 70341A Catastrophic Power Failure in this chapter.
3. Attach a spectrum analyzer to the Signal Generator front panel RF OUTPUT as shown in Figure 1-1 and attempt to measure the signal.
4. Use the display softkeys to vary the frequency of the Signal Generator from 10 MHz to 999 MHz and the power from −10 dBm to +10 dBm while following the signal on the spectrum analyzer.
   a. If the frequency of the signal changes as expected, continue troubleshooting with the next numbered step (5).
   b. If the signal amplitude is undetectable or too low, or frequency differs unexpectedly, detach the spectrum analyzer from front panel RF OUTPUT.
   c. Connect the spectrum analyzer to the HP 70340A 0.5 to 1 GHz OUTPUT rear panel as shown in Figure 1-1 (dotted line).
   d. Use the display softkeys to vary the frequency of the Signal Generator from 500 MHz to 1 GHz. Attempting to change amplitude at this point will have no effect.
   e. The frequency from the HP 70340A rear panel should track 500 MHz to 1 GHz with a power amplitude from -2 dBm to +3 dBm.
   f. If you cannot obtain the proper frequency and power amplitudes, the HP 70340A is faulty.
   g. If the HP 70340A delivers the proper signal, continue troubleshooting with the next step.

Note Re-connect the .05 - 1 GHz semi rigid cable before proceeding.

5. If the power amplitude is unexpectedly low and/or the UNLEVELED and ERR indicator is lit on the HP 70340A front panel, detach the PULSE and AM cables from the HP 70341A rear panel.
   a. If the power amplitude increases, go to Pulse Check in this manual.
   b. If the power amplitude remains unchanged or drops, go to the next step.

6. Remove the cable from the HP 70341A rear panel ALC CTRL input and connect the instruments as shown in Figure 1-2. with the spectrum analyzer connected to the HP 70341A rear panel .01 to 1 GHz OUTPUT.

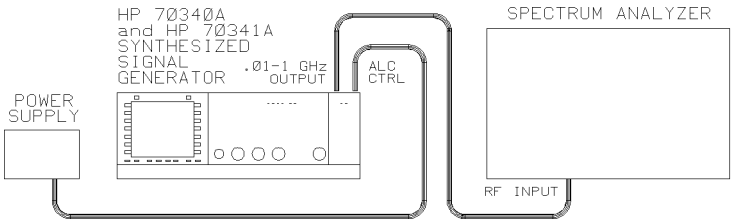

Figure 1-2. ALC Troubleshooting Test Setup 2

7. Vary the external voltage from −10V to +10V dc while observing the power level indicated on the spectrum analyzer.
   a. If the power level of the .01 - 1 GHz OUTPUT varies while external voltage is applied to ALC CTRL, the HP 70340A is faulty.
   b. If the power level of the .01 - 1 GHz OUTPUT remains unchanged or too low, the HP 70341A is faulty. Continue troubleshooting with HP 70341A Assembly Level Troubleshooting.

Note Re-connect PULSE and AM rear panel connection prior to proceeding with the next procedures.

Pulse Check

Recommended Equipment

HP 54111D Oscilloscope
HP 8116A Function Generator

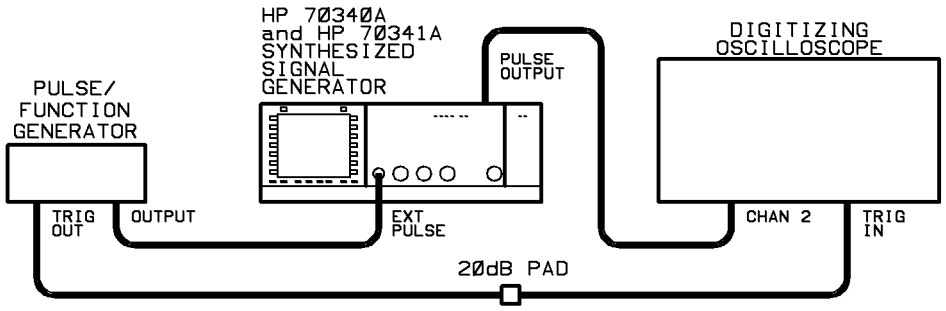

Figure 1-3. Pulse Check Setup

1. Connect the equipment as shown in Figure 1-3 with the oscilloscope connected to PULSE OUTPUT.
2. On the Signal Generator:

   Press PRESET.
   Set AMPLITUDE to −3.99 dBm.

Set CW Frequency to 800 MHz.
Turn pulse modulation on.

3. On the pulse generator, set:

   Frequency = 50 kHz (Period = 2 μs)
   Pulse Width = 950 ns
   High Level = 3.0 V
   Low Level = 0 V
   Select square wave
   Disable = Off (to enable pulse generator)

4. On the oscilloscope: Press AUTOSCALE

5. The oscilloscope should display a square wave. If a square wave is not present, the HP 70340A is faulty. Go to the HP 70340A Service Manual for further troubleshooting.

6. While watching the oscilloscope display, toggle NRM/INV softkey on the Signal Generator. If the state of the signal does not change, the HP 70340A is faulty, go to the HP 70340A Service Manual for further troubleshooting.

7. If the square wave is present and changes state, continue with next procedure.

HP 70341A Modulation Output Check

HP 54111D Oscilloscope
HP 8116A Function Generator

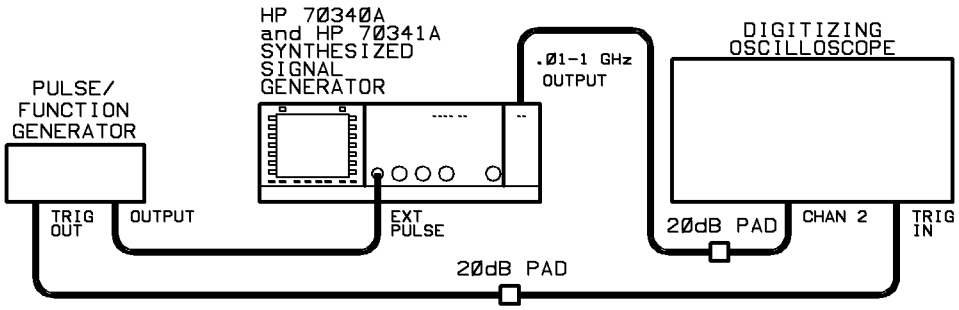

Figure 1-4. Modulation Check Setup

1. Make sure the HP 70341A rear panel PULSE INPUT is connected.

2. Disconnect the semi-rigid cable from the rear panel .01 - 1 GHZ OUTPUT.

3. Connect the oscilloscope to HP 70341A .01 -1 GHZ OUTPUT.

4. On the oscilloscope:

   Press AUTOSCALE
   Set Time/Div = 200 ns
   Set DELAY so that 1 full pulse envelope is displayed
   Set PERSISTENCE to 900 ms

5. Change the Oscilloscope display to single if it is not already.

6. Use the DELAY function on the oscilloscope to position the pulse envelope on the display. The oscilloscope display should appear as shown in Figure 1-5.

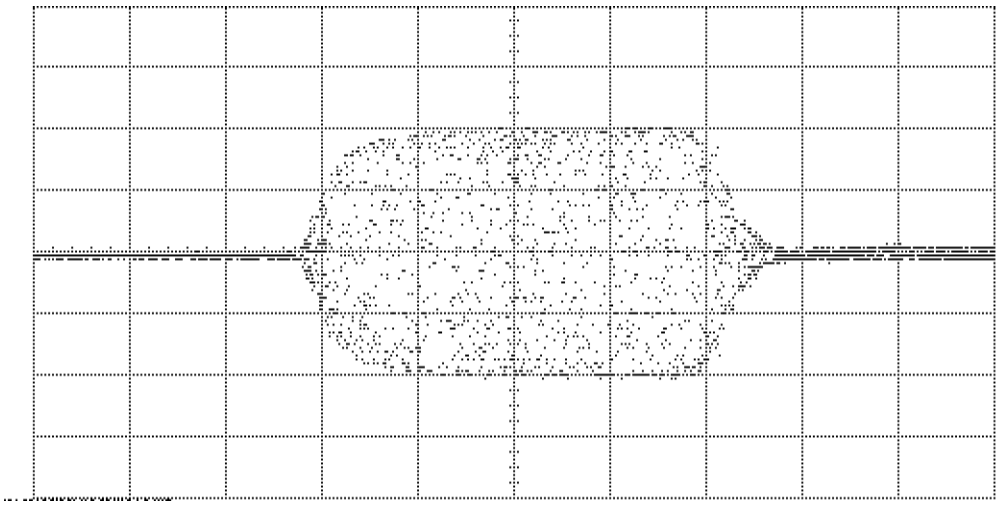

Figure 1-5. Pulse Modulation Example

7. If the modulated pulse similar to that shown in Figure 1-5 is not present, continue troubleshooting with A3 Modulation Check in this manual.
8. If the modulated pulse similar to that shown in Figure 1-5 is present, the pulse function is operating. Continue with the next procedure.

AM Check

Recommended Equipment

HP 8566B Spectrum Analyzer
HP 8116A Function Generator
HP 3458A Voltmeter

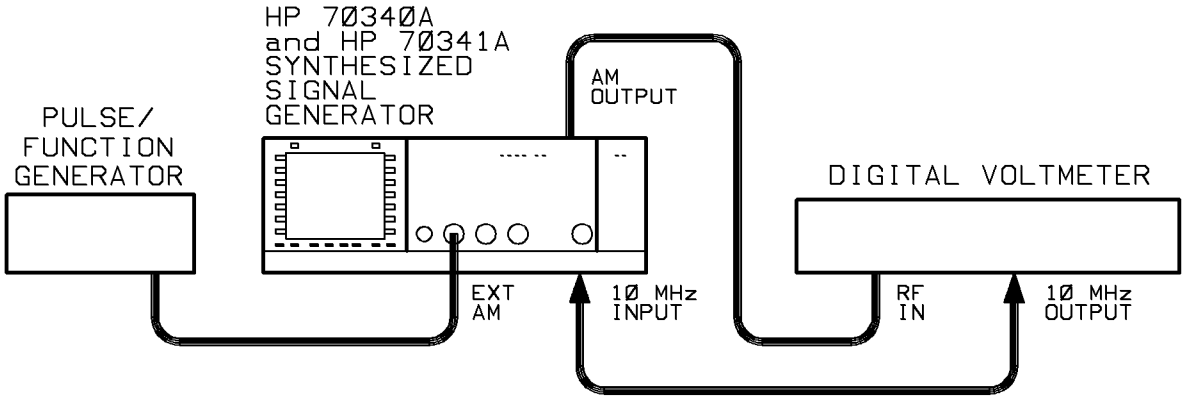

Figure 1-6. HP 70340A AM OUTPUT Check Setup

1. Set up the equipment as shown in Figure 1-6.
2. On the Signal Generator:

   Press PRESET.
   Set Frequency to: 10 MHz
   Set Amplitude to 0 dBm.

3. Set the function generator as follows:

   Waveforms = off.
   Offset = 3.5 Vdc
   Disable = off (to enable output)

4. Verify that the function generator output is 7 Vdc using a voltmeter.
5. Connect the equipment as shown in Figure 1-6 with the voltmeter connected to AM OUTPUT on the HP 70340A rear panel.
6. Toggle the Signal Generator `LOG AM` ON and OFF.
7. If approximately 7 Vdc is not present when LogAM is ON or present when LOG AM is OFF at the HP 70340A AM OUTPUT, the HP 70340A is faulty. Go to the HP 70340A Service guide for troubleshooting.
8. If 7 Vdc is present at AM OUTPUT, re-connect the AM INPUT wire assembly, do not change the settings, and continue with the next procedure, HP 70341A AM Output Check.

HP 70341A AM Output Check

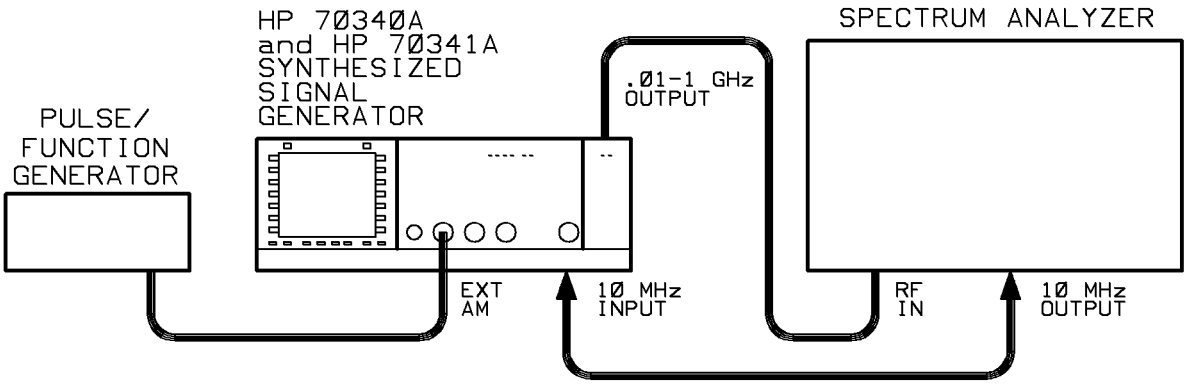

Figure 1-7. HP 70341A AM Output Check Setup

1. Make sure the the wire to AM INPUT on the HP 70341A rear panel is connected to AM OUTPUT on the HP 70340A.
2. On the Signal Generator press `LOG AM` so OFF is underlined.
3. Disconnect the semi rigid cable from .01 to 1 GHz OUTPUT.
4. Connect the spectrum analyzer to the HP 70341A .01 to 1 GHz OUTPUT.
5. Place the spectrum analyzer signal peak on the top of the graticule line.
6. On the Signal Generator press `LOG AM` so ON is underlined.
7. If the signal drops about -60 dBm, the HP 70341A Log AM is functioning.
8. If the signal does not drop about -60 dBm, the HP 70341A is faulty, go to HP 70341A Assembly Level Troubleshooting.

HP 70341A Assembly Level Troubleshooting

This procedure assumes you have determined the HP 70341A is faulty. The following troubleshooting procedures will isolate as faulty these assemblies:

- A1 Front Panel Assembly
- A3 Power Mod Assembly
- A4 Divide and Level Assembly

Use standard techniques to eliminate faulty cable assemblies.

Assembly part numbers are located in Replaceable Parts, Chapter 3. Replacement procedures and instructions on how to place the instrument into the service position are located in Chapter 2.

CAUTION Turn OFF the MMS before removing or replacing cables and assemblies or the instrument or the MMS could be damaged.

Troubleshooting Preparation

Assembly level troubleshooting procedures assume the instrument has been placed into the service position.

1. Turn the MMS system OFF.
2. Place the HP 70341A into the service position. (See Replacement Procedures, Chapter 2.)

No Power / Fuse Check Procedure

CAUTION Turn OFF the MMS before removing or replacing cables and assemblies or the instrument or the MMS could be damaged.

1. Make sure the MMS system is OFF.
2. Check the address settings. See Figure 1-8.
3. Remove the HP 70341A from the MMS. Remove the covers from the HP 70341A. (See Replacement Procedures, Chapter 2.)
4. Locate the fuse on the reverse side of the A3 Power Mod Assembly. Remove the fuse. With a continuity light, check the fuse.
5. If the fuse is blown, visually inspect W3 (the wire assembly connecting A3J5 to A4J1) to make sure the connectors have been properly inserted and that the wire insulation is intact. Wires could become pinched between the frame and covers, causing a short circuit. Run a continuity check on the wires. Replace W3 if necessary.
6. With the fuse detached, place the continuity light between the two fuse terminals.
7. If the light indicates a short, detach A3J5 and A3J2. If the continuity light goes out, the A4 assembly or connecting wire assemblies are faulty.
8. Continue troubleshooting in this manner until you identify the faulty assembly.

Note The MMS system monitors both voltage and current loads on the system bus. If voltage is too low or current too high, the display will indicate a problem exists.

Latch LED Check 1

1. Check the front panel LED. ACT should be lit.
2. Locate DS2 (4 light LED) to the left of A3J2. Normal TTL operation is indicated when the latch LED is repetitively sequencing back an forth. An error condition is indicated when the sequencing stops, or is "latched" causing one of more of the lights to be constantly lit. An error condition is also indicated if no LED is lit.
3. If DS2 is latched, turn OFF the MMS.
4. Make sure switches S1 and MSIB address switch, S2 are set correctly. Make sure no other MMS device connected to your MMS system has the same address. The original factory set switch settings are shown in Figure 1-8.

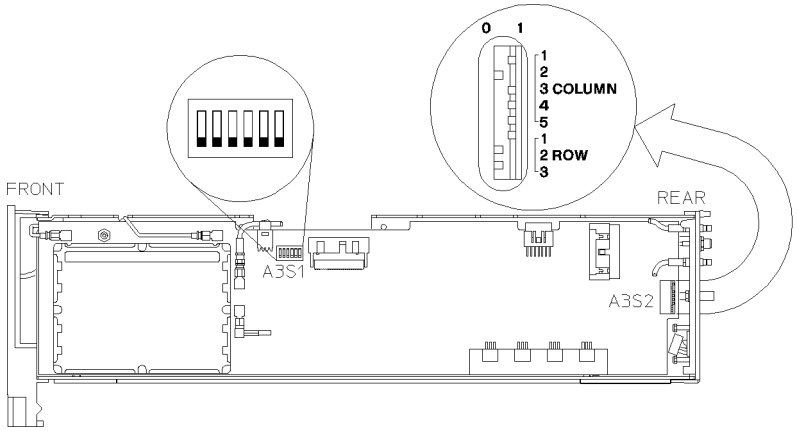

Figure 1-8. S1 and S2 Settings

5. Turn ON the MMS.
6. Select the HP 70340A from the MMS display.
7. Set to a frequency of 10 MHz with a amplitude of 0 dBm.
8. Check the front panel LEDs. ACT should be lit.
9. If DS2 remains latched go to Power Check Procedure.
10. If the front panel ACT remains dark, go to the next procedure.

A1 Front Panel Check Procedure

The HP 70341A front panel has two active components: LEDs labeled ACT and ERR. When the HP 70340A/41A is selected from the MMS display, ACT should be lit.

1. If the ACT light is dark, turn OFF the MMS.
2. Remove the connector from J1.
3. Place the positive end of a +3V continuity light on the grey wire of the connector leading to the front panel.

4. Touch the negative end of the continuity light to the other two wires while watching the front panel.
5. The two front panel LEDs, ACT and ERR should dimly light as you touch the wires. If they do not light the front panel or connector wire assembly is faulty. See Replacement Procedures Chapter 2, and Replaceable Parts Chapter 3.
6. If you determine the front panel is operational, connect the wire assembly A3J1 and continue with the next procedure.

Power Check Procedure

In a small percentage of instances, an apparent failure on an assembly might be caused by a voltage that is out of specification. The following procedure should isolate HP 70341A power problems to either the A3 or A4 Assemblies.

1. Set the HP 70340A/41A to the same state you left it in the previous procedure.
   a. HP 70341A in the service position.
   b. HP 70340A selected from the MMS display.
2. With a voltmeter check the A4 Assembly TP6 (−15V dc), TP4 (+5V dc), and TP5 (+15V dc).
3. With a voltmeter check the power test pins (labeled −15V, +5VA, +5VD, +15V, +5REF) on the A3 Power Mod Assembly.
4. If the voltages on A3 and A4 are as expected, go to the next procedure, Latch LED Check 2.
5. If you cannot obtain the appropriate voltage from the A4 or A3 assemblies:
   a. Turn OFF the MMS
   b. Disconnect A4J1 (power connection to the A4 assembly).
   c. Turn the MMS ON.
      i. Select HP 70340A from the MMS display
   d. Recheck voltages on the A3 Power Mod Assembly. See step 3.
   e. If the A3 recheck yields incorrect voltages, A3 Power Mod Assembly or the MSIB connector assembly is faulty. See replacement procedures in this manual.
   f. If the A3 recheck yields the appropriate voltages, then the A4 Assembly or W3 (the wire/connector assembly between A3J5 and A4J1) is faulty.

Latch LED Check 2

This procedure assumes proper switch positions and power levels in the assemblies being checked.

1. If the Latch LED, DS2, is sequencing back and forth, normal TTL activity is indicated. Go to the next procedure, CW vs Modulation Check.
2. If the Latch LED, DS2 is “latched” (either no lights or one or more lights constantly on), turn OFF the MMS.
3. Disconnect W2 ribbon cable from A4J2.
4. Turn ON the MMS.
5. If DS2 remains latched, the A3 Power Mod Assembly is faulty.
6. If DS2 begins to sequence back and forth, A4 Divide and Level Assembly is faulty.

TTL Activity Check

1. Turn OFF the MMS.
2. Disconnect the ribbon cable from A4J2.
3. Turn ON the MMS.
4. While constantly pressing INSTR PRESET on the MMS display, use an oscilloscope to probe A3J2 for TTL activity on the following pins: 5, 6, 8, 10, 12, 13, 14, 15, 16, 17, 18, 19, 22, 24, 26.
5. If TTL activity is not present on one or more of the pins listed, A3 is faulty.
6. If TTL activity is detected as expected, turn OFF the MMS
7. Connect the ribbon cable to A4J2.
8. Turn ON the MMS.
9. While constantly pressing INSTR PRESET on the MMS display, use an oscilloscope to probe A4J2 for TTL activity on the following pins: 5, 6, 8, 10, 12, 13, 14, 15, 16, 17, 18, 19, 22, 24, 26.
10. If TTL activity is not detected on one or more the the pins listed, A4 Divide and Level Assembly is faulty.
11. If TTL activity is detected as expected, go to the next procedure A4 CW vs A3 Modulation Check.

Signal Path Troubleshooting

The following procedures assume that no power or TTL problems were detected in the previous procedures.

A4 CW Check

This check tests A4 Divide and Level assembly delivery of a CW signal from .01 to 999 GHz between -1 dBm to +3 dBm from A4J4.

Recommended Equipment

HP 8566B Spectrum Analyzer

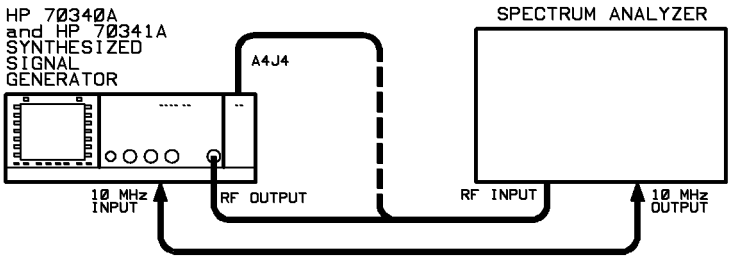

Figure 1-9. A4 CW Check Setup

1. Turn the MMS OFF.
2. Disconnect the semi-rigid cable connecting A4J4 to A3J9.
3. Connect a spectrum analyzer to A4J4 as shown is Figure 1-9.
4. Turn ON the MMS
5. Set the Signal Generator to 10 MHz. Increase the frequency to 100 MHz then to 999 MHz in 100 MHz steps while watching the signal on the spectrum analyzer display.
6. Signal coming into A3J9 from A4J4 should vary in frequency from 10 MHz to 999 MHz. The amplitude should be between −1 to +2 dBm.
7. If the signal from A4J4 amplitude is too low or undetectable, or if the signal frequency will not adjust appropriately below 500 MHz, the A4 Divide and Level Assembly is faulty.
8. If the signal arriving at from A4J4 is good, continue with A3 Modulation Check.

A3 Modulation Check

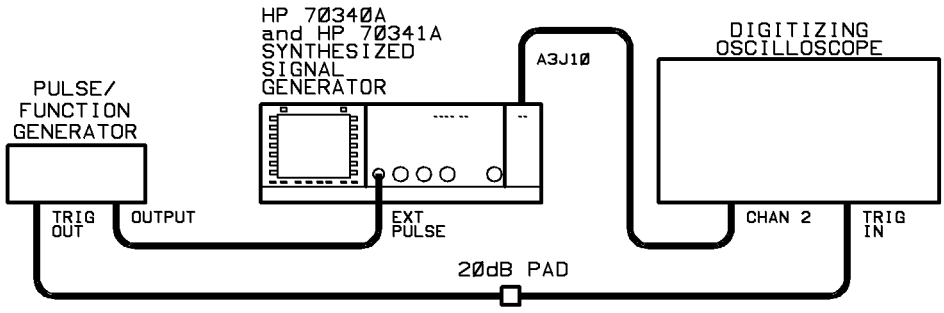

Figure 1-10. Pulse Width Test Setup

1. Turn OFF the MMS.
2. Make sure the HP 70341A rear panel PULSE INPUT is connected.
3. Disconnect the semi-rigid cable between A3J10 and A4J5.
4. Re-connect the semi-rigid cable between A4J4 and A3J9.
5. Connect the equipment as shown in Figure 1-10 with the oscilloscope connected to A3J10.
6. Turn ON the MMS.
7. On the Signal Generator:

   Press PRESET.
   Set AMPLITUDE to −3.99 dBm.
   Set CW Frequency to 800 MHz.
   Turn pulse modulation on.

8. On the pulse generator, set:

   Frequency = 50 kHz (Period = 2 μs)
   Pulse Width = 950 ns
   High Level = 3.0 V
   Low Level = 0 V
   Select square wave
   Disable = Off (to enable pulse generator)

9. On the oscilloscope:

   Press (AUTOSCALE)
   Set Time/Div = 200 ns
   Set DELAY so that 1 full pulse envelope is displayed
   Set PERSISTENCE to 900 ms

10. Change the Oscilloscope display to single if it is not already.
11. Use the DELAY function on the oscilloscope to position the pulse envelope on the display. The oscilloscope display should appear as shown in Figure 1-11.

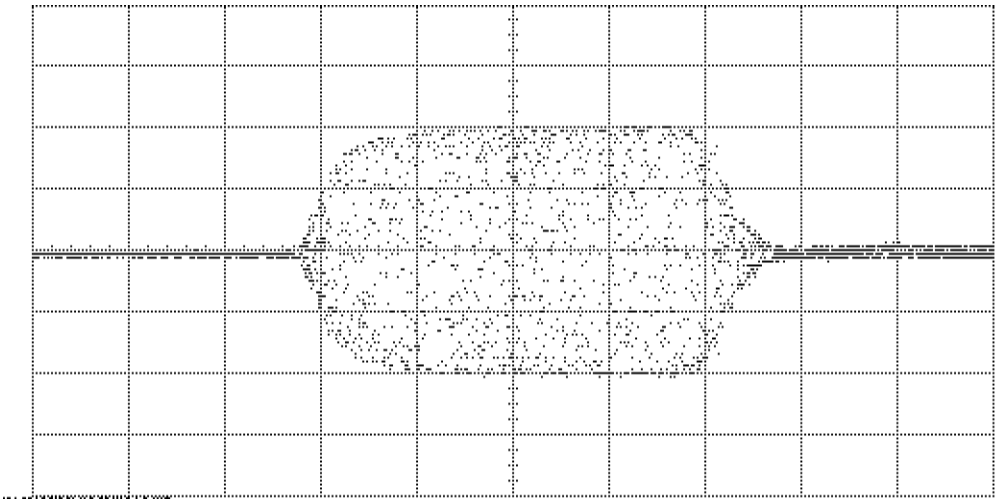

Figure 1-11. Pulse Modulation Example

12. If the modulated pulse similar to that shown in Figure 1-11 is not present, the A3 Power Mod Assembly is faulty.

13. If the modulated pulse similar to that shown in Figure 1-11 is present, and was *not* present at .01 - 1 GHz OUTPUT (when you checked using Figure 1-4) the A4 Divide and Level Assembly or connecting cables are faulty.

A3 AM Check

Recommended Equipment

HP 8566B Spectrum Analyzer
HP 8116A Function Generator
HP 3458A Voltmeter

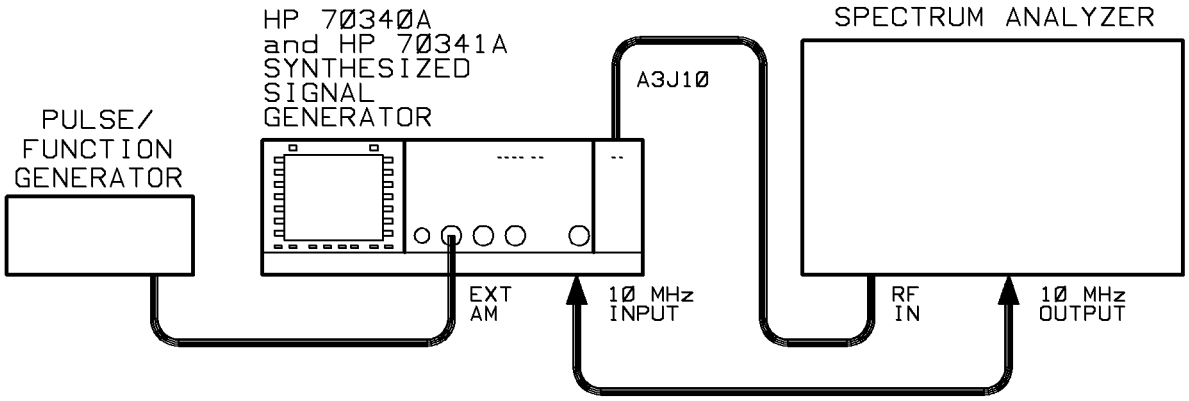

Figure 1-12. Minimum AM Depth Test Setup

1. Turn OFF the MMS.
2. Connect the equipment as shown in Figure 1-12 with the spectrum analyzer connected to A3J10.
3. On the Signal Generator:

   Turn ON the MMS.
   Press PRESET.
   Set Frequency to: 10 MHz
   Set Amplitude to 0 dBm.
4. Set the function generator as follows:

   Waveforms = off.
   Offset = 3.5 Vdc
   Disable = off (to enable output)
5. Verify that the function generator output is 7 Vdc using a voltmeter.
6. Connect the function generator to HP 70340A front panel as shown in Figure 1-12.
7. Set up the spectrum analyzer as follows:

   Frequency: 10 MHz
   Span = 500 Hz
   Input Attenuation = 10 dB
   Reference Level = 0 dBm
   Resolution Bandwidth = 10 Hz
8. Make sure the Signal Generator `LOG AM` OFF is underlined.
9. Position the signal peak to the top of the graticule line.

10. Turn the Signal Generator `LOG AM` ON.
11. If the signal peak on the spectrum analyzer does not drop about −60 dBm, A3 Power Mod Assembly is faulty.
12. End Troubleshooting. Go to the HP 70340A / 41A Calibration Guide for post repair adjustments.

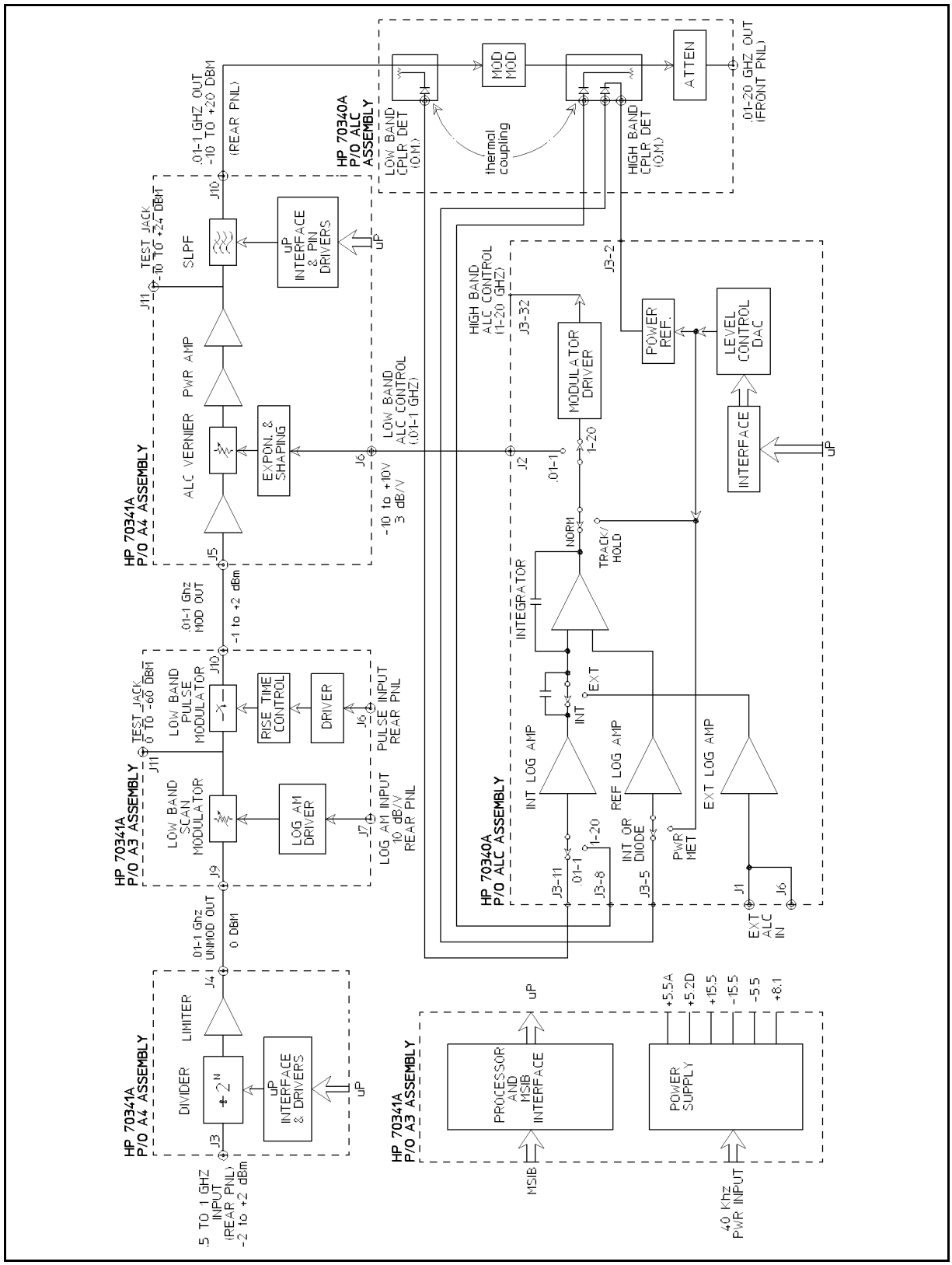

Figure 1-5. HP 70341A Block Diagram

2

Replacement Procedures

Introduction

This chapter contains procedures for the removal and replacement of failed assemblies, subassemblies, and parts in the HP 70341A Frequency Extension. The procedures are organized to allow removal in the most effective way, leaving the surrounding areas undisturbed whenever possible.

Where specific or special methods are required for installation, instructions are provided. In general, each procedure is divided into three parts:

- The disassembly steps necessary to place the Frequency Extension in the service position.
- Further disassembly steps necessary to remove the failed assembly or subassembly from the Frequency Extension
- Specific installation or reassembly steps, where installation or reassembly is more than a simple reversal of disassembly

Preparing a Static-Safe Work Station

Electrostatic discharge (ESD) can damage or destroy electronic components. Therefore, all work performed on assemblies consisting of electronic components should be done at a static-safe work station.

Figure 2-1 shows an example of a static-safe work station. Two types of ESD protection are shown:

- a conductive table mat and wrist strap combination
- a conductive floor mat and heel strap combination

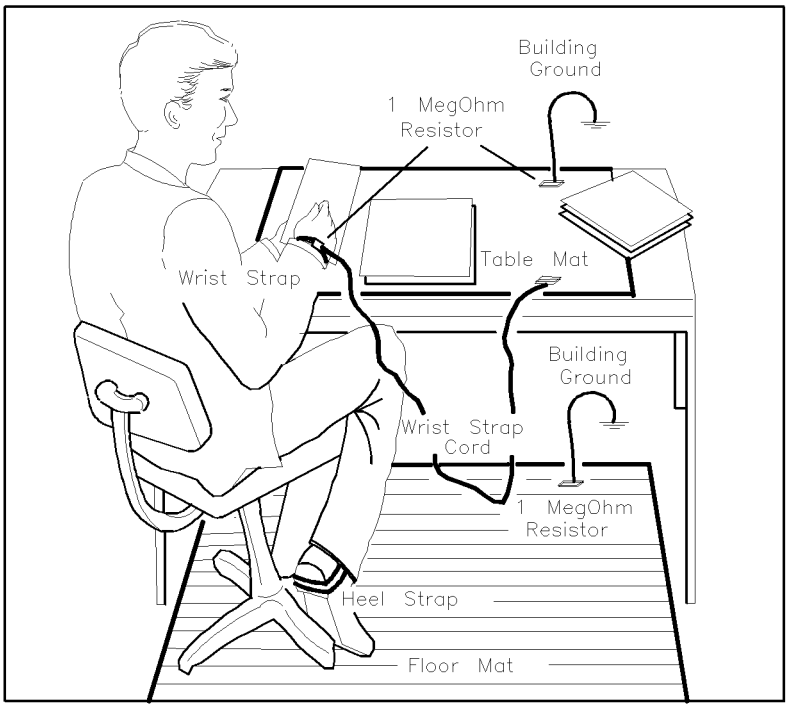

Figure 2-1. Static-Safe Work Station

These two types of ESD protection must be used together. Refer to Table 2-1 for a list of static-safe accessories and their HP part numbers.

CAUTION

- Do not touch the edge-connector contacts or trace surfaces with bare hands. Always handle board assemblies by the edges.
- Do not use erasers to clean the edge-connector contacts. Erasers generate static electricity and degrade the electrical quality of the contacts by removing the thin gold plating.
- Do not use paper of any kind to clean the edge-connector contacts. Paper or lint particles left on the contact surface can cause intermittent electrical connections.

Reducing ESD Damage

To help reduce the amount of ESD damage that occurs during testing and servicing use the following guidelines:

- Be sure that all instruments are properly earth-grounded to prevent buildup of static charge.
- Personnel should be grounded with a resistor-isolated wrist strap before touching the center pin of any connector and before removing any assembly from a piece of equipment.

  Use a resistor-isolated wrist strap that is connected to the HP 70000 Series modular spectrum analyzer system mainframe's chassis. If you do not have a resistor-isolated wrist strap, touch the chassis frequently to equalize any static charge.
- Before connecting any coaxial cable to an instrument connector for the first time each day, *momentarily* short the center and outer conductors of the cable together.
- Handle all PC board assemblies and electronic components only at static-safe work stations.
- Store or transport PC board assemblies and electronic components in static-shielding containers.
- PC board assembly edge-connector contacts may be cleaned by using a lintfree cloth with a solution of 80% electronics-grade isopropyl alcohol and 20% deionized water. This procedure should be performed at a static-safe work station.

Static-Safe ESD Accessories

Table 2-1. Static-Safe ESD Accessories

HP Part Number	Description
9300-0797	Set includes: 3M static control mat 0.6 m × 1.2 m (2 ft × 4 ft) and 4.6 m (15 ft) ground wire. (The wrist-strap and wrist-strap cord are not included. They must be ordered separately.)
9300-0865	Ground wire, 4.6 m (15 ft)
9300-0980	Wrist-strap cord 1.5 m (5 ft)
9300-1367	Wrist-strap, color black, stainless steel, without cord, has four adjustable links and a 7 mm post-type connection.
9300-1308	ESD heel-strap (reusable 6 to 12 months).
Order the above by calling HP DIRECT at (800) 538-8787 or through any Hewlett-Packard Sales and Service Office.	

The procedures in this chapter describe removal and replacement of the following assemblies, subassemblies, and parts:

- Frequency Extension Removal from MMS
- Frequency Extension Cover
- Service Position
- Power Mod Board Assembly (A3)
- Divide and Level Board Assembly (A4)
- Front Panel
- Rear Panel
- MSIB (Modular System Interface Bus) Cable (W1)

Disposables and Tools

The following disposable items and tools are used during removal and installation of assemblies, subassemblies, and parts:

Table 2-2. Disposables

Disposable Item	Specifications
Carton/Pouch, Anti-static and Protective	8 x 8 in (HP P/N 9211-4917) 14 x 10 in (HP P/N 9211-4919) 17 x 6 in (HP P/N 9211-4920
Conductive Foam Block (Qty 3)	6 x 8 in (HP P/N 4208-0127)
Plastic Bags	Zipper lock (for hardware only, not for electronic assemblies or parts)
Wire Labels	Writable and removable
Cleaning Swabs	Anti-static (natural fiber)
Cleaning Solvent	Isopropyl alcohol, 91% min

Table 2-3. Tools

Tool	Specifications
Work Station, Anti-static (ESD)	HP P/N xxxx-xxxx
Hex Ball Driver	8 mm (HP P/N 8710-1307) (supplied with 70000-series mainframe and/or display unit)
TORX® Screwdriver	Size 10 (HP P/N 8710-1623)
MMS Extender Module	HP P/N 70001-60013
3 Cables (To use with Extender Module)	SMB(m) to SMB(m), 1 meter long
2 cables (To use with Extender Module)	SMA(m) to SMA(m), 1 meter long
Pozidriv® Screwdriver	No. 1 (HP P/N 8710-0899) No. 2 (HP P/N 8710-0900)
End Wrench	15/64-in 5/16-in 9/16-in
Slotted Box Wrench	5/16-in
Torque Wrench	15/64-in, 60 to 70 oz-in (HP P/N xxxx-xxxx) 1/4-in, 9.5 to 10.5 lbs-in 5/16-in, 7 to 9 lbs-in (HP P/N 8710-1765) 5/16-in, 9.5 to 10.5 lbs-in
Torque Screwdriver	Size 10 TORX®, 9.5 to 10.5 lbs-in Pozidriv®, 9.5 to 10.5 lbs-in
Nutdriver	5.5 mm 9/16-in
Torque Nutdriver	5.5 mm, 5.5 to 6.5 lbs-in 9/16-in, 19 to 21 lbs-in 9/16-in, 31 to 33 lbs-in 9/16-in, 70 to 80 lb-in
Long-nose Pliers	4- to 6-in
Diagonal Cutters	Small
Soldering Iron	35 to 50 W with grounded tip
Solder Removal Tool	Vacuum device with anti-static tip (HP P/N 8690-0227)

Special Techniques

Before undertaking repair of your Frequency Extension, read through the following warnings, cautions, and tips.

Safety

Disassembly procedures are to be conducted with the interface cable disconnected from the Frequency Extension. Do not reconnect power until you have a Board Assembly in the service position and are ready for troubleshooting.

Electrostatic Discharge

There are several components including MOS, CMOS, and microwave devices that can be damaged by electrostatic discharge (ESD). A sensitive assembly should be stored in an anti-static container whenever it is not installed. Use a static free work area and a properly grounded wrist strap.

Fasteners

Screws and nuts used in the Frequency Extension require specific tools for removal or installation. If the incorrect tool is used, the fastener or the Frequency Extension could be damaged:

- Most screws used in the Frequency Extension are TORX® head. Do not use Allen-head, spline, Bristol, or other hex-head drivers in place of the required TORX® driver.
- Fasteners should be tightened to specific values with a calibrated torque driver. Unless otherwise indicated within a procedure, use the torque value listed.

Table 2-4. Fastener Torque Values

Fastener Type/Location	Torque Specification
Size 10 TORX® Screws	10.0 ± 0.5 lbs-in
5.5 mm Nut (Rear Panel MSIB Connector	6.0 ± 0.5 lbs-in
1/4-in Nut (Rear Panel SMB Connectors)	10.0 ± 0.5 lbs-in
5/16-in Nut (Rear Panel SMA Connectors)	10.0 ± 0.5 lbs-in
9/16-in Nut (Front Panel BNC Connectors)	20 ± 1 lbs-in

Disassembly and Reassembly

To maintain performance of the Frequency Extension within its specified limits, assemblies and parts must be installed in the same manner as they were removed:

- The routing of cables through the instrument is important. Make notes of the routes cables take before disconnecting or moving them. The routing of cables which run near the Power Supply portion of the Power Mod Board Assembly (A3) is particularly important.
- The wire list in Replaceable Parts details cable connections within the Frequency Extension, including colors for the wires and cables. To facilitate reconnection of cables, you should also tag each cable with a temporary paper label as it is disconnected.
- Disconnect, inspect, clean and connect semi-rigid coaxial cable assemblies as detailed in **Semi-Rigid Coaxial Cables**.
- Disconnect and connect flexible coaxial cable assemblies as detailed in **Flexible Coaxial Cables**.
- Disconnect and connect multiwire connectors as detailed in **Multiwire Cables**.

Semi-Rigid Coaxial Cables

Coaxial cables with a solid center conductor and a solid metal outer conductor are used in the Frequency Extension to carry signals at microwave frequencies. Because minor mechanical imperfections in these cables and their connecting parts can produce performance degradation, it is important the cables be treated with the care afforded any microwave component:

1. Disconnect 3.5 mm (SMA) connectors from the mating connector by loosening the 5/16-inch nut until it is completely free of the mating connector. Loosen the nuts at both ends of the cable before attempting to remove either end.
2. When both nuts are completely free of the mating connectors, pull the semi-rigid cable gently until the center pins disengage from the mating sockets.
3. Place protective caps on semi-rigid cable connectors, and store cables to prevent damage to the center pins or accidental bending.
4. Before reconnecting semi-rigid cables, inspect both ends carefully:
   a. Ensure the center conductor is not bent or damaged.
   b. Ensure the insulating material between the center conductor and the outer conductor is undamaged, clean, and free of contamination from metal particles.
   c. If necessary, clean the cable ends using a cotton swab lightly moistened with alcohol.
   d. Inspect the mating connectors and clean them if necessary.
   e. Allow the alcohol to evaporate completely before assembling the connectors.
5. Connect the semi-rigid cable to its mating connectors as follows:
   a. Retract the outer nuts away from the ends of the cable.
   b. Carefully insert both ends of the cable partially into the shells of the mating connectors.

CAUTION Do not force the cable when mating connectors. Minimal force is required to seat the center pin in the mating socket. If excessive force is used, the microwave device to which the cable is connected can be damaged.

---

6. Be sure the center pin of the cable is aligned with the socket of the mating connector, then gently push the cable into place. For short cables, insert both center pins simultaneously.

CAUTION Do not cross-thread the nut of the semi-rigid cable on the shell of the mating connector. Do not over-tighten the nut. Either of these actions can result in damage to the microwave device to which the cable is connected.

7. Ensure the cable is seated in the mating connector at both ends, then slide the nuts along the cable to the mating connectors.
8. Start the nut on the mating connector with your fingers. If resistance is felt, back the nut away from the connector and begin again.
9. Tighten both connector nuts finger-tight.
10. Using a 5/16-inch torque wrench, tighten each connector nut to a value of 8.0 ± 1.0 lbs-in.

Flexible Coaxial Cables

Three SMB (push-on) connectors are used to connect the Frequency Extension rear panel to the HP 70340A Synthesizer. The remaining flexible coaxial cable connectors within the Frequency Extension are SMC (miniature threaded) types.

Remove SMC connectors with a 15/64-inch end wrench.

CAUTION Do not cross-thread the nut of a coaxial cable on the shell of the mating connector. Do not over-tighten the nut. Either of these actions can result in damage to the microwave device.

The SMA connectors should be hand-tightened, then torqued to 8.0 ± 1.0 lbs-in with a 5/16-inch torque wrench. The SMC connectors within the Frequency Extension should be hand-tightened, then torqued to 65 ± 5 oz-in with a 15/64-inch torque wrench.

Some internal cables and most of the cables connected to the rear panel have unthreaded SMB connectors. These connectors are removed in the following manner:

CAUTION Exert force only on the body of the connector. Do not pull on the cable. These connectors are easily damaged.

---

1. Grasp the connector body and pull steadily until the connector separates from its mate. If the connectors will not separate easily, rock the connector body **very** slightly side-to-side while exerting a steady pull.
2. If the connectors still will not separate, place the jaws of a pair of long-nose pliers under the connector body. Use the jaws as a fulcrum to lift the connector away from the rear panel. Use a piece of tape or other material under the pliers to avoid scratching the surface to which the connector is mounted.

Multiwire Cables

Multiwire cables mate with connectors mounted on board assemblies.

CAUTION Do not pull on the wires or cable when disconnecting cable assemblies. Do not connect a multiwire cable if the mating connector has bent or broken pins.

---

1. Except for ribbon cables, multiwire cable connectors have keying tabs to prevent incorrect mating. Ensure the keying tab is aligned with the slot in the mating connector body before inserting the cable connector.
2. Several board assembly connector have ejector tabs. Disconnect cables from these connector by simultaneously pulling both ejector tabs away from the connector body.
3. To connect these cables, rotate the locking tabs to the vertical position and insert the connector. Ensure the cable connector is fully seated and the locking tabs are vertical, with the small locking piece over the body of the cable connector.
4. Mate connectors which do not have locking tabs by pressing on the cable connector body until the connector is fully seated. Do not press on the cable wires.

Assembly and Part Locations

Internal assemblies and parts will be visible after the Frequency Extension has been removed from the mainframe and the top cover has been removed from the Frequency Extension.

Major Assembly Locations

Throughout the procedures, references are made to the assemblies and cables within the Frequency Extension. Figure 3-1 will aid in identifying and locating the major assemblies.

Cable Locations

The illustrations in the following procedures show the cables and connectors which are pertinent to the procedures.

Cable and Connector Identification

Connectors on printed circuit assemblies are identified as part of the assembly to which they are mounted. For example, connector J2 of assembly A3 is A3J2. Some of the illustrations which follow will show and identify specific connectors which are mentioned in the procedure.

Cables with connectors on both ends are considered one replaceable part and are assigned reference designators as follows:

1. Ribbon cables or cables that terminate in multiple connections are assigned Wx numbers. For example, the MSIB cable that connects from the rear panel to MMS power and the MSIB bus is numbered “W1”.
2. Coax cables terminating in connectors on the rear panel are assigned W2XX numbers.
3. Flexible coax cables connecting internal assemblies are assigned W3XX numbers.
4. All Semi-Rigid coax cables have W4xx numbers.

The notation “NC” in an illustration means “no connection”.

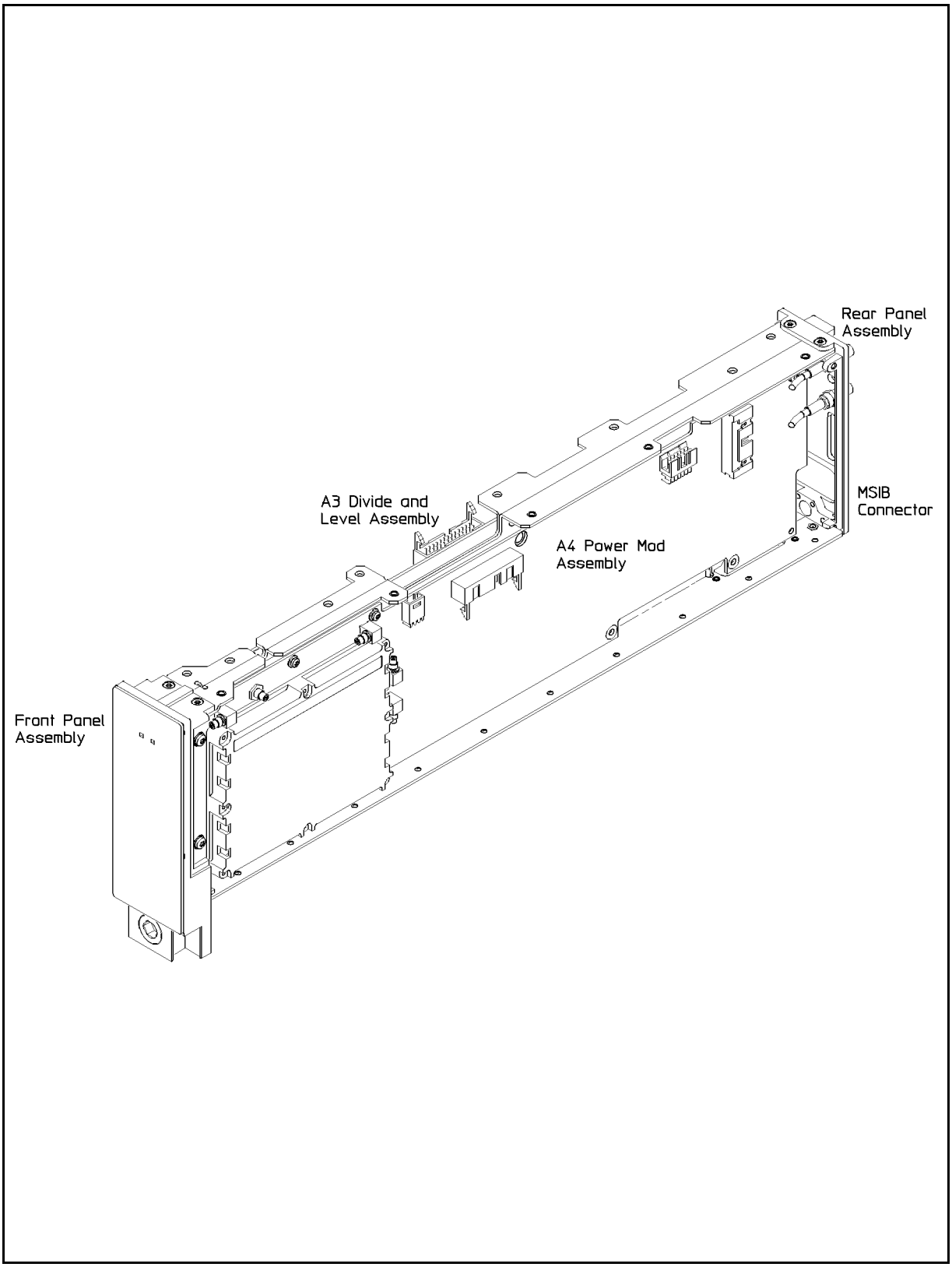

Figure 2-2. Location of Major Assemblies

Instrument Removal/Installation

The Hewlett Packard 70341A Frequency Extension operates in a 70000-series MMS (Modular Measurement System) mainframe. The HP 70341A must be removed from the mainframe before it can be serviced.

CAUTION Turn off MMS power before attempting to remove or install the HP 70341A. If system power is on when you remove or install the HP 70341A, damage to the mainframe or HP 70341A can occur.

Removal

1. Set the mainframe LINE switch to the "off"position.
2. **Before removing the HP 70341A, ensure mainframe power is off.**
3. On the back of the MMS mainframe, remove any cables attached to the rear panel of the HP 70341A. (Refer to **Flexible Coaxial Cables** in this Chapter.)
4. Swing the front panel door of the mainframe down. On some MMS mainframe models, the door will not open unless the LINE switch is set to the "off" position.
5. Using an 8 millimeter hex-ball driver, unlock the hex nut on the front panel of the HP 70341A.

Note The hex-ball driver is supplied with the 70000-series mainframe and/or with the display unit.

6. Slide the HP 70341A out of the MMS mainframe.

Installation

1. Set the mainframe LINE switch to the "off"position.
2. **Before installing the HP 70341A, ensure mainframe power is off.**
3. If you have an extender module installed, remove it. (Extender module is shown in Figure 2-4.)
4. Slide the HP 70341A into the MMS mainframe.
5. Using an 8 millimeter hex-ball driver, thread the hex nut on the front panel of the HP 70341A.

Note The hex-ball driver is supplied with the 70000-series mainframe and/or with the display unit.

6. Close the door of the mainframe front panel.

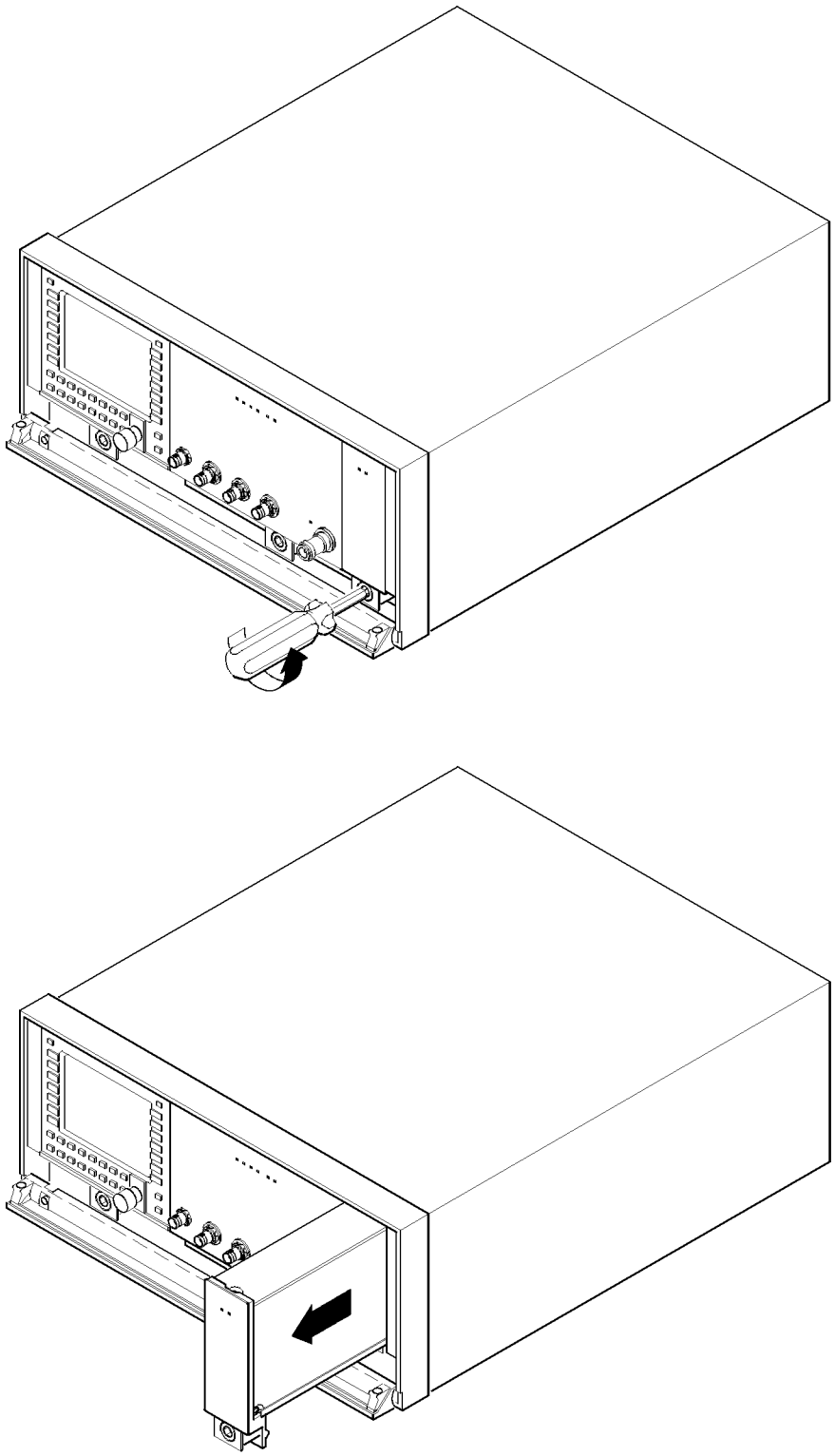

Figure 2-3. HP 70341A Removal

Covers Removal/Installation

CAUTION Turn off MMS power before attempting to remove or install *any assembly* of the HP 70341A. If system power is on when you remove or install any assembly, damage to the mainframe or HP 70341A can occur.

Removal

1. Remove the HP 70341A from the mainframe as detailed in **Instrument Extension Removal/Installation**.
2. Using a size 8 TORX® driver, remove all screws securing the covers to the HP 70341A.
3. Save the screws for reinstallation of the cover.
4. Remove the covers from the HP 70341A.

Installation

1. The covers are made to install in only one possible configuration.
2. Replace the screws.
3. Tighten the screws.

Extender Module Installation/Removal

CAUTION Turn off MMS power before attempting to remove or install *any assembly* of the HP 70341A. If system power is on when you remove or install any assembly, damage to the mainframe or HP 70341A can occur.

Installation

1. Remove the HP 70341A from the mainframe as detailed in **Instrument Extension Removal/Installation**.
2. Flip down the retaining door on the mainframe as shown in Figure 2-4.
3. Install the Extender Module (HP part number 70001-60013) directly to the right of an HP 70340A.
4. Use the hex ball driver to secure the module to the mainframe.

Removal

1. Removal of the Extender Module is the reverse of installation.

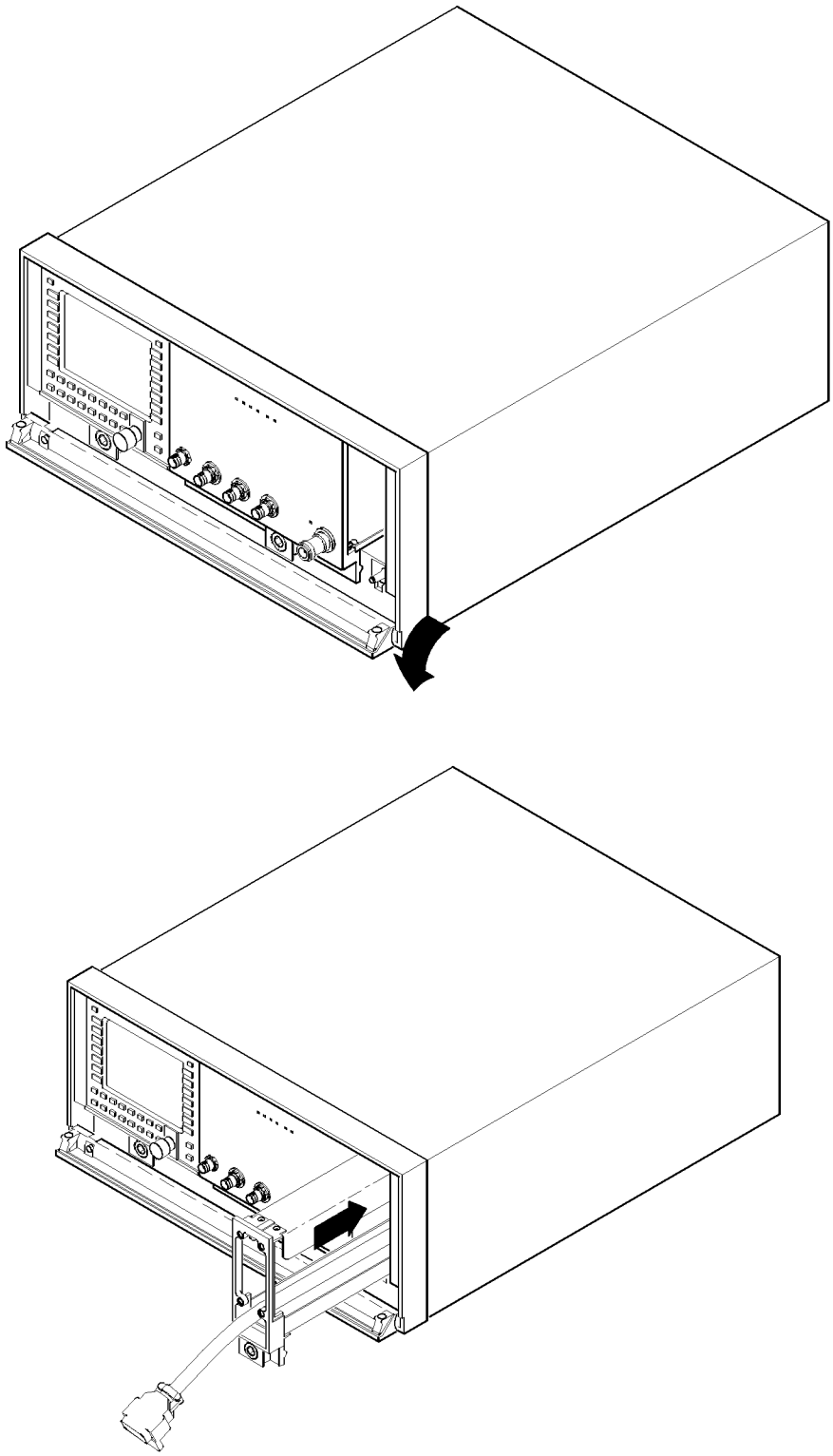

Figure 2-4. Installing the Extender Module

Service Position

CAUTION Turn off MMS power before attempting to remove or install *any assembly* of the HP 70341A. If system power is on when you remove or install any assembly, damage to the mainframe or HP 70341A can occur.

1. Make sure MMS mainframe LINE switch is OFF.
2. Remove the covers as described in **Covers Removal and Installation.**
3. Install the Extender Module as shown in Figure 2-4.
4. Connect the HP 70341A to the MSIB bus from the extender module.
5. Connect cables of suitable length (3 cables SMB(m) to SMB(m), 2 cables SMA(m) to SMA(m)) from the HP 70340A through the extender module to the HP 73041A as shown in Figure 2-5.

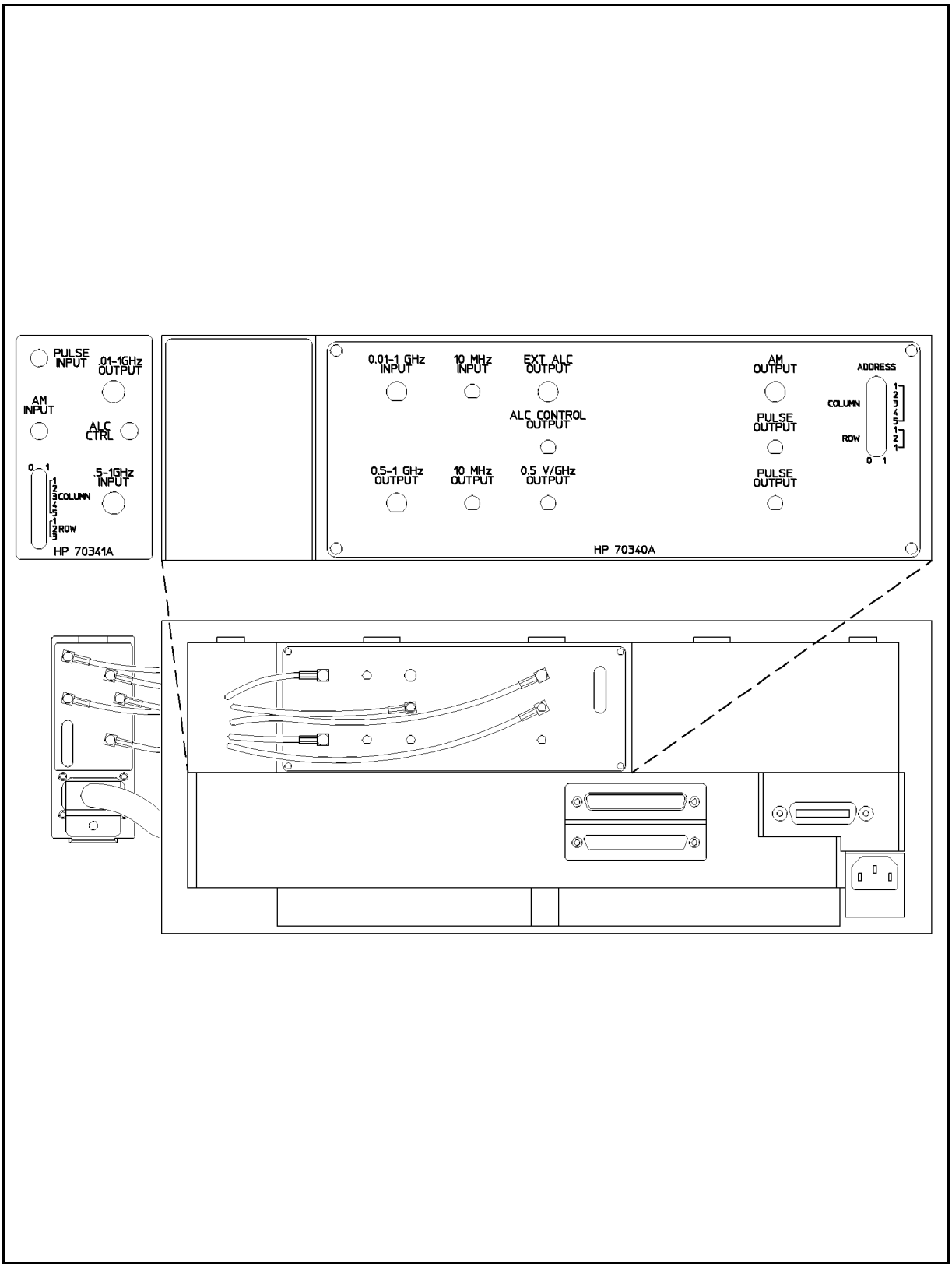

Figure 2-5. Connecting HP 70340A to HP 70341A through the Extender Module

Power Mod Board Assembly A3

This procedure contains two parts: (1) **Removal**, (2) **Reassembly**.

CAUTION Turn off MMS power before attempting to remove or install *any assembly* of the HP 70341A. If system power is on when you remove or install any assembly, damage to the mainframe or HP 70341A can occur.

Removal

1. Completely disconnect the HP 70341A from the MMS system. Remove the covers.
2. See Figure 2-6. Disconnect the following cables *completely* from A3 Power Mod Board Assembly and the rear panel, using 5/16 and 15/64 inch wrenches.
   a. W201 from J8 (leading to PULSE INPUT).
   b. W202 from J7 (leading to AM INPUT).
   c. W401 from J10.
   d. W403 from J9.
3. From A3 Power Mod Board Assembly *only* disconnect the following cables. You can leave these cables attached to the other (A4) assembly.
   a. W2 (ribbon) from J2.
   b. W4 (3 wire connector) from J1.
   c. P/O W1 (21 wire connector) from J3.
   d. W3 (7 wire connector) from J5.
4. Remove the **five** Power Mod Board Assembly mounting screws with a TORX® Screwdriver, Size 10. Save the screws.
5. Remove A3.
   a. Place the board assembly in a cushioned antistatic container.

Reassembly

Reassembly is generally a simple reversal of the removal procedures. Refer to Figure 2-6 when connecting the cables to the replacement assembly. Refer to "Semi-Rigid Cables" and "Flexible Cables" earlier in this chapter for proper care and installation of the cables.

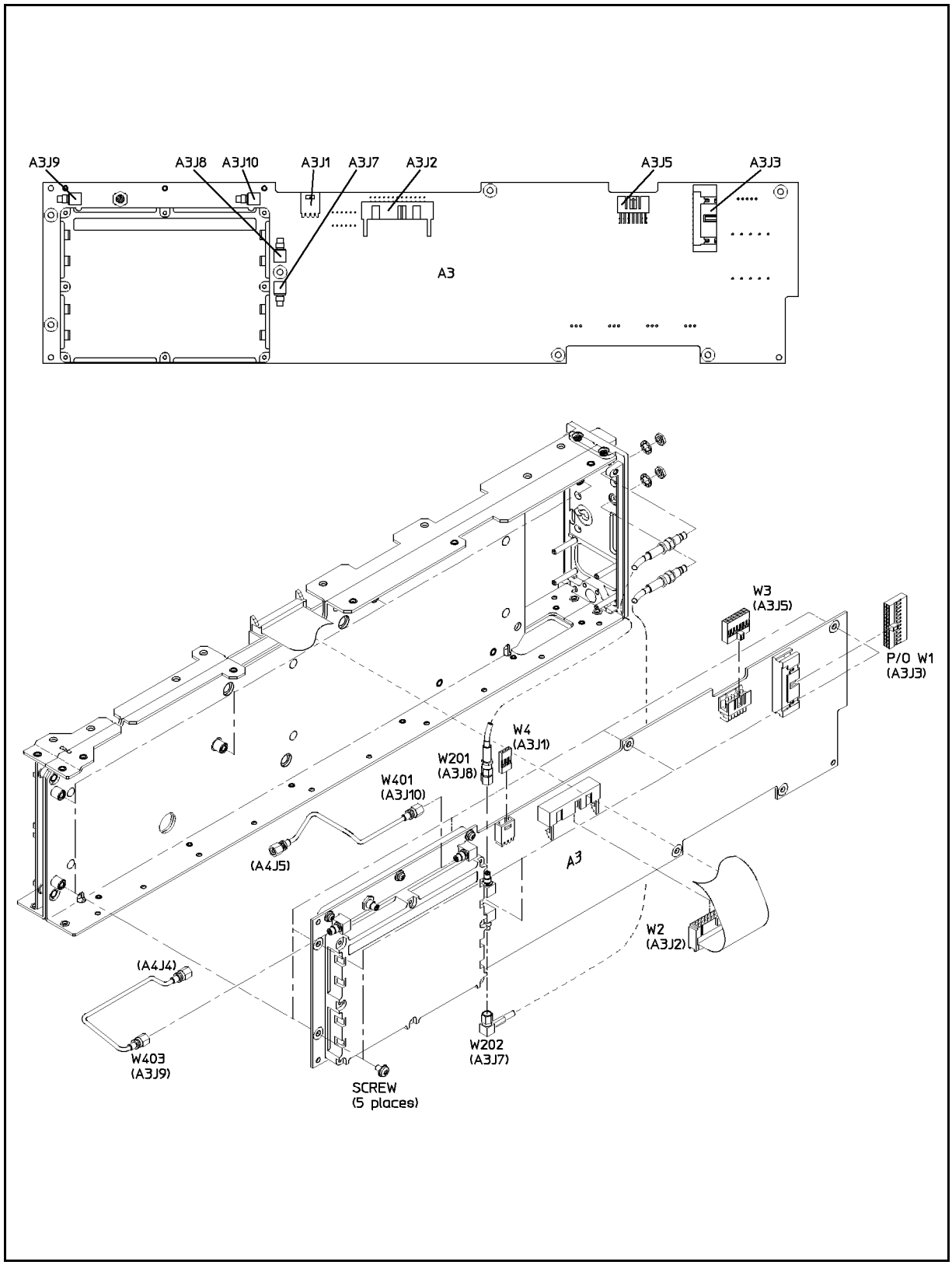

Figure 2-6. Power Mod Board Assembly A3

Divide and Level Board Assembly A4

This procedure contains two parts: (1) **Removal**, and (2) **Reassembly**.

Removal

1. Using 5/16 and 15/64-inch end wrenches, completely disconnect the following cables:
   a. W401 from J5.
   b. W402 from J10 to rear panel.
   c. W403 from J4.
2. Remove the following cables from A4 Assembly only.
   a. W203 from J6.
   b. W204 from J3.
   c. W2 (ribbon) from J2.
   d. W3 (7 wire connector) from J1.
3. Remove the A4 Board Assembly mounting screws with a TORX® Screwdriver, Size 10. Save the screws.
4. Remove A4.

   Place the board assembly in a cushioned antistatic container.

Reassembly

Reassembly is generally a simple reversal of the removal procedures. Refer to Figure 2-7 when connecting the cables to the replacement assembly. Refer to "Semi-Rigid Cables" and "Flexible Cables" earlier in this chapter for proper care and installation of the cables.

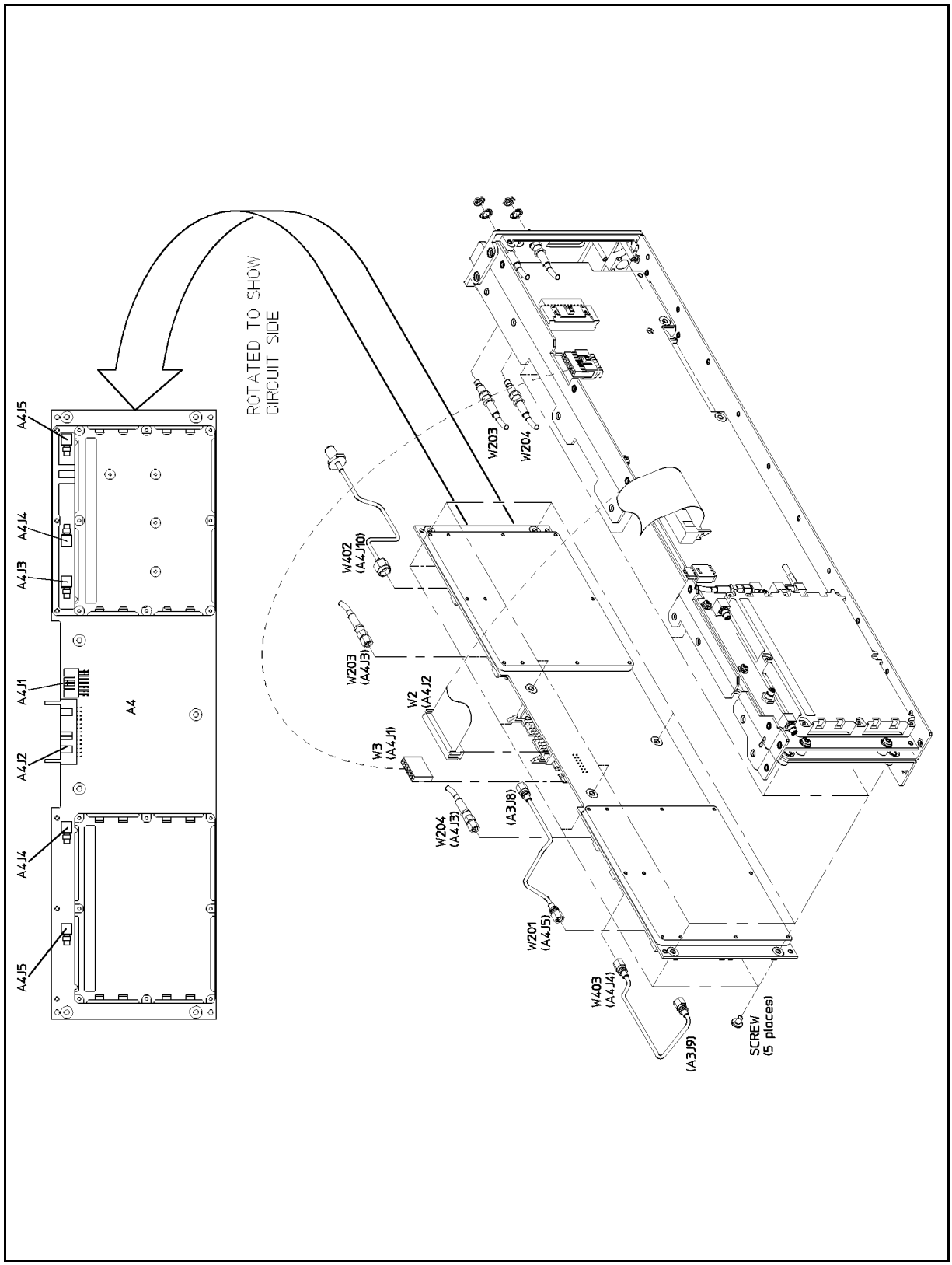

Figure 2-7. Divide and Level Board Assembly A4

Front Panel Components

This procedure is divided into removal and reassembly procedures. for the Front Panel Board Assembly.

Front Panel Disassembly

1. Remove the HP 70341A from the mainframe as described in **HP 70341A Removal/Installation**.
2. Remove W4 from A3J1. (See Figure 2-4).
3. Remove the covers as described in **HP 70341A Covers**.
4. Using a size 10 TORX® screwdriver, remove the two screws **(5)** from the top of the frame and the two screws **(7)** from the bottom of the frame. Save the screws. See Figure 2-8.
5. The front panel assembly will be free from the frame.
6. Remove the four mounting screws **(9)** from A1 Circuit Board. Save the screws.
7. The front dress panel **(1)** and circuit board **(8)** will be free.

   Remove the cable from the circuit board and save it.

   Save the screws

   Place the board assembly in a cushioned antistatic container.

Front Panel Reassembly

Reassembly is generally a simple reversal of the removal procedures. Refer to Figure 2-8.

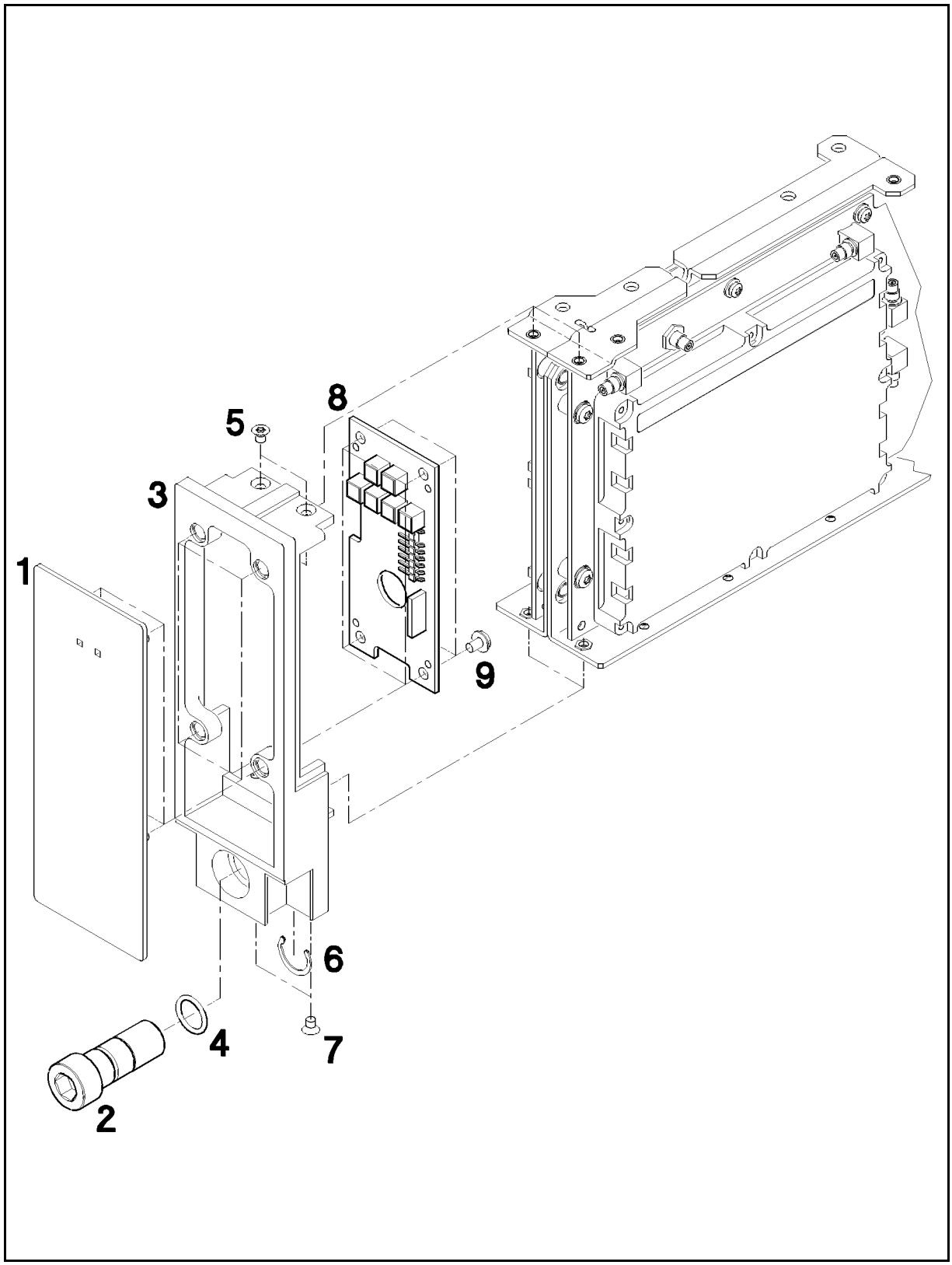

Figure 2-8. Front Panel Removal

Rear Panel

With the exception of the MSIB connector, connectors located on the rear panel are repaired by replacing the entire wire/connector assembly without removing the rear panel from the frame.

Rear Panel Disassembly / MSIB Removal

1. Disconnect MSIB cable connector W1 from A3J3 and A3J4 (Power Mod Board Assembly).
2. Using a 5/16-inch wrench, remove the following cables from the rear panel. See Figure 2-9.
   W402 **(4)** from .01 to 1 GHz OUTPUT.
   W204 **(7)** from .5 to 1 GHz INPUT.
3. Using a 15/64-inch wrench, remove the following cables from the rear panel. See Figure 2-9.
   W203 **(6)** from ALC CTRL.
   W201 **(11)** from PULSE INPUT.
   W202 **(12)** from AM INPUT.
4. To free the rear panel from the HP 70341A frame, use a size 10 TORX® screwdriver and remove the two screws **(14)** at the bottom edge and the two screws **(14)** at the top edge of the rear panel.
5. To free the MSIB connector from the rear panel assembly:
   a. Cut the cable tie securing the ferrite block to the bracket.
   b. Using a 5.5 mm nutdriver, remove four locknuts from four studs. Keep the locknuts.
   c. Remove the springs from the studs and store them.
   d. Remove the clamps from the studs.
   e. Remove the MSIB connector from the rear panel.

Rear Panel Reassembly

1. Ensure the MSIB connector is properly secured to the rear panel assembly. (Figure 2-9).
   a. Install the MSIB connector **(5)** into the hole in the rear panel. *Install two clamps **(3)** on the studs.
   b. Install a spring **(2)** on one of the studs, then start a locknut **(1)** on that stud.
   c. Install the remaining three springs and locknuts.
   d. Using a 5.5 mm nutdriver, tighten four locknuts until they meet the unthreaded portion of the studs.
2. Attach the rear panel assembly **(10)** to the frame with the four screws **(14)**.
3. Review **Multiwire Cables**, then connect MSIB cable connector W1 to connector A3J3 and A3J4 (Figure 2-9).
4. Place rear dress panel **(13)** as shown in Figure 2-9.
5. Review **Semi-Rigid Coaxial Cables**, install cable W402 to .01 to 1 GHz OUTPUT.
6. Review **Flexible Cables**, then connect the remaining cables.
7. Torque the SMA connector nuts to 8.0 ± 1.0 lbs-in.

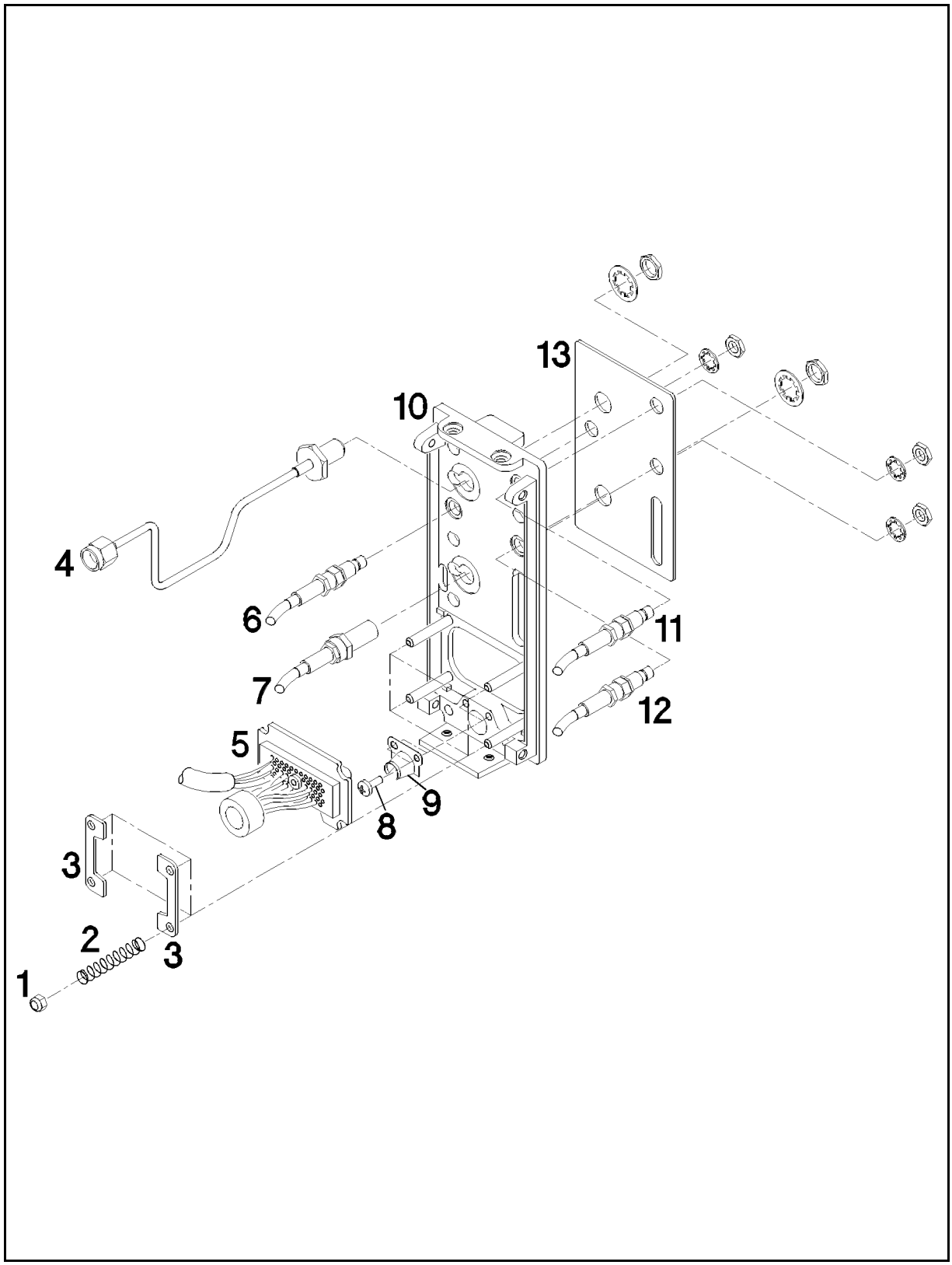

Figure 2-9. Rear Panel Disassembly

3

Obtaining the Replacement Assembly/Part

Introduction

This chapter contains information for identifying and ordering replacement assemblies and mechanical parts for the HP 70341A frequency extension.

The parts lists, schematic diagrams, and component location diagrams for board assemblies are available separately in *HP 70341A Component Level Information*.

Abbreviations

Table 3-2 lists abbreviations used in the parts list, block diagrams, and throughout the manual. Standard abbreviations may be in upper or lower-case letters. However, the replaceable parts lists are computer printouts using only upper-case letters. Thus, abbreviations in the replaceable parts lists are in upper-case letters only.

Assembly Level Replaceable Parts Table Format

Tables 3-3 and 3-4 list the following information for each major assembly and for each mechanical and electrical part that is not part of a major assembly:

1. Assembly reference designation. This column lists the reference designator for the assembly (Table 3-3) or the reference number of the assembly or part shown in the applicable illustration (Table 3-4).
2. Hewlett-Packard part number.
3. Part number check digit (CD). This digit is used by HP to perform a checksum test, helping to assure that the part number you order has been written correctly.
4. Quantity used. The total quantity of parts used in the illustration or in a specific area of the illustration is listed in this column.
5. Description of the assembly. A brief description of the assembly or part is given. Parenthetical information may be included to indicate optional parts or parts deleted when an option is added. Reference designators may also appear in parentheses. References to another illustration will appear in this column where a part is shown in more than one illustration.

6. Manufacturer's code number. This column lists a five-digit code for the manufacturer of each part, with the exception of common hardware. The codes are listed in Federal Cataloging Handbook H4/H8: Commercial and Government Entity (CAGE) Publications. This handbook is available from:

   Commander
   Defense Logistics Services Center
   Federal Center
   74 North Washington
   Battle Creek MI 49017-3084

7. Manufacturer's part number.

Illustrated Parts Breakdowns

Figures 3-1 through 3-9 are Illustrated Parts Breakdowns (IPBs) of the Frequency Extension. Each IPB contains an exploded illustration of a section of the instrument along with a listing of the parts that are identified in each figure.

Ordering Information

To order a part listed in any replaceable parts table, include the Hewlett-Packard part number, the check digit, and the quantity required. Address the order to the nearest Hewlett-Packard office. Inclusion of the check digit (CD) will ensure accurate and timely processing of your order.

Note Within the USA, it is most expedient to order directly from the Hewlett-Packard Parts Center by calling the toll-free number: 1-800-227-8164. The HP Parts Center is open Monday through Friday, 6 AM to 5PM (Pacific Time). Ask your nearest HP office for information and forms for the "Direct Mail Order System".

Optional Configurations

Several options are available for the Hewlett Packard Model 70341A Frequency Extension. The option numbers listed below are used in the replaceable parts lists and throughout this manual:

- Option 1E1. Adds a programmable 90 dB microwave attenuator.
- Option 1E2. Adds internal pulse modulation.
- Option 1E8. Substitutes 1 Hz frequency resolution for the standard 10 Hz frequency resolution.
- Option 1E9. Substitutes a 3.5 mm RF output connector for the standard Type N connector.

Parts List Backdating

The replaceable parts lists contain the parts for all instrument configurations. If a part is not used in all instrument configurations, this is indicated with a serial number prefix or a range of prefixes.

Parts List Updating (Change Package)

Production changes made after the publication date of this manual are accompanied by a change in the serial number prefix. Changes to the parts list are recorded by serial number prefix in a "Change Package." Contact your nearest HP office for information on obtaining the most recent Change Package for the Frequency Extension.

Parts Identification

To identify a part not shown or not in the "Change Package," contact the parts identification section of your nearest Hewlett-Packard service center. Be prepared to identify the instrument by model and serial number, and to describe the part by type, function, and location within the Frequency Extension.

Exchange Assemblies

Table 3-1 lists assemblies within the Frequency Extension that can be replaced on an exchange basis. Factory repaired and tested exchange assemblies are available only on a trade-in basis. Defective assemblies must be returned for credit. Assemblies required for spare parts stock must be ordered by the new assembly part number.

Table 3-1. Part Numbers for Exchange Assemblies

Reference Designator	Description	Part Number[1]	
		Exchange Assy	New Assy
A3	Power Mod Board Assembly	70341-69010	70341-60010
A4	Divide and Level Board Assembly	83732-69101	83732-60101

1 When ordering extra assemblies for spare parts stock, use new assembly part number only. Exchange orders require return of the defective part.

Recommended Spares List

Stocking spare parts for an instrument is often done to ensure quick return to service after a malfunction occurs. Hewlett-Packard prepares a "Recommended Spares" list for this instrument. The contents of the list are based on failure reports and repair data. Quantities given are for one year of parts support. A copy of the "Recommended Spares" list may be requested from your nearest Hewlett-Packard office.

When stocking parts to support more than one instrument or to support a variety of Hewlett-Packard instruments, it may be more economical to work from one consolidated list rather than simply adding together stocking quantities from the individual instrument lists. Hewlett-Packard will prepare consolidated "Recommended Spares" lists for any number or combination of instruments. Contact your nearest Hewlett-Packard office for details.

Table 3-2. Reference Designations

A assembly	E miscellaneous electrical part	P electrical connector (movable portion); plug	V electron tube
AT attenuator; isolator; termination	F fuse	Q transistor; SCR; triode thyristor	VR voltage regulator; breakdown diode
B fan; motor	FL filter	R resistor	W cable; transmission path; wire
BT battery	H hardware	RT thermistor	X socket
C capacitor	HY circulator	S switch	Y crystal unit (piezoelectric or quartz)
CP coupler	J electrical connector (stationary portion); jack	T transformer	Z tuned cavity; tuned circuit
CR diode; diode thyristor; varactor	K relay	TB terminal board	
DC directional coupler	L coil; inductor	TC thermocouple	
DL delay line	M meter	TP test point	
DS annunciator; signaling device (audible or visual); lamp; LED	MP miscellaneous mechanical part	U integrated circuit; microcircuit	

Table 3-3. Abbreviations

A ampere	cw clockwise	h hour	MΩ megohm
ac alternating current	cm centimeter	HET heterodyne	MEG meg (10^6) (used in Parts List)
ACCESS accessory	D/A digital-to-analog	HEX hexagonal	MET FLM metal film
ADJ adjustment	dB decibel	HD head	MET OX metallic oxide
A/D analog-to-digital	dBm decibel referred to 1 mW	HDW hardware	MF medium frequency; microfarad (used in Parts List)
AF audio frequency	dc direct current	HF high frequency	MFR manufacturer
AFC automatic frequency control	deg degree (temperature interval or difference)	HG mercury	mg milligram
AGC automatic gain control	... ° degree (plane angle)	HI high	MHz megahertz
AL aluminum	°C degree Celsius (centigrade)	HP Hewlett-Packard	mH millihenry
ALC automatic level control	°F degree Fahrenheit	HPF high-pass filter	mho mho
AM amplitude modulation	°K degree Kelvin	HR hour (used in Parts List)	MIN minimum
AMPL amplifier	DEPC deposited carbon	HV high voltage	min minute (time)
APC automatic phase control	DET detector	Hz Hertz	... ' minute (plane angle)
ASSY assembly	diam diameter	IC integrated circuit	MINAT miniature
AUX auxiliary	DIA diameter (used in Parts List)	ID inside diameter	mm millimetre
avg average	DIFF AMPL differential amplifier	IF intermediate frequency	MOD modulator
AWG American wire gauge	div division	IMPG impregnated	MOM momentary
BAL balance	DPDT double-pole, double-throw	in inch	MOS metal-oxide semiconductor
BCD binary coded decimal	DR drive	INCD incandescent	ms millisecond
BD board	DSB double sideband	INCL include(s)	MTG mounting
BE CU beryllium copper	DTL diode transistor logic	INP input	MTR meter (indicating device)
BFO beat frequency oscillator	DVM digital voltmeter	INS insulation	mV millivolt
BH binder head	ECL emitter coupled logic	INT internal	mVac millivolt, ac
BKDN breakdown	EMF electromotive force	kg kilogram	mVdc millivolt, dc
BP bandpass	EDP electronic data processing	kHz kilohertz	mVpk millivolt, peak
BPF bandpass filter	ELECT electrolytic	kΩ kilohm	mVp-p millivolt, peak-to-peak
BRS brass	ENCAP encapsulated	kV kilovolt	mVrms millivolt, rms
BWO backward-wave oscillator	EXT external	lb pound	mW milliwatt
CAL calibrate	F farad	LC inductance-capacitance	MUX multiplex
ccw counterclockwise	FET field-effect transistor	LED light-emitting diode	MY mylar
CER ceramic	F/F flip-flop	LF low frequency	μA microampere
CHAN channel	FH flat head	LG long	μF microfarad
cm centimeter	FIL H fillister head	LH left hand	μH microhenry
CMO cabinet mount only	FM frequency modulation	LIM limit	μumho micromho
COAX coaxial	FP front panel	LIN linear taper (used in Parts List)	μs microsecond
COEF coefficient	FREQ frequency	lin linear	μV microvolt
COM common	FXD fixed	LK WASH lock washer	μVac microvolt, ac
COMP composition	g gram	LO low; local oscillator	μVdc microvolt, dc
COMPL complete	GE germanium	LOG logarithmic taper (used in Parts List)	μVpk microvolt, peak
CONN connector	GHz gigahertz	log logarithm(ic)	μVp-p microvolt, peak-to-peak
CP cadmium plate	GL glass	LPF low pass filter	μVrms microvolt, rms
CRT cathode-ray tube	GRD ground(ed)	LV low voltage	μW microwatt
CTL complementary transistor logic	H henry	m metre (distance)	
CW continuous wave		mA millampere	
		MAX maximum	

Table 3-3. Abbreviations (continued)

nA nanoampere
NC no connection
N/C normally closed
NE neon
NEG negative
nF nanofarad
NI PL nickel plate
N/O normally open
NOM nominal
NORM normal
NPN negative-positive-negative
NPO negative-positive zero (zero temperature coefficient)
NRFR not recommended for field replacement
NSR not separately replaceable
ns nanosecond
nW nanowatt
OBD order by description
OD outside diameter
OH oval head
OP AMPL operational amplifier
OPT option
OSC oscillator
OX oxide
oz ounce
Ω ohm
P peak (used in Parts List)
PAM pulse-amplitude modulation
PC printed circuit
PCM pulse-code modulation; pulse-count modulation
PDM pulse-duration modulation
pF picofarad
PH BRZ phosphor bronze
PHL Phillips
PIN positive-intrinsic-negative
PIV peak inverse voltage
pk peak
PL phase lock
PLO phase lock oscillator
PM phase modulation
PNP positive-negative-positive
P/O part of
POLY polystyrene
PORC porcelain
POS positive; position(s) (used in Parts List)
POSN position
POT potentiometer
p-p peak-to-peak
PP peak-to-peak (used in Parts List)
PPM pulse-position modulation
PREAMPL preamplifier
PRF pulse-repetition frequency
PRR pulse repetition rate
ps picosecond
PT point
PTM pulse-time modulation
PWM pulse-width modulation
PWV peak working voltage
RC resistance-capacitance
RECT rectifier
REF reference
REG regulated
REPL replaceable
RF radio frequency
RFI radio frequency interference
RH round head; right hand
RLC resistance-inductance-capacitance
RMO rack mount only
rms root-mean-square
RND round
RAM random-access memory
ROM read-only memory
R&P rack and panel
RWV reverse working voltage
S scattering parameter
s second (time)
... " second (plane angle)
S-B slow-blow (fuse) (used in Parts List)
SCR silicon controlled rectifier; screw
SE selenium
SECT sections
SEMICON semiconductor
SHF super-high frequency
SI silicon
SIL silver
SL slide
SNR signal-to-noise ratio
SPDT single-pole, double-throw
SPG spring
SR split ring
SPST single-pole, single-throw
SSB single sideband
SST stainless steel
STL steel
SQ square
SWR standing-wave ratio
SYNC synchronize
T timed (slow-blow fuse)
TA tantalum
TC temperature compensating
TD time delay
TERM terminal
TFT thin-film transistor
TGL toggle
THD thread
THRU through
TI titanium
TOL tolerance
TRIM trimmer
TSTR transistor
TTL transistor-transistor logic
TV television
TVI television interference
TWT traveling wave tube
U micro (10^{-6}) (used in Parts List)
UF microfarad (used in Parts List)
UHF ultra-high frequency
UNREG unregulated
V volt
VA voltampere
Vac volts, ac
VAR variable
VCO voltage-controlled oscillator
Vdc volts, dc
VDCW volts, dc, working (used in Parts List)
V(F) volts, filtered
VFO variable-frequency oscillator
VHF very-high frequency
Vpk volts, peak
Vp-p volts, peak-to-peak
Vrms volts, rms
VSWR voltage standing-wave ratio
VTO voltage-tuned oscillator
VTVM vacuum-tube voltmeter
V(X) volts, switched
W watt
W/ with
WIV working inverse voltage
WW wirewound
W/O without
YIG yttrium-iron-garnet
Z_o characteristic impedance

Table 3-4. Multipliers

Abbreviation	Prefix	Multiple
T	tera	10^{12}
G	giga	10^{9}
M	mega	10^{6}
k	kilo	10^{3}
da	deka	10
d	deci	10^{-1}
c	centi	10^{-2}
m	milli	10^{-3}
μ	micro	10^{-6}
n	nano	10^{-9}
p	pico	10^{-12}
f	femto	10^{-15}
a	atto	10^{-18}

Table 3-3. Major Assemblies Figure Location

Reference Designation	Description	Figure Number
A1	Front Panel Assemblies	Figure 3-3
A2	Rear Panel Assemblies	Figure 3-6
A3	Power Mod Board Assembly	Figure 3-4
A3F1	Fuse	Figure 3-7
A4	Divide and Level Board Assembly	Figure 3-4
AT1	U-Wave Output Attenuator	Figure 3-7
MP1	Cover	Figure 3-2
MP2	Cover	Figure 3-2
MP3	Frame	Figure 3-5
W1	MSIB Connector / MMS Power Assembly	Figure 3-6
W2	A3 / A4 Interconnect	Figure 3-7
W3	Connector Wire Assembly From A3J5 to A4J1Figure 3-7	
W4	Front Panel LED Connector Wire Assembly	Figure 3-7
W201	PULSE INPUT to A3J8 Connector Wire Assembly	Figure 3-6
W202	AM INPUT to A3J7 Connector Wire Assembly	Figure 3-6
W203	ALC CTRL to A4J6 Connector Wire Assembly	Figure 3-6
W204	.5 - 1 GHz INPUT to A4J3 Connector Wire Assembly	Figure 3-6
W401	A4J5 to A3J10 Connector Semi Rigid Cable Assembly	Figure 3-4
W402	.01 - 1 GHz OUTPUT to A4J10 Connector Semi Rigid Cable Assembly	Figure 3-6
W403	A4J4 to A3J6 Connector Semi Rigid Cable Assembly	Figure 3-4

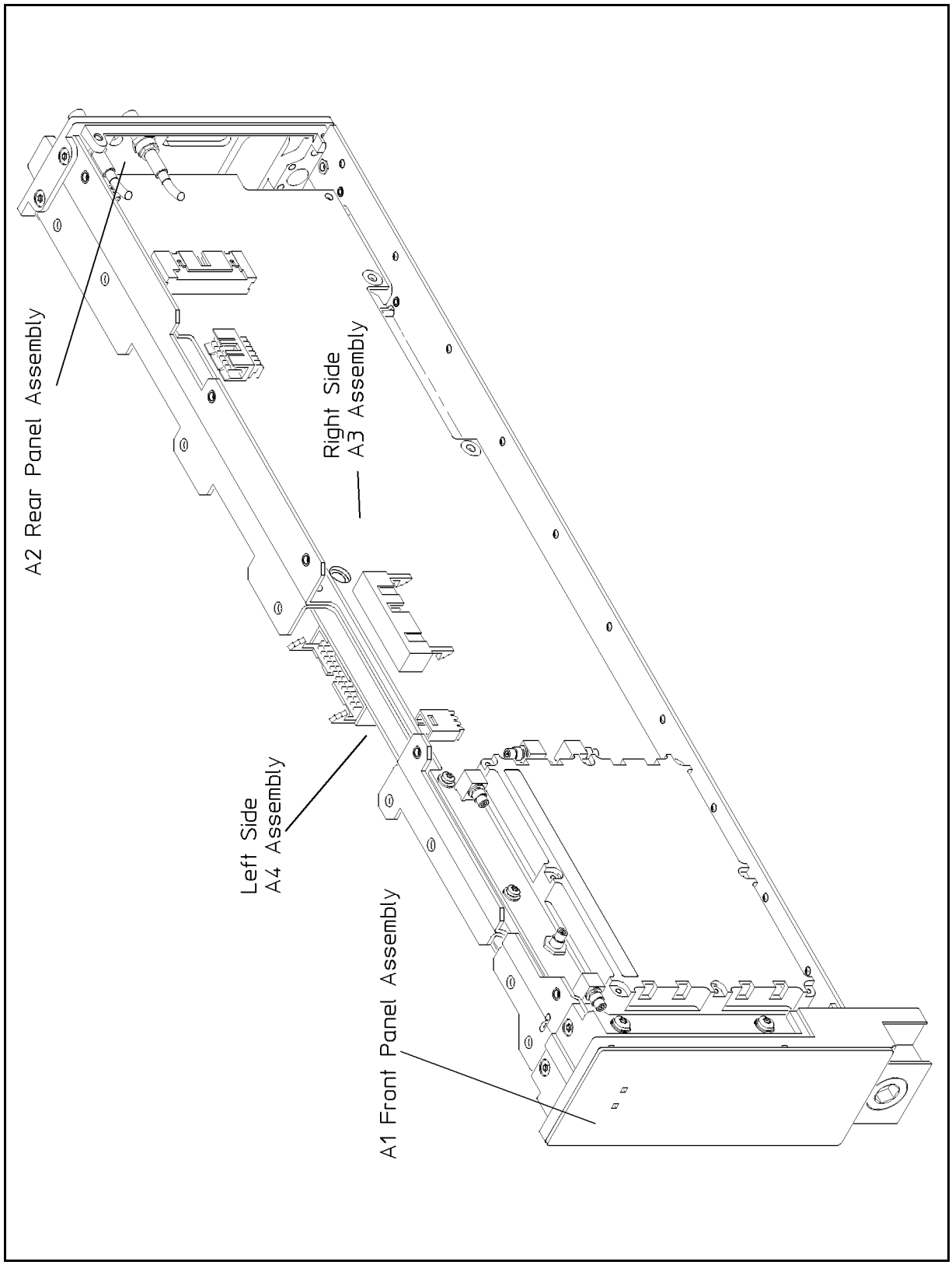

Figure 3-1. Major Assembly Locations Drawing

Table 3-4. Replaceable Parts

Reference Designation	HP Part No.	C D	Qty	Description	Mfr Code	Manufacturer Part Number
1	70341-00003	8	1	COVER-LEFT	28480	70341-00003
2	70341-00004	9	1	COVER-RIGHT	28480	70341-00004
3	0515-2028	9	5	SCREW-MACH M2.5 X 0.45 6MM-LG		
4	0515-2028	9	2	SCREW-MACH M2.5 X 0.45 6MM-LG		
5	0515-2028	9	10	SCREW-MACH M2.5 X 0.45 6MM-LG		
6	0515-2028	9	10	SCREW-MACH M2.5 X 0.45 6MM-LG		
7	0515-2028	9	2	SCREW-MACH M2.5 X 0.45 6MM-LG		

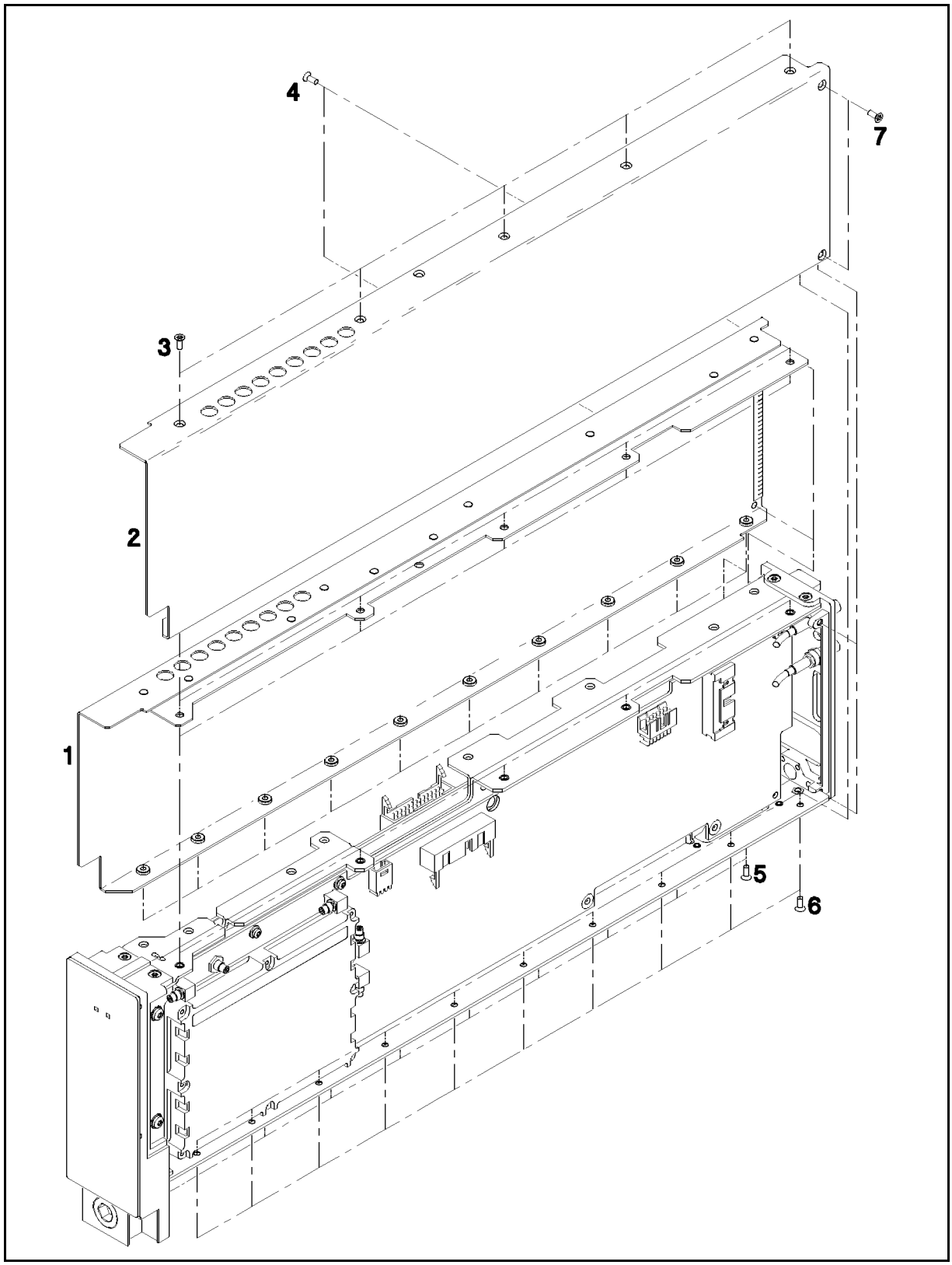

Figure 3-2. Covers Illustrated Parts Breakdown

Table 3-4. Replaceable Parts

Reference Designation	HP Part No.	C D	Qty	Description	Mfr Code	Manufacturer Part Number
1	70341-00001	1	1	PANEL FRONT	28480	70341-0001
2	5022-0051	4	1	LATCH FRONT	28480	5022-0051
3	70100-20012	0	1	HI RES FRT FRAME	28480	70100-20012
4	0900-0012	4	1	O-RING .364-IN-ID .07-IN-XSECT-DIA NTRL	51633	AS568-012 A-700
5	0515-2146	2	2	SCREW-MACH M3 X 0.5 4MM-LG 90-DEG-FLH-HD		
6	0510-1244	9	1	RETAINER-PUSH ON CIRCULAR-EXT	79136	11-410-0120-100-1
7	0515-2146	2	2	SCREW-MACH M3 X 0.5 4MM-LG 90-DEG-FLH-HD		
8	70100-60001	1	1	DISPLAY BD AY	28480	70100-60001
9	0515-0430	3	4	SCREW-MACHINE ASSEMBLY M3 X 0.5 6MM-LG	93907	

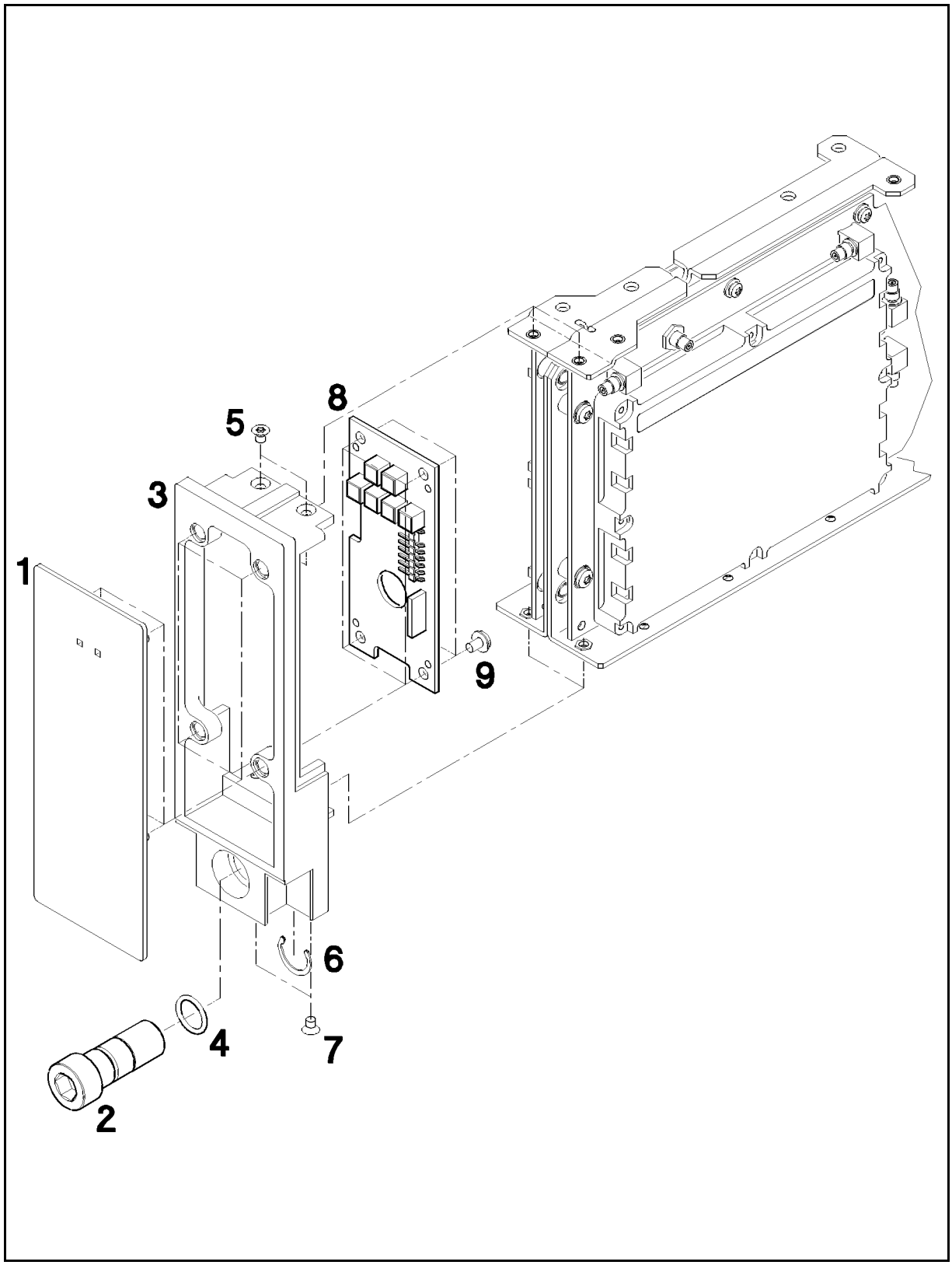

Figure 3-3. Front Panel Illustrated Parts Breakdown

Table 3-4. Replaceable Parts

Reference Designation	HP Part No.	C D	Qty	Description	Mfr Code	Manufacturer Part Number
1	0515-0430	3	7	SCREW-MACHINE ASSEMBLY M3 X 0.5 6MM-LG	93907	
2	83732-60101	3	1	DIVD & LEVEL BD AY	28480	83732-60101
3	70341-20004	1	1	CA S/R .01-1 GHz	28480	70341-20004
4	70341-20005	2	1	CA S/R .01-1 OUT	28480	70341-20005
5	70341-60011	4	1	PWR MICRO ASSY	28480	70341-60011
6	0515-0430	3	5	SCREW-MACHINE ASSEMBLY M3 X 0.5 6MM-LG	93907	

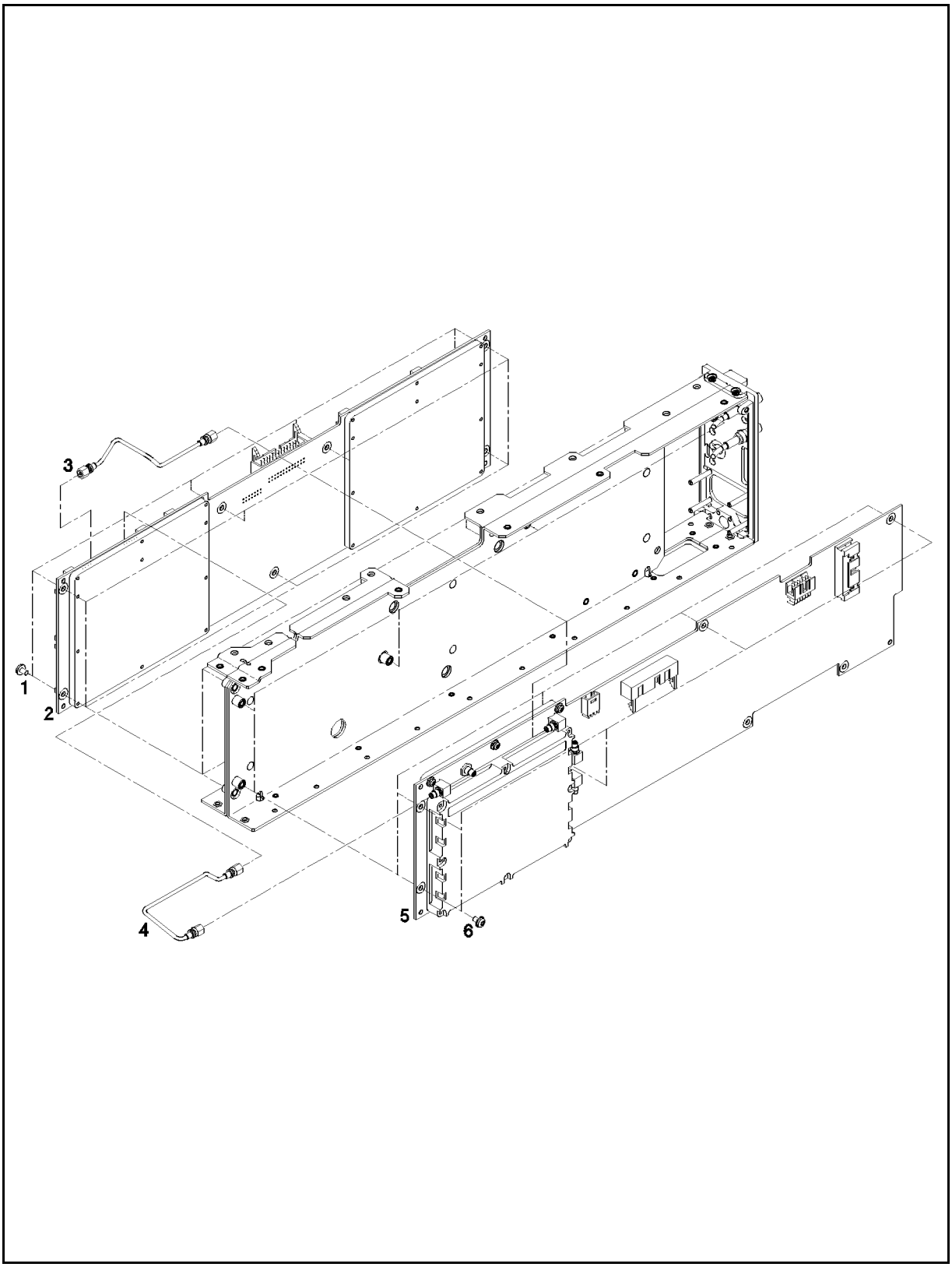

Figure 3-4. Major Printed Circuit Assemblies Illustrated Parts Breakdown

Table 3-4. Replaceable Parts

Reference Designation	HP Part No.	C D	Qty	Description	Mfr Code	Manufacturer Part Number
1	70341-00002	7	1	CENTER FRAME	28480	70341-00002
2	0515-2146	2	2	SCREW-MACH M3 X 0.5 4MM-LG 90-DEG-FLH-HD		
3	0515-2146	2	2	SCREW-MACH M3 X 0.5 4MM-LG 90-DEG-FLH-HD		

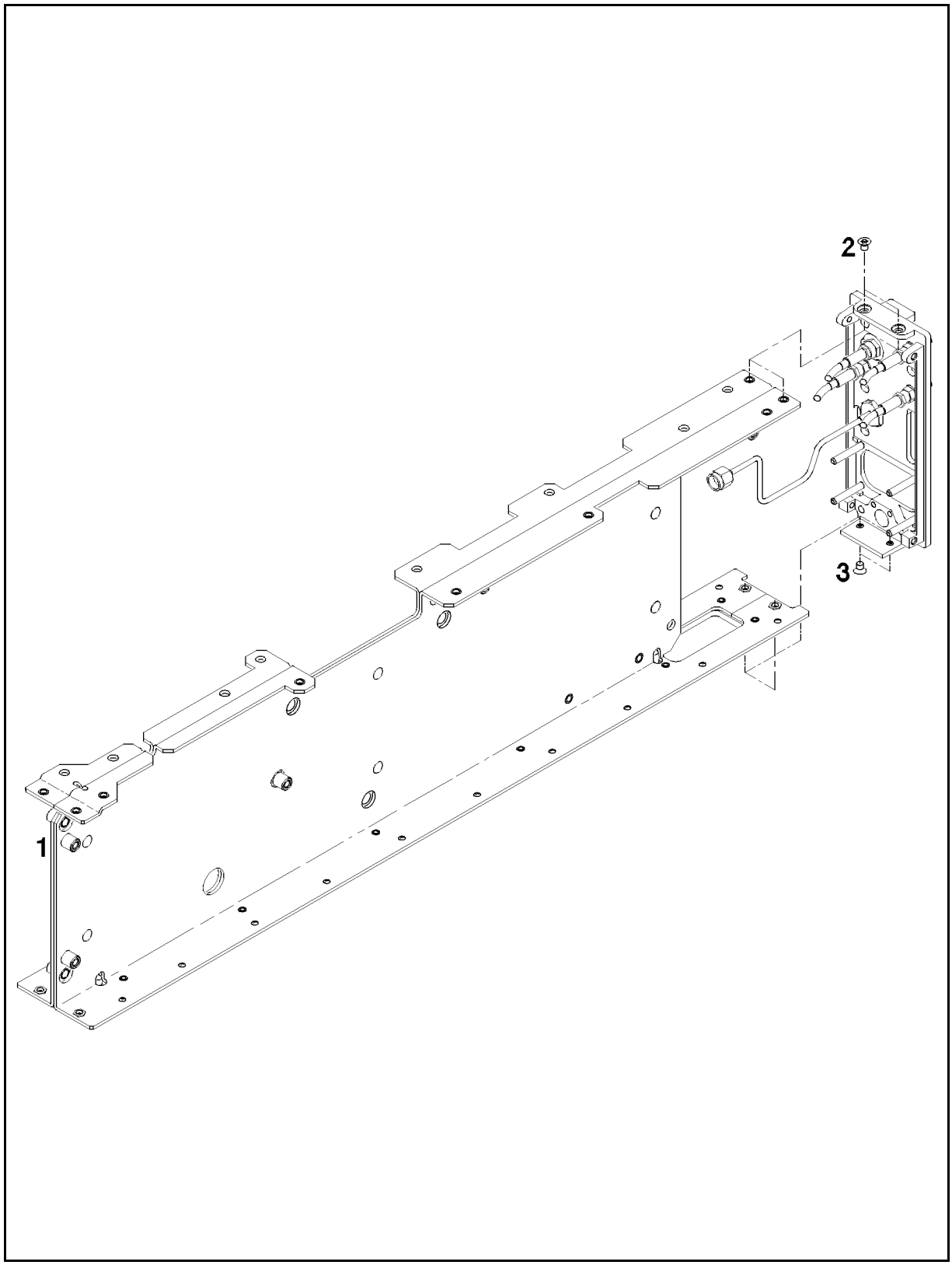

Figure 3-5. Frame Illustrated Parts Breakdown

Table 3-4. Replaceable Parts

Reference Designation	HP Part No.	C D	Qty	Description	Mfr Code	Manufacturer Part Number
1	0535-0042	5	4	NUT-HEX PLSTC-LKG M3 X 0.5 4MM-THK		M3DIN985-A2
2	1460-2095	4	4	SPRING-CPRSN 5.49-MM-OD 16.8-MM-OA-LG		
3	5001-5835	8	2	BAR - CONNECTOR	28480	5001-5835
4 W402	70341-20007	4	1	S/R CA 0.1-1 GHZ	28480	70341-20007
5	70301-60035	4	1	50 PIN MSIB CBL	28480	70301-60035
6 W203	70341-60006	7	1	CBL ALC CNTL	28480	70341-60006
7 W204	70341-60007	8	1	CBL .5-1 GHz IN	28480	70341-60007
8	0515-0894	3	2	SCREW-MACH M2.5 X 0.45 6MM-LG PAN-HD		
9	5001-5840	5	1	SPRING-GROUNDING	28480	5001-5840
10	70341-20002	9	1	FRAME REAR	28480	70341-20002
11 W201	70341-60005	6	1	CBL PLS INPUT	28480	70341-60005
12 W202	70341-60004	5	1	CBL AY SMC-SMB	28480	70341-60004
13	70341-00006	1	1	PANEL REAR	28480	70341-00006

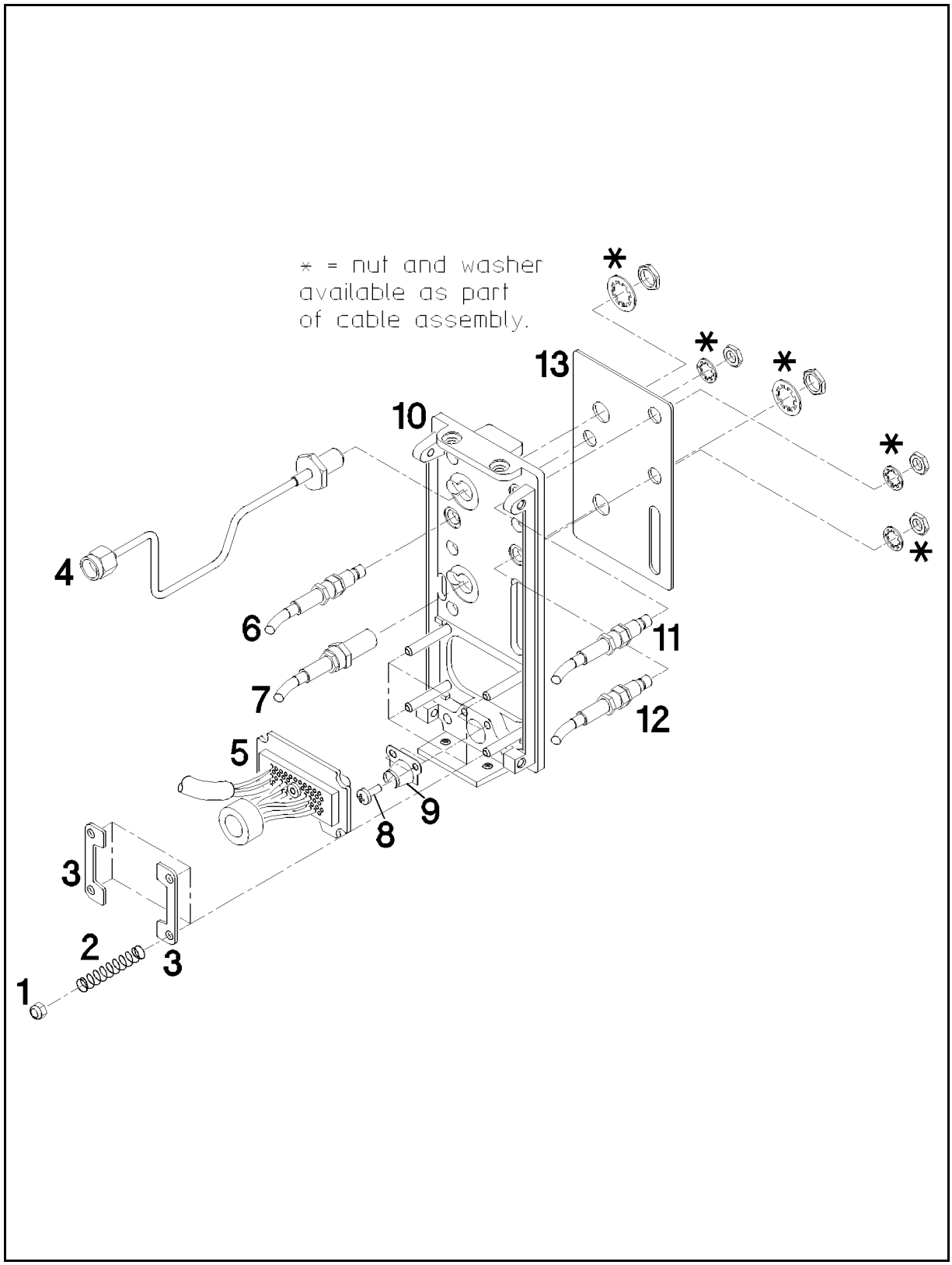

Figure 3-6. Rear Panel Illustrated Parts Breakdown

Table 3-4. Illustrated Replaceable Parts (Figure 5-7)

Reference Designation	HP Part No.	C D	Qty	Description	Mfr Code	Manufacturer Part Number
1 P/O W1	70301-60035	4	1	50 PIN MSIB CBL	28480	70301-60035
2 W204	70341-60007	8	1	CBL .5-1 GHZ IN	28480	70341-60007
3 W203	70341-60006	7	1	CBL ALC CNTL	28480	70341-60006
4 W402	70341-20007	4	1	S/R CA 0.1-1 GHz	28480	70341-20007
5 A3F1	2110-0495	4	1	FUSE (METRIC) 1.6A 250V FE IEC	D3841	19195
6 AT1	0955-0301	9	1	U-WAVE ATTENUATOR 18 GHZ MAX 18AH-2/EP		
7 W2	70341-60001		1	CBL AY DATA	28480	70341-60001
8 W3	70341-60003		1	CBL AY PWR	28480	70341-60003
9 W403	70341-20005		1	CA S/R .01-1 OUT	28480	70341-20005
10 W401	70341-20004		1	CA S/R .01-1 GHZ	28480	70341-20004
11 W4	70341-60002		1	CBL AY DISPLAY	28480	70341-60002

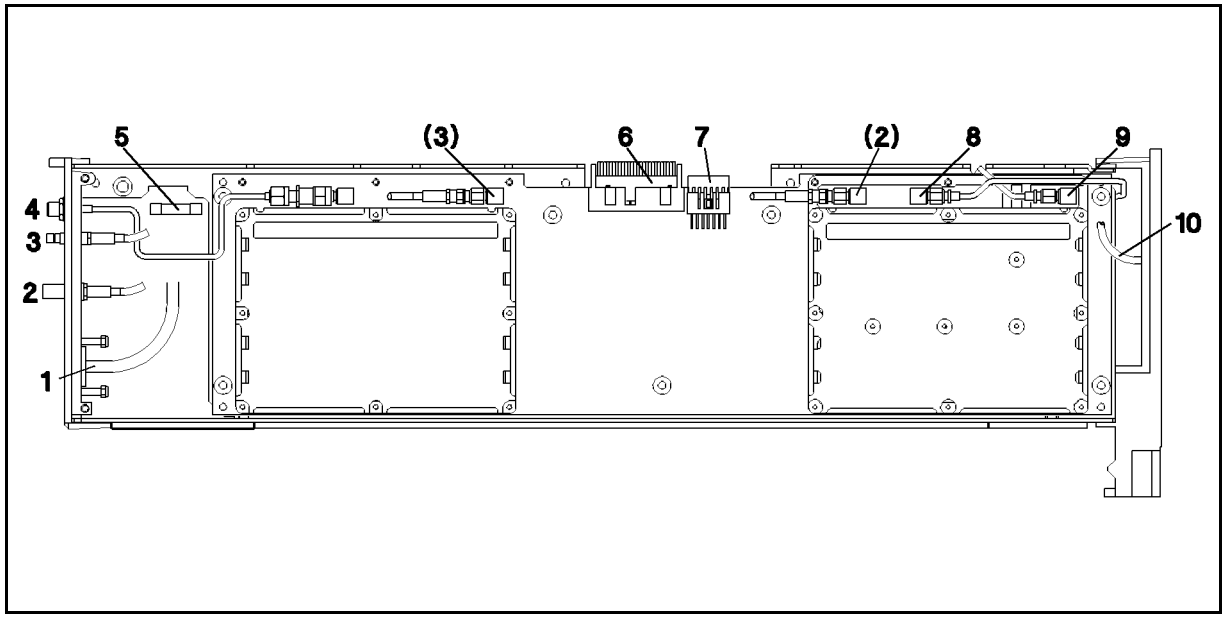

Figure 3-7. Left Side Cable Assemblies and Fuse

Table 3-4. Illustrated Replaceable Parts (Figure 5-7)

Reference Designation	HP Part No.	C D	Qty	Description	Mfr Code	Manufacturer Part Number
1 W4	70341-60002		1	CBL AY DISPLAY	28480	70341-60002
2 W403	70341-20005		1	CA S/R .01-1 OUT	28480	70341-20005
3 W401	70341-20004		1	CA S/R .01-1 GHZ	28480	70341-20004
4 W202	70341-60004	5	1	CBL AY SMC-SMB	28480	70341-60004
5 W201	70341-60005	6	1	CBL PLS INPUT	28480	70341-60005
6 W2	70341-60001		1	CBL AY DATA	28480	70341-60001
7 W3	70341-60003		1	CBL AY PWR	28480	70341-60003
8 P/O W1	70301-60035	4	1	50 PIN MSIB CBL	28480	70301-60035

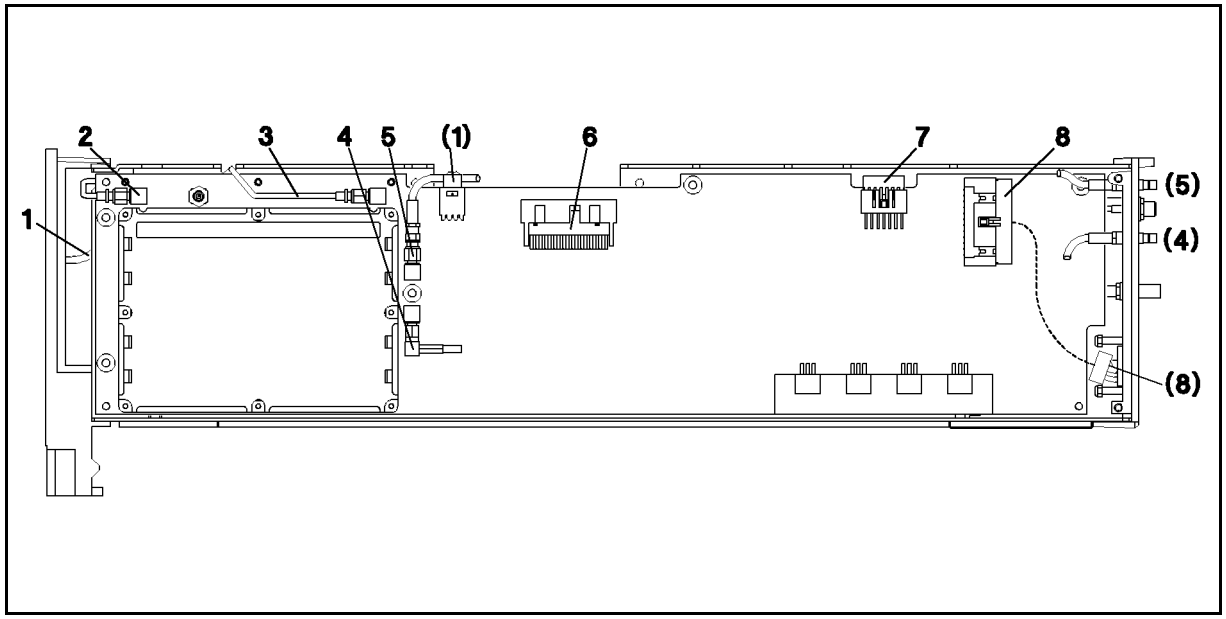

Figure 3-8. Right Side Cable Assemblies

Table 3-4. Illustrated Replaceable Parts (Figure 5-10)

Reference Designation	HP Part No.	C D	Qty	Description	Mfr Code	Manufacturer Part Number
1	5021-9263	6	2	CABLE AY S/R	28480	5021-9263
2	08753-60061	1	1	CABLE FLEX	28480	08753-60061
3	5061-1022	3	2	CABLE FLEX	28480	5061-1022

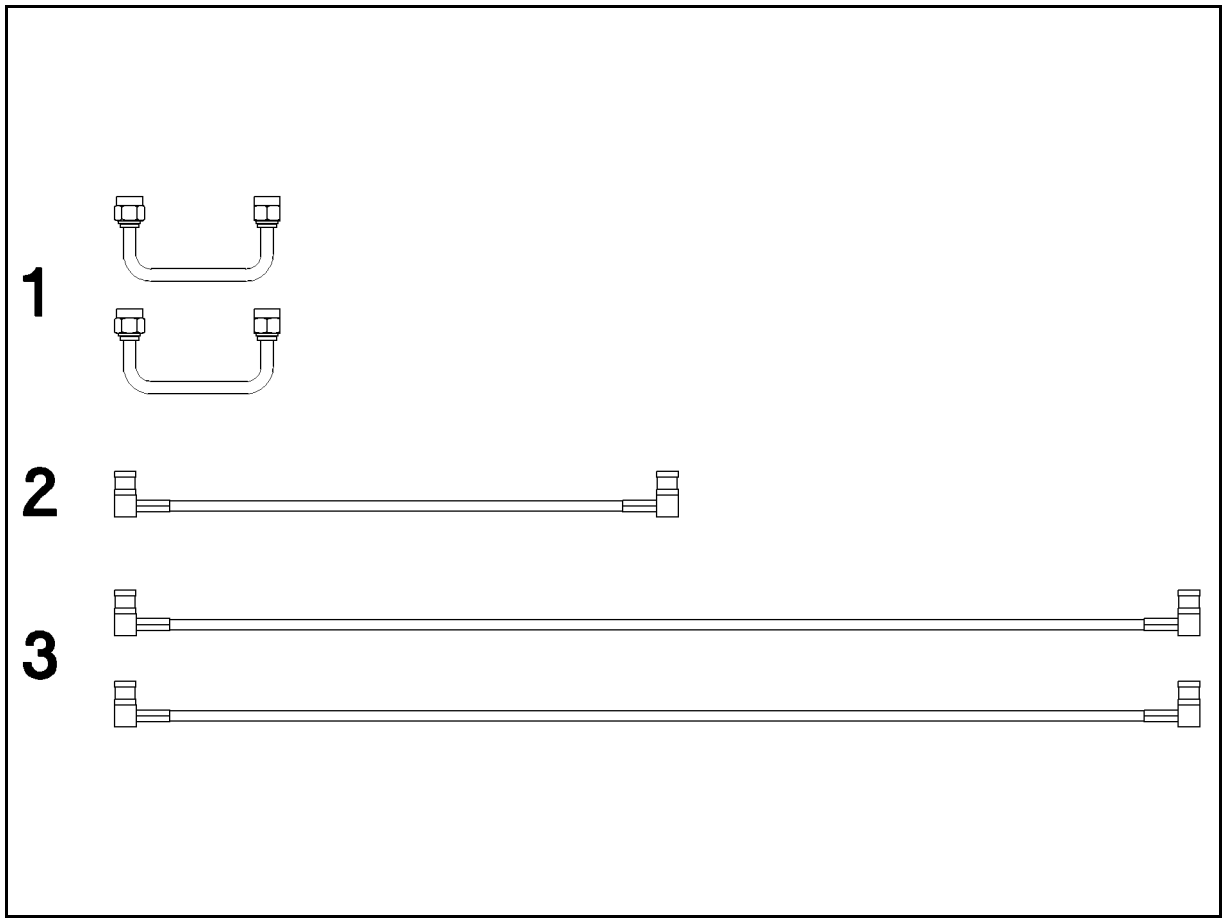

Figure 3-9. Exterior Cables (HP 70340A to HP 70341A)

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