

Service Guide
Agilent Technologies
ESG Family Signal Generators

Serial Number Prefixes:

(Affix Label Here)



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1. Initial Troubleshooting and RF Block Diagrams

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1 Initial Troubleshooting and RF Block Diagrams

This chapter will help you begin troubleshooting your signal generator. The procedures in this chapter primarily check your instrument for failures that affect the power supplies or CPU function. An RF block diagram of your signal generator is at the end of this chapter.

Before You Begin Troubleshooting

Be sure to review the warning and caution statements described in [Chapter 7](#) prior to troubleshooting your signal generator.

Using this Service Guide to Troubleshoot

Several chapters in this service guide work together to help you troubleshoot and repair your signal generator.

- **Chapter 1, “Initial Troubleshooting and RF Block Diagrams,”** helps you get started with some basic checks and instructions.
- **Chapter 2, “Assembly-Level Troubleshooting with Block Diagrams,”** helps you identify and verify the failed assembly.
- **Chapter 3, “Replaceable Parts (ESG-A & ESG-D),”** helps you locate the failed assembly or cable in the signal generator and also provides you with part numbers and ordering information.
- **Chapter 4, “Replaceable Parts (ESG-AP & ESG-DP),”** helps you locate the failed assembly or cable in the signal generator and also provides you with part numbers and ordering information.
- **Chapter 5, “Assembly Replacement,”** gives you step-by-step instructions on how to remove and replace an assembly.
- **Chapter 6, “Post-Repair Procedures,”** lists the performance tests and adjustments that must be performed after an assembly has been repaired or replaced.

Signal Generator Options

This section lists the hardware, software, and documentation options you can order with a new signal generator. Some of the options can be retrofitted into your existing signal generator. Order a retrofit by requesting either the post-sales option number or the part number.

| Hardware and Software Options Available for New Instruments | | | | | | |
|---|-------|-------|----------|----------|------------------|----------------------|
| Desired Option | ESG-A | ESG-D | ESG-AP | ESG-DP | Required Options | Incompatible Options |
| 100 | | X | | X | UND | |
| 101 | | X | | X | UND | |
| 1CM | X | X | X | X | | |
| 1CN | X | X | X | X | | |
| 1CP | X | X | X | X | | |
| 1EM | X | X | X | X | | |
| 1E5 | X | X | Standard | Standard | | |
| 1E6 | X | | X | | | |
| 200 | | X | | X | UN8 | |
| 201 | | X | | X | UN8 | |
| 300 | | X | | X | UN7, UN8 | UND |
| UN5 | | X | | X | UND | |
| UN7 | | X | | X | UN3, UN4, or UN8 | |
| UN8 | | X | | X | | |
| UN9 | | X | | X | UN8 | |
| UNA | | X | | X | UN8 | UNB |
| UNB | | X | | X | | UNA |
| UND | | X | | X | | |

| Adding Hardware and Software Options to Existing Instruments | | | | |
|---|------------------------|-------------------------|--------------------------|--------------------|
| Desired Option | Existing Option | Required Options | Post-Sales Option | Part Number |
| 100 | | UND | 150 | |
| 101 | | UND | 151 | |
| 200 | | UN8 | 250 | |
| 201 | | UN8 | 251 | |
| 300 | | UN7, UN8 | | |
| UN5 | | UND | 005 | |
| UN7 | | UN3, UN4, or UN8 | 007 | E4400-60143 |
| UN8 | | | 008 | E4400-60170 |
| UN8 | UN3 or UN4 | | | E4400-60160 |
| UN8 and UN9 | | | 009 | E4400-60185 |
| UN8 and UN9 | UN3 or UN4 | | | E4400-60184 |
| UND | | | 004 | E4400-60166 |
| UND | UN3 or UN4 | | | E4400-60181 |

| Option | Description |
|---------------|--|
| 100 | <p>Option 100 has two implementations:</p> <p>Multichannel W-CDMA (Revision 1.0-1.2) Personality - This first implementation of Option 100 simulates multichannel forward and reverse link signals according to the developing W-CDMA international standards. Spreading and frame structure of these signals are implemented according to March 1999 ARIB 1.0 - 1.2 specification.</p> <p>Multichannel W-CDMA (3GPP 3.1 12-99) Personality - This second implementation of Option 100 simulates multichannel downlink and uplink signals according to the developing W-CDMA international standards. This option implements a chip rate of 3.84 Mcps, and is based on the December 1999 3GPP 3.1 specification.</p> |
| 101 | Multichannel CDMA2000 Personality - This option simulates multichannel forward and reverse link signals according to the developing CDMA2000 standard revision 8. |
| 1CM | Rack Mount Flanges without Handles - This option adds two flanges and the necessary hardware to rack mount the signal generator in a System II or System II Plus cabinet. |
| 1CN | Front Handles - This option adds two front handles with the necessary hardware to attach the handles to the front of the signal generator. |
| 1CP | Rack Mount Flanges with Handles - This option adds two front handles, two flanges, and the necessary hardware to rack mount the signal generator in an System II or System II Plus cabinet. |
| 1E5 | High Stability Timebase - This option replaces the standard timebase reference assembly with a high-stability timebase reference assembly that has improved specifications over the standard assembly, including warranted specifications for aging rate. This feature is standard on ESG-AP and ESG-DP Series Signal Generators. |
| 1E6 | High Performance Pulse Input - This option provides high performance pulse capabilities with rise and fall times < 10 ns and on/off ratios > 70 dB. |
| 1EM | Move All Front Panel Connectors to Rear Panel - This option moves all of the front panel connectors to the rear panel. If you order Option 1EM in combination with any option that adds front panel connectors, Option 1EM will cause all of the front panel connectors to be moved to the rear panel and, in addition, some of the connectors will be changed from BNC to SMB connectors. |

- 200 Fully Coded 3GPP W-CDMA Personality - This option can be used to provide fully-coded, multichannel downlink and uplink signals in compliance with 3GPP specifications. Support for this 3GPP W-CDMA solution may require the use of two ESG signal generators.
- 201 Multichannel Real-Time cdma2000 Personality - This option can be used to provide fully-coded, multichannel forward and reverse link signals supporting both the IS-95 and IS-2000 CDMA standards.
Support for IS-2000 may require the use of two ESG signal generators. Because IS-2000 provides backward compatibility with IS-95 in RC1 and RC2 configurations, the Option 201 personality also supports the IS-95 standard.
- 300 Base Station BERT Extension for Option UN7 - This option adds bit error rate testing for GSM base stations to the ESG/VSA combination.
- ES1 This option indicates that a more recent version of firmware is resident in the signal generator than was originally shipped. The operating features in the new firmware may be different than those documented in your original manual set.
- UN3 I/Q Baseband Generator with 1 Mbit Pattern RAM (Obsolete) - *This option is no longer available.* Option UN3 provided an I/Q baseband generator with DECT, GSM, NADC, PDC, PHS, and TETRA digital modulation formats. Option UN3 is replaced by Option UN8.
- UN4 I/Q Baseband Generator with 8 Mbit Pattern RAM (Obsolete) - *This option is no longer available.* Option UN4 provided an I/Q baseband generator with DECT, GSM, NADC, PDC, PHS, and TETRA digital modulation formats. Pre-modulation filtering selections and PRBS capability were provided. Option UN4 is replaced by Option UN8 with Option UN9.
- UN5 Multi-Channel CDMA - This option provides multi-channel IS-95 CDMA capability, which provides flexible, coded-channel setups for CDMA base stations or mobiles, components, or sub-system test.
- UN7 Bit Error Rate Test - This option adds a bit error rate test function that evaluates PN9 or PN15 bit streams for errors. Configuration of data, clock, and clock gate inputs allow testing of demodulated TDMA or CDMA formats. A baseband generator must be part of the instrument configuration.
- UN8 Real-time I/Q Baseband Generator - This option provides a custom modulation generator with 1 Mbit of pattern RAM. The custom modulation generator provides generic symbol building, variable symbol rates, and variable filter capabilities in addition to TDMA protocols.
- UN9 +7 Mbits RAM - This option adds an additional 7 Mbits of pattern RAM to Option UN8 for very long data pattern generation. You must purchase Option UN8 in conjunction with Option UN9.
- UNA Alternate Timeslot Power Level Control - This option provides alternate timeslot power level control for adjacent timeslots in TDMA applications.

- UNB** **High Power with Mechanical Attenuator** - This option provides a mechanical attenuator that provides 4 to 6 dB more output power than the standard electronic attenuator.
- UND** **Internal Dual Arbitrary Waveform Generator** - This option provides an internal dual arbitrary waveform generator that contains an on-board digital signal processor capable of playing back downloaded waveforms to generate complex, digitally modulated signals. A 1 Megasample per channel memory accepts I/Q files from different waveform generation programs, such as Omnisys and Matlab. 14 bit DACs optimize dynamic range and reduce noise.

Contacting Agilent Technologies

This section prepares you for contacting Agilent Technologies should you have a problem with your signal generator.

Check the Basics before Contacting Agilent Technologies

Often problems may be solved by repeating what was being done when the problem occurred. A few minutes spent in performing these simple checks may eliminate time spent waiting for instrument repair.

- Check that the signal generator is plugged into the proper ac power source.
- Check that the line socket has power.
- Check that the signal generator is turned on.
- Check that the other equipment, cables, and connectors are connected properly and operating correctly.
- Check the equipment settings in the procedure that was being used when the problem occurred.
- Check that the test being performed and the expected results are within the specifications and capabilities of the signal generator. (Refer to the calibration guide.)
- Check the signal generator display for error messages. (Refer to the Error Messages guide.)
- Check operation by performing the verification procedures in the calibration guide. Record all results in the performance test record.

Review the Warranty

If there is still a problem, read the warranty printed in [Chapter 7, “Safety and Regulatory.”](#) If your signal generator is covered by a separate maintenance agreement, be familiar with its terms.

Agilent Technologies offers several maintenance plans to service your signal generator after warranty expiration. Call your Agilent Technologies sales and service office for full details.

Calling Agilent Technologies Sales and Service Offices

Sales and service offices are located around the world to provide complete support for your signal generator. To obtain servicing information, contact the nearest Agilent Technologies Sales and Service office listed in [Table 1-1](#). For information on ordering parts refer to [Chapter 3](#) or [Chapter 4](#).

In any correspondence or telephone conversation, refer to the signal generator by its model number and full serial number. With this information, the Agilent Technologies representative can quickly determine whether your unit is still within its warranty period.

Table 1-1 Agilent Technologies Sales and Service Offices

| | | |
|---|--|---|
| UNITED STATES | | |
| Instrument Support Center Agilent Technologies (800) 403-0801 | | |
| EUROPEAN FIELD OPERATIONS | | |
| Headquarters Agilent Technologies S.A. 150, Route du Nant-d'Avril 1217 Meyrin 2/ Geneva Switzerland (41 22) 780.8111 | France Agilent Technologies France 1 Avenue Du Canada Zone D'Activite De Courtaboeuf F-91947 Les Ulis Cedex France (33 1) 69 82 60 60 | Germany Agilent Technologies GmbH Agilent Technologies Strasse 61352 Bad Homburg v.d.H Germany (49 6172) 16-0 |
| Great Britain Agilent Technologies Eskdale Road, Winnersh Triangle Wokingham, Berkshire RG41 5DZ England (44 118) 9696622 | | |
| INTERCON FIELD OPERATIONS | | |
| Headquarters Agilent Technologies 3495 Deer Creek Rd. Palo Alto, CA 94304-1316 USA (650) 857-5027 | Australia Agilent Technologies Australia Ltd. 31-41 Joseph Street Blackburn, Victoria 3130 (61 3) 895-2895 | Canada Agilent Technologies (Canada) Ltd. 17500 South Service Road Trans-Canada Highway Kirkland, Quebec H9J 2X8 Canada (514) 697-4232 |
| Japan Agilent Technologies Japan, Ltd. 9-1 Takakura-Cho, Hachioji Tokyo 192, Japan (81 426) 60-2111 | Singapore Agilent Technologies Singapore (Pte.) Ltd. 150 Beach Road #29-00 Gateway West Singapore 0718 (65) 291-9088 | Taiwan Agilent Technologies Taiwan 8th Floor, H-P Building 337 Fu Hsing North Road Taipei, Taiwan (886 2) 712-0404 |
| China China Agilent Technologies 38 Bei San Huan X1 Road Shuang Yu Shu Hai Dian District Beijing, China (86 1) 256-6888 | | |

Returning Your Signal Generator for Service

Use the information in this section if you need to return the signal generator to Agilent Technologies.

Packaging the Signal Generator

Use the following steps to package the signal generator for shipment to Agilent Technologies for service:

1. Fill out a blue repair tag (available at the end of this chapter) and attach it to the instrument. Be as specific as possible about the nature of the problem. Send a copy of any or all of the following information:
 - Any error messages that appeared on the signal generator display.
 - A completed performance test record from the calibration guide for your instrument.
 - Any other specific data on the performance of the signal generator.
2. Use the original packaging materials or a strong shipping container that is made of double-walled, corrugated cardboard with 159 kg (350 lb) bursting strength. The carton must be both large enough and strong enough to accommodate the signal generator and allow at least 3 to 4 inches on all sides of the signal generator for packing material.

CAUTION Signal generator damage can result from using packaging materials other than those specified. Never use styrene pellets, in any shape, as packaging materials. They do not adequately cushion the instrument or prevent it from shifting in the carton. Styrene pellets cause equipment damage by generating static electricity and by lodging in the signal generator fan.

3. Surround the instrument with at least 3 to 4 inches of packing material, or enough to prevent the instrument from moving in the carton. If packing foam is not available, the best alternative is SD-240 Air Cap™ from Sealed Air Corporation (Hayward, CA 94545). Air Cap looks like a plastic sheet covered with 1-1/4 inch air-filled bubbles. Use the pink Air Cap to reduce static electricity. Wrap the instrument several times in the material to both protect the instrument and prevent it from moving in the carton.
4. Seal the shipping container securely with strong, nylon adhesive tape.
5. Mark the shipping container “FRAGILE, HANDLE WITH CARE” to ensure careful handling.
6. Retain copies of all shipping papers.

Equipment Required for Troubleshooting

Table 1-2 lists the equipment required to troubleshoot your signal generator. You may use the recommended model or an equivalent that meets the critical specifications.

Table 1-2 Recommended Test Equipment

| Equipment | Critical Specifications for Equipment Substitution | Recommended Model Number |
|--------------------|---|---------------------------------|
| Digital Multimeter | Input Resistance: $\leq 10\text{ M}\Omega$ Accuracy: 10 mV on 100 V range | Agilent 3458A |

Initial Troubleshooting

Perform the following troubleshooting steps in the order they are presented. If you are unable to identify the failed assembly, go to [Chapter 2, “Assembly-Level Troubleshooting with Block Diagrams,”](#) for further instruction.

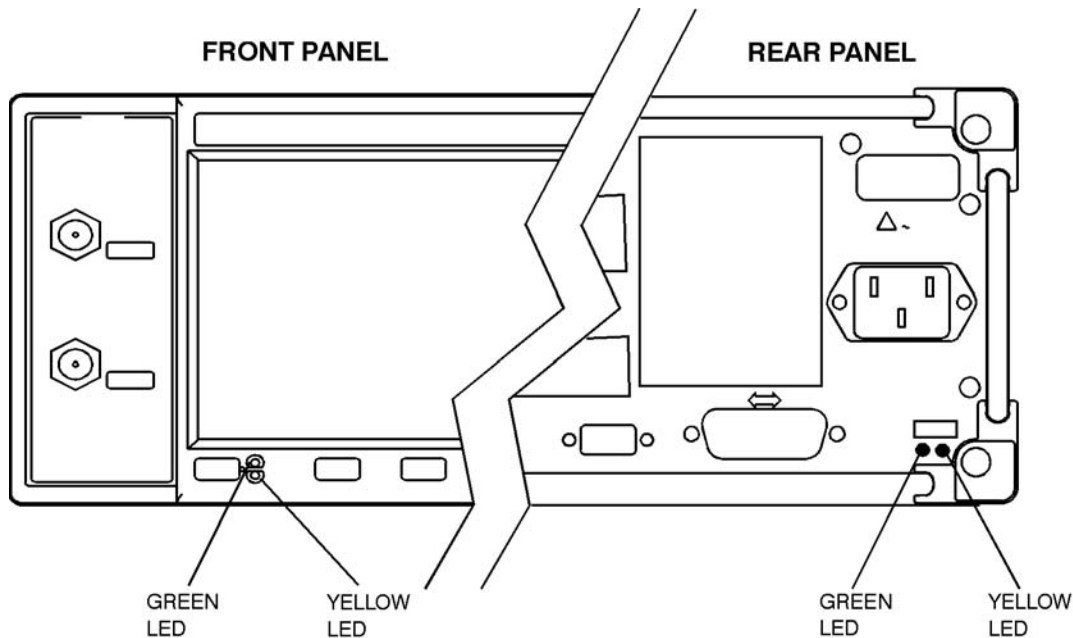
NOTE *Do not* attempt to replace any fuses within the power supply to correct a problem with your signal generator. If you determine that the power supply is the failed assembly, replace the power supply.

Step 1: Observe the Front and Rear Panel LEDs

Observing the LEDs on the front and rear panel of the signal generator will determine if there is a catastrophic failure in the power supply assembly.

1. Ensure the signal generator is plugged in (*do not* switch the power on) and verify that the yellow LED on both the front and rear panels is lit. Refer to [Figure 1-1](#) for LED locations. A lit yellow LED (+15 V_STBY) indicates that line voltage is present.
2. Power on the signal generator and verify that the green LED on both the front and rear panels is lit. A lit green LED indicates the power supply has received an “ON” command. The ON/OFF switch toggles a flip-flop latch which biases the proper transistors in the LED control circuit. This circuit is powered by VBAT, the battery-backed SRAM supply, so that the on-off state is “remembered” even when the instrument is unplugged.

Figure 1-1 LED Locations on the Front and Rear Panels



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Step 2: Power On the Signal Generator and Check for Error Messages

This procedure verifies that the signal generator powers up and that the internal instrument check identifies no errors. The internal check evaluates the correctness of operation and returns an error message if a problem is detected.

1. Switch on the signal generator. Let the signal generator warm up for at least five minutes.

| | |
|-------------|--|
| NOTE | For ESG-AP, ESG-DP, and Option 1E5 signal generators, <code>ERROR 514, Reference Oven Cold</code> will occur whenever the signal generator is powered up within five minutes of being connected to AC line power. The <code>OVEN COLD</code> annunciator and the <code>ERR</code> annunciator will both turn on. The <code>OVEN COLD</code> annunciator will automatically clear after approximately five minutes. The error queue <i>cannot</i> be cleared, however, until the <code>OVEN COLD</code> annunciator has turned off. |
|-------------|--|

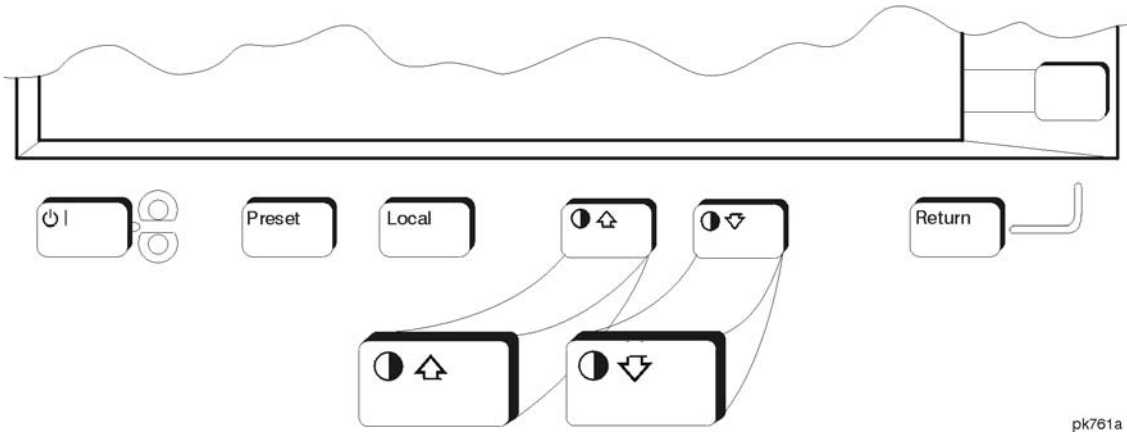
2. Cycle the power to the signal generator and verify that the green LED on both the front and rear panels is lit. Refer to [Figure 1-1](#).
3. When the display is lit, check to see if the `ERR` annunciator is turned on.
4. If the `ERR` annunciator is turned on, review the error messages in the queue by pressing **Utility > Error Info > View Next Error Message**. The first error message in the queue will be shown in the text area of the display. Refer to the *Error Messages* guide for descriptions of error messages.

If there is more than one error message (each message will be designated as 1 of *n*), continue pressing the **View Next Error Message** softkey until you have seen and recorded all of the messages.
5. If you were able to resolve all of the error messages, press **Utility > Error Info > Clear Error Queue(s)** to delete the list of error messages.

Step 3: Functional Check the Front Panel Keys and Display

1. Press various front panel hardkeys and softkeys to verify they function as expected.
2. Use the contrast keys to verify that the display can be lightened and darkened. Refer to [Figure 1-2](#).

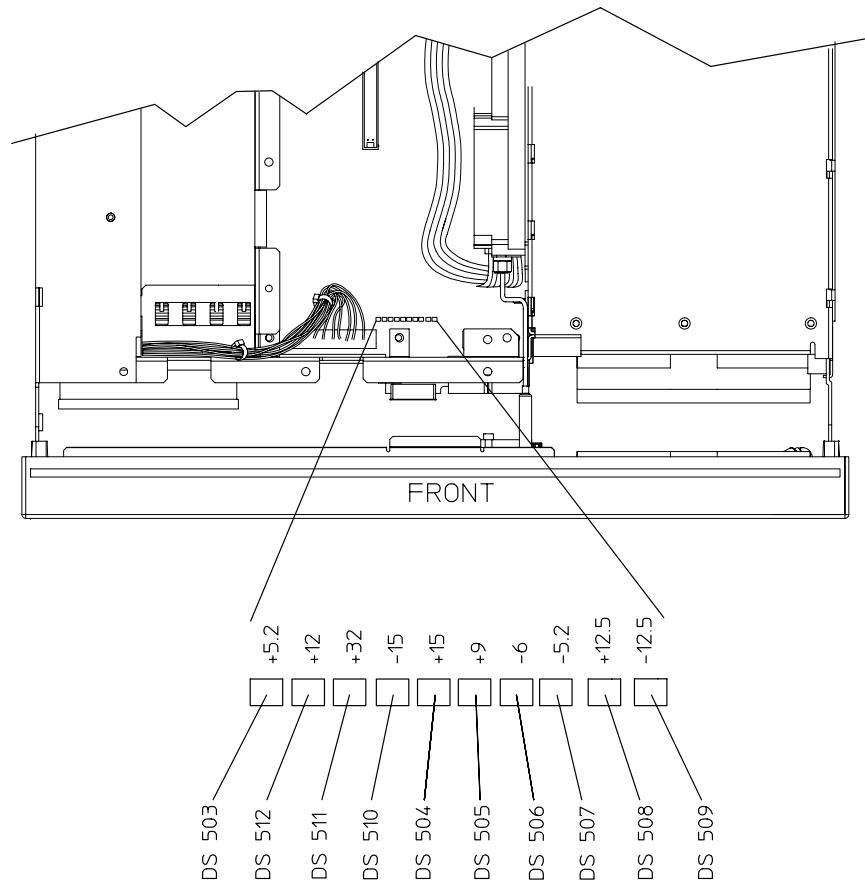
Figure 1-2 Contrast Keys



Step 4: Visually Check the Individual Voltage Supplies

1. Unplug the signal generator and remove the instrument cover. Refer to [Chapter 5, "Assembly Replacement,"](#) for removal instructions.
2. Expose the motherboard by removing the top cover. It is secured by 11 screws.
3. Plug in the signal generator and allow it to warm up for at least five minutes.
4. If possible, clear the error queue(s) of messages. Press **Utility > Error Info > Clear Error Queue(s)**.
5. On the motherboard, locate the 10 LEDs that correspond to the individual voltage supplies (see [Figure 1-3](#)). Verify that all the LEDs are lit. If one or more LEDs are off, proceed to ["Step 6: Isolate the Failed Assembly"](#).

Figure 1-3 LED Locations on the Motherboard



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Step 5: Measure the Individual Voltage Supplies

The voltages supplied as inputs from the power supply via J6 to the motherboard are +15 V (TP502), +15 V standby (+15 V_STBY), -15 V (TP503), +12 V (TP505), and +5.2 V (TP302). DGND (TP301) is associated with these supplies.

The -6 V (TP508) and -5.2 V (TP509) supplies receive their input from the +5.2 V digital supply (5.2 VD at TP506). The +5.2 V digital line is filtered to prevent the switching power supply noise from being induced onto the +5.2 VD supply lines. The -6 V is a bias voltage for circuits on the output board and other RF circuitry. The -5.2 V is used by the emitter coupled logic (ECL) digital ICs. The LCD display driver voltage (VLCD), a -14 V to -24 V source, also receives input from the +5.2 VD supply.

The input to the +32 V supply (TP504) is the +12 V supply. The +32 V supply is used by the synthesizer/doubler assembly. This supply also includes an LC noise filter.

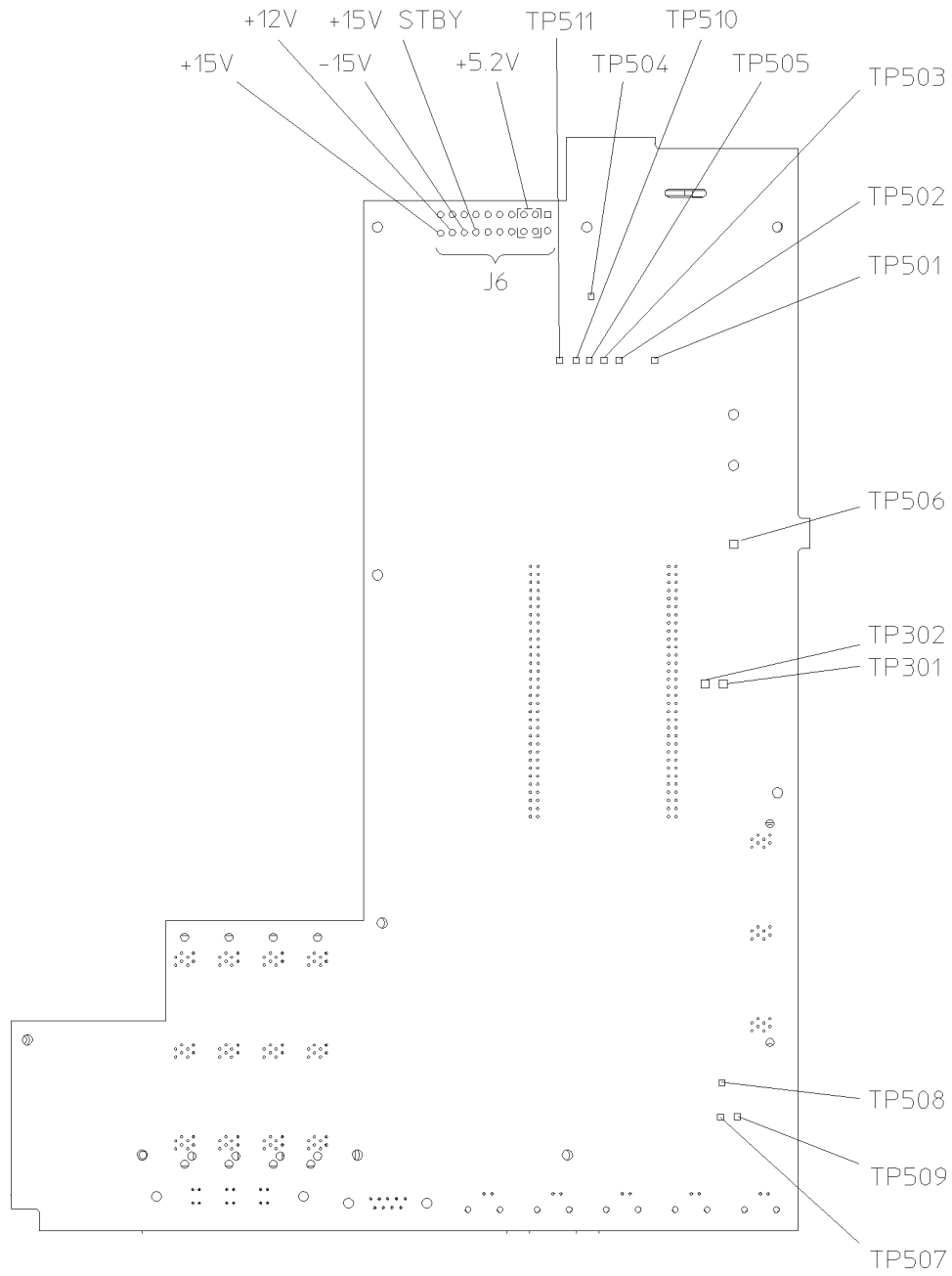
The +12.5 V regulated supply (TP510) originates from the +15 V input. The -12.5 V regulated supply (TP511) originates from the -15 V input. These two supplies are used by the solid-state attenuator and the reverse power protection (RPP). The +10 V reference (TP501) originates from the +15 V input. The +9 V supply (TP507) originates from the +10 V reference and the +12 V supply.

1. Unplug the signal generator and turn it upside-down.
2. Expose the motherboard by removing the bottom cover. It is secured by 15 screws.
3. Plug in the signal generator.
4. Measure the voltage of each supply to verify they are within the tolerances listed in [Table 1-3](#). The voltage supply test point locations are shown in [Figure 1-4](#). If all the voltages are within tolerance, proceed to [“Step 7: Check for Basic CPU Functionality”](#).

Table 1-3 Voltage Supply Tolerances

| Test Point | Supply Voltage | Tolerance |
|------------------------|-----------------------|------------------|
| J6 (pins 2, 3, 12, 13) | +5.2 V | +/- 3% |
| J6 (pin 20) | +15 V | +/- 3% |
| J6 (pin 18) | -15 V | +/- 3% |
| J6 (pin 19) | +12 V | +/- 3% |
| J6 (pin 17) | +15 V_STBY | +/- 5% |
| TP301 | DGND | N/A |
| TP302 | +5.2 V | +/- 3% |
| TP501 | +10 V_REF | +/- 3% |
| TP502 | +15 V | +/- 3% |
| TP503 | -15 V | +/- 3% |
| TP504 | +32 V | +/- 4% |
| TP505 | +12 V | +/- 3% |
| TP506 | +5.2 VD | +/- 4% |
| TP507 | +9 V | +/- 4% |
| TP508 | -6 V | +/- 4% |
| TP509 | -5.2 V | +/- 4% |
| TP510 | +12.5 V | +/- 4% |
| TP511 | -12.5 V | +/- 4% |

Figure 1-4 Motherboard Test Point Locations



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Step 6: Isolate the Failed Assembly

1. Switch off the signal generator.
2. Remove or disconnect an assembly. Below is a suggested order of removal/disconnection based upon ease.

For the ESG-A and ESG-D Series:

- a. A5 Dual Arbitrary Waveform Generator Board (Option UND)
- b. A6 Bit Error Rate Test Board (Option UN7)
- c. A7 Baseband Generator Board (Options UN3, UN4, UN8, UN9)
- d. A8 Data Generator Board (Options UN3, UN4, UN8, UN9)
- e. A21 Demodulator Board (Option 300)
- f. Front Panel - disconnect A1W1 ribbon cable
- g. A3 Inverter - disconnect A3W1
- h. A2 Display - disconnect W10
- i. AT1 Electronic Attenuator/RPP - disconnect W13
AT1 Mechanical Attenuator and A19 RPP (Option UNB) - disconnect W13 and A19W1
- j. A25 Pulse Modulator (Option 1E6) - disconnect A25W1
- k. B1 Fan - disconnect B1W1 (disconnect *only* temporarily)
- l. B2 Fan - disconnect B2W1 (disconnect only temporarily)
- m. A9 Output Board
- n. A11 Reference Board
- o. A12 Synthesizer/Doubler Board
- p. A20 YIG Down Convertor Assembly (Option 300) - disconnect W31

NOTE Refer to [Chapter 3, “Replaceable Parts \(ESG-A and ESG-D Series\),”](#) for information on locating assemblies. Refer to [Chapter 5, “Assembly Replacement,”](#) for information on removing or disconnecting assemblies.

For the ESG-AP and ESG-DP Series:

- a. A5 Dual Arbitrary Waveform Generator Board (Option UND)
- b. A6 Bit Error Rate Test Board (Option UN7)
- c. A7 Baseband Generator Board (Options UN3, UN4, UN8, UN9)
- d. A8 Data Generator Board (Options UN3, UN4, UN8, UN9)
- e. Front Panel - disconnect A1W1 ribbon cable
- f. A3 Inverter - disconnect A3W1

- g. A2 Display - disconnect W10
- h. AT1 Electronic Attenuator/RPP - disconnect W13
AT1 Mechanical Attenuator and A19 RPP (Option UNB) - disconnect W13 and A19W1
- i. A25 Pulse Modulator (Option 1E6) - disconnect A25W1
- j. B1 Fan - disconnect B1W1 (disconnect *only* temporarily)
- k. B2 Fan - disconnect B2W1 (disconnect *only* temporarily)
- l. A9 Output Board
- m. A11 Reference Board
- n. A23 Sampler Board
- o. A24 Frac-N/Divider Board
- p. A22 YIG Driver Assembly - disconnect W35

NOTE Refer to [Chapter 4, “Replaceable Parts \(ESG-AP and ESG-DP Series\),”](#) for information on locating assemblies. Refer to [Chapter 5, “Assembly Replacement,”](#) for information on removing or disconnecting assemblies.

3. Switch on the signal generator and check the voltage supply LEDs (see [Figure 1-3](#)). If the LEDs are lit, you have likely identified the failed assembly. If one or more LEDs are still off, switch off the signal generator and replace/reconnect the assembly and repeat this procedure.

Step 7: Check for Basic CPU Functionality

The Digital Signal Processor (DSP) performs a self-diagnostic test at power up. If the DSP is not working, the CPU reports an error.

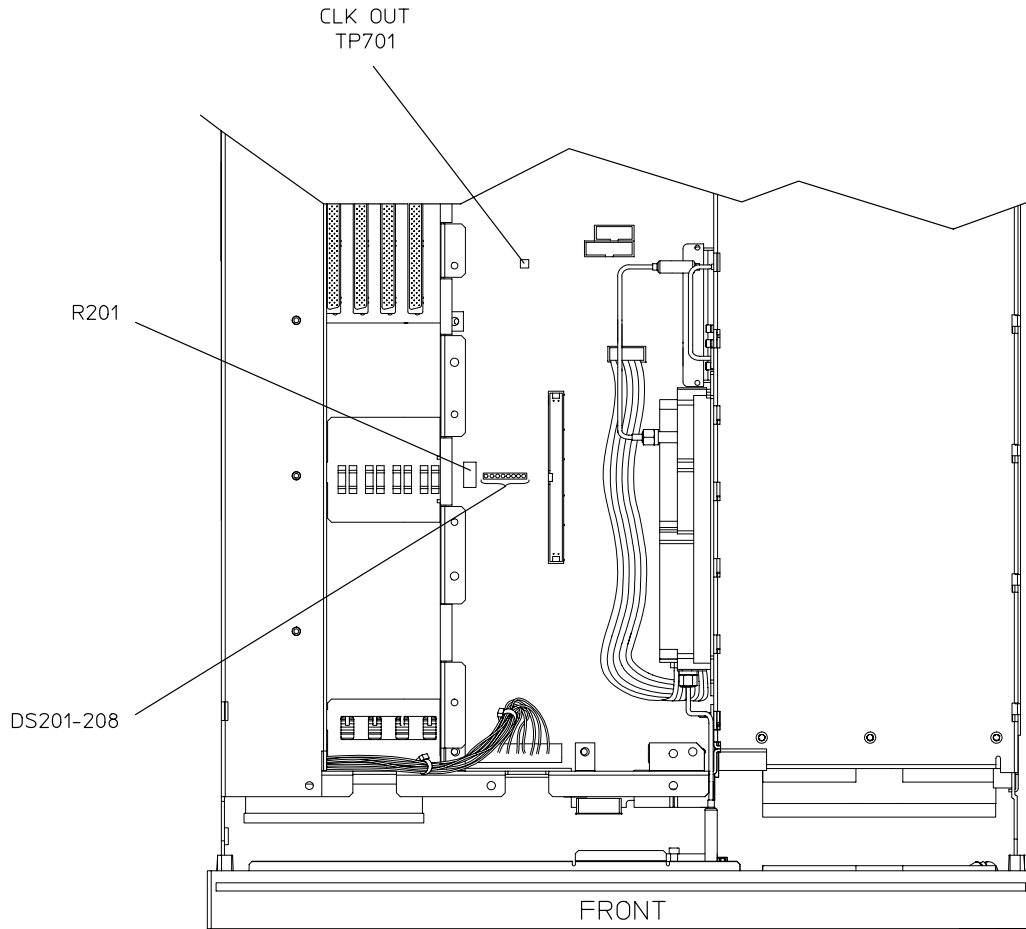
If the DSP does not seem to be working and the CPU did not report the error, then check the CLK_OUT signal at TP701. It should be a 16 MHz signal. (Refer to [Figure 1-5](#).)

The eight LEDs of DS201 (see [Figure 1-5](#)) indicate the status of the boot and flash ROM for the CPU. The LEDs form a binary code that can be described as a two digit hexadecimal code. [Table 1-4](#) shows the test sequence and the LED pattern (binary representation) of the test that is running. If an error occurs and the test is halted, the LED pattern will indicate which self test halted the process. The LED closest to R201 is the place holder for the Least Significant Bit (LSB) in the pattern.

Table 1-4 Sequence for DSP Self-Diagnostic Tests

| Test Description | Hexadecimal Code | Binary Equivalent MSB LSB |
|-----------------------------|------------------|------------------------------|
| LEDs at start of test | FF | 1111 1111 |
| Checksum test | FE | 1111 1110 |
| Bootrom RAM test | FD | 1111 1101 |
| RAM test | FC | 1111 1100 |
| I/O bus test | FB | 1111 1011 |
| Main firmware checksum test | FA | 1111 1010 |
| CPU test | AA | 1010 1010 |
| Test done and OK | 00 | 0000 0000 |

Figure 1-5 Location of TP701 and DS201-208 on CPU/Motherboard



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Additional Information for Troubleshooting the ESG-AP and ESG-DP Series

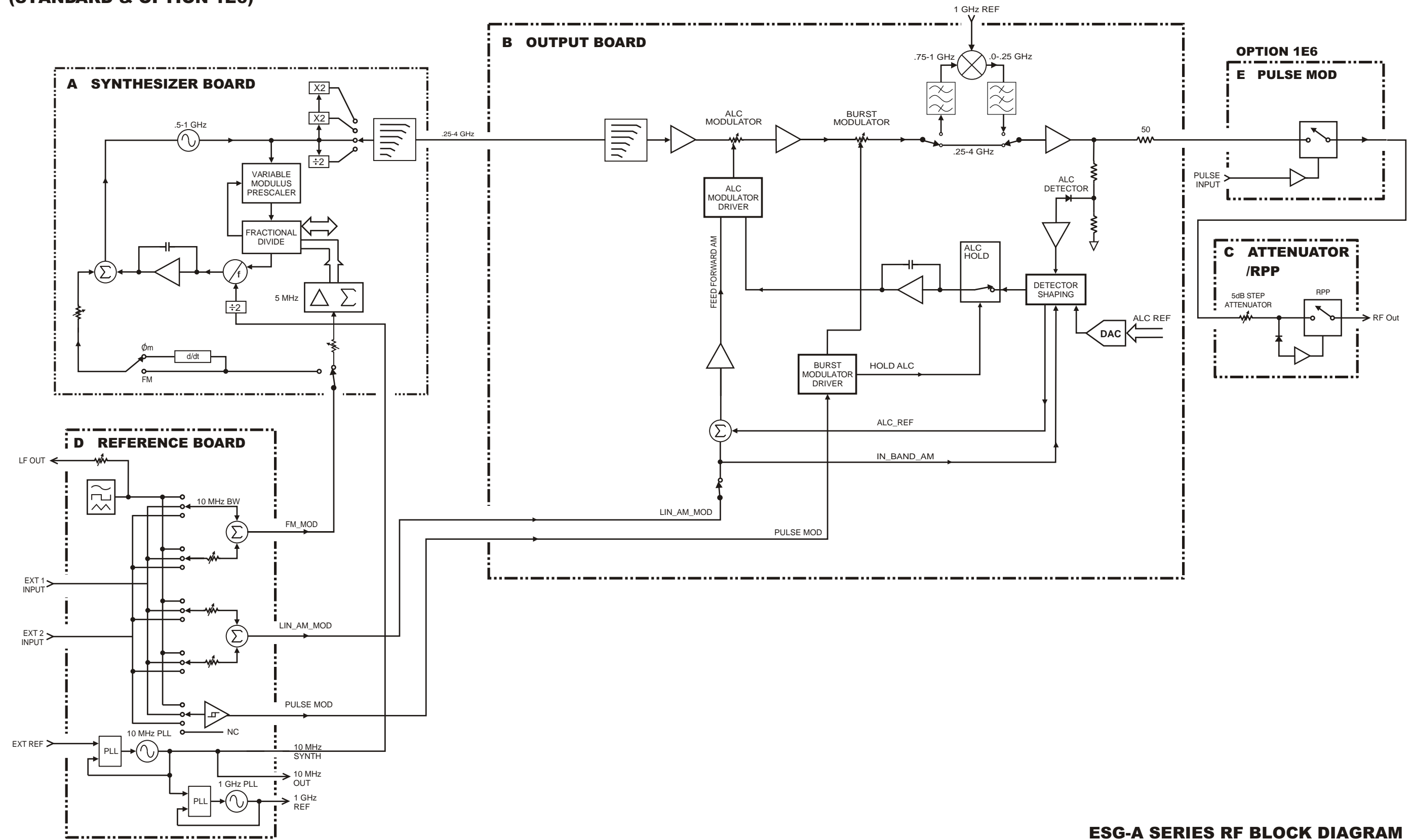
Table 1-5 provides frequency-dependent settings for selected points in the RF signal flow of the ESG-AP and ESG-DP Series Signal Generators. Notice that the settings are relative to the RF output frequency. This information can improve your understanding of the signal generator circuitry, especially when used with the RF block diagram.

NOTE The values for **Table 1-5** assume FM modulation is turned off.

Table 1-5 Frac-N, YO, and Other Selected Frequency-Dependent Settings for Several RF Output Frequencies

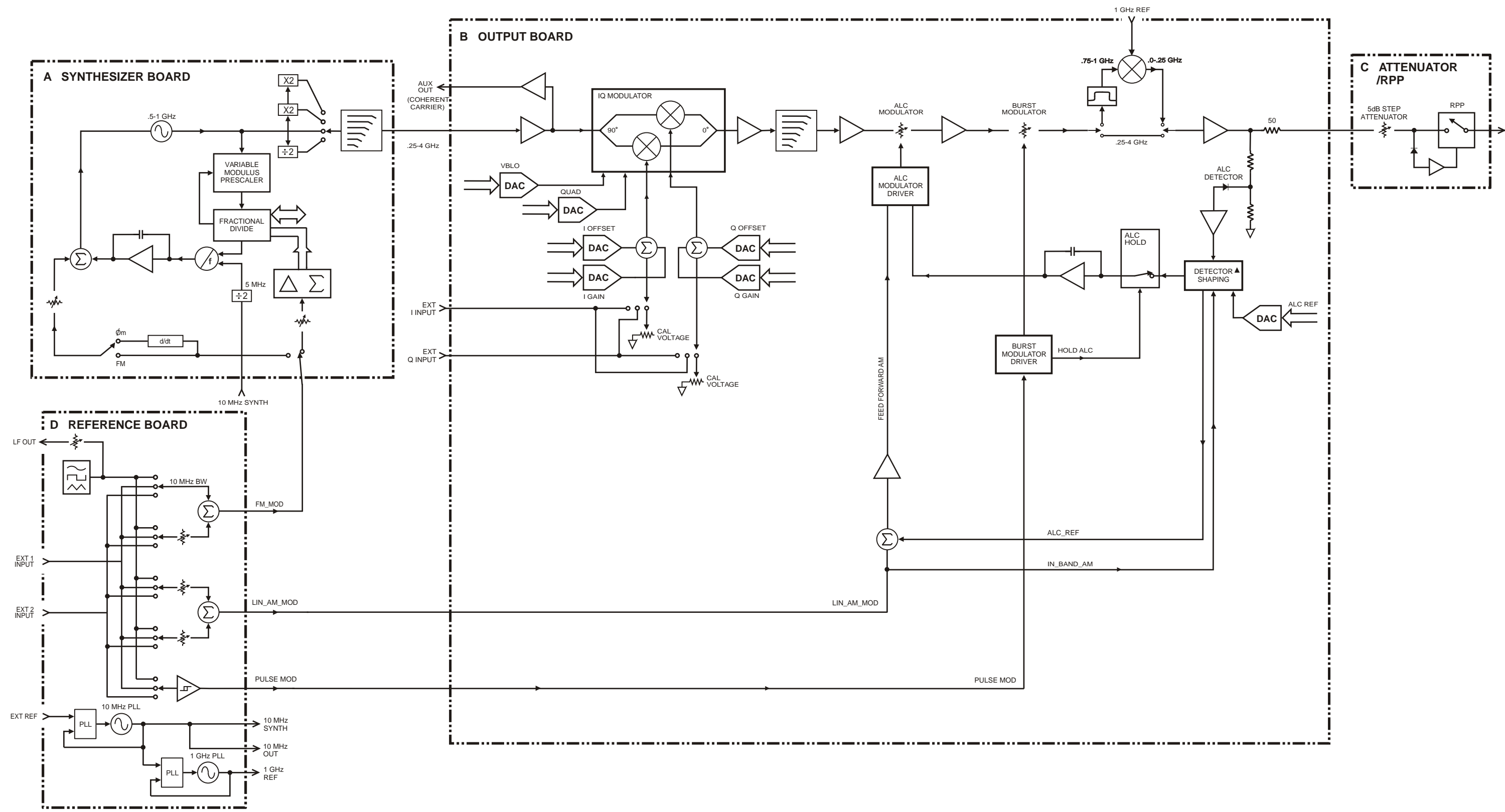
| Freq Out (MHz) | Freq YO (MHz) | N | P | Frac-N (MHz) | F _{if} (MHz) | F _s (MHz) | Hi/Low | Output Divider |
|----------------|---------------|---|----|--------------|-----------------------|----------------------|--------|----------------|
| 4000 | 8000 | 9 | 8 | 593.75000 | 37.1093750 | 884.7656250 | High | 2 |
| 3000 | 6000 | 7 | 10 | 644.53125 | 32.2265625 | 852.5390625 | High | 2 |
| 2271 | 4542 | 7 | 10 | 605.62500 | 30.2812500 | 644.5312500 | Low | 2 |
| 1500 | 6000 | 7 | 10 | 644.53125 | 32.2265625 | 852.5390625 | High | 4 |
| 1001 | 4004 | 5 | 10 | 685.46875 | 34.2734375 | 793.9453125 | High | 4 |
| 1000 | 8000 | 9 | 8 | 593.75000 | 37.1093750 | 884.7656250 | High | 8 |
| 700 | 5600 | 7 | 10 | 847.65625 | 42.3828125 | 793.9453125 | High | 8 |
| 300 | 4800 | 6 | 10 | 726.56250 | 36.3281250 | 793.9453125 | High | 16 |
| 240 | 6080 | 7 | 10 | 603.90625 | 30.1953125 | 864.2578125 | High | 8 |
| 100 | 7200 | 8 | 9 | 928.12500 | 51.5625000 | 893.5546875 | High | 8 |
| 1 | 7992 | 9 | 8 | 887.62500 | 55.4765625 | 881.8359375 | High | 8 |

**ESG-A SERIES RF BLOCK DIAGRAM
(STANDARD & OPTION 1E6)**

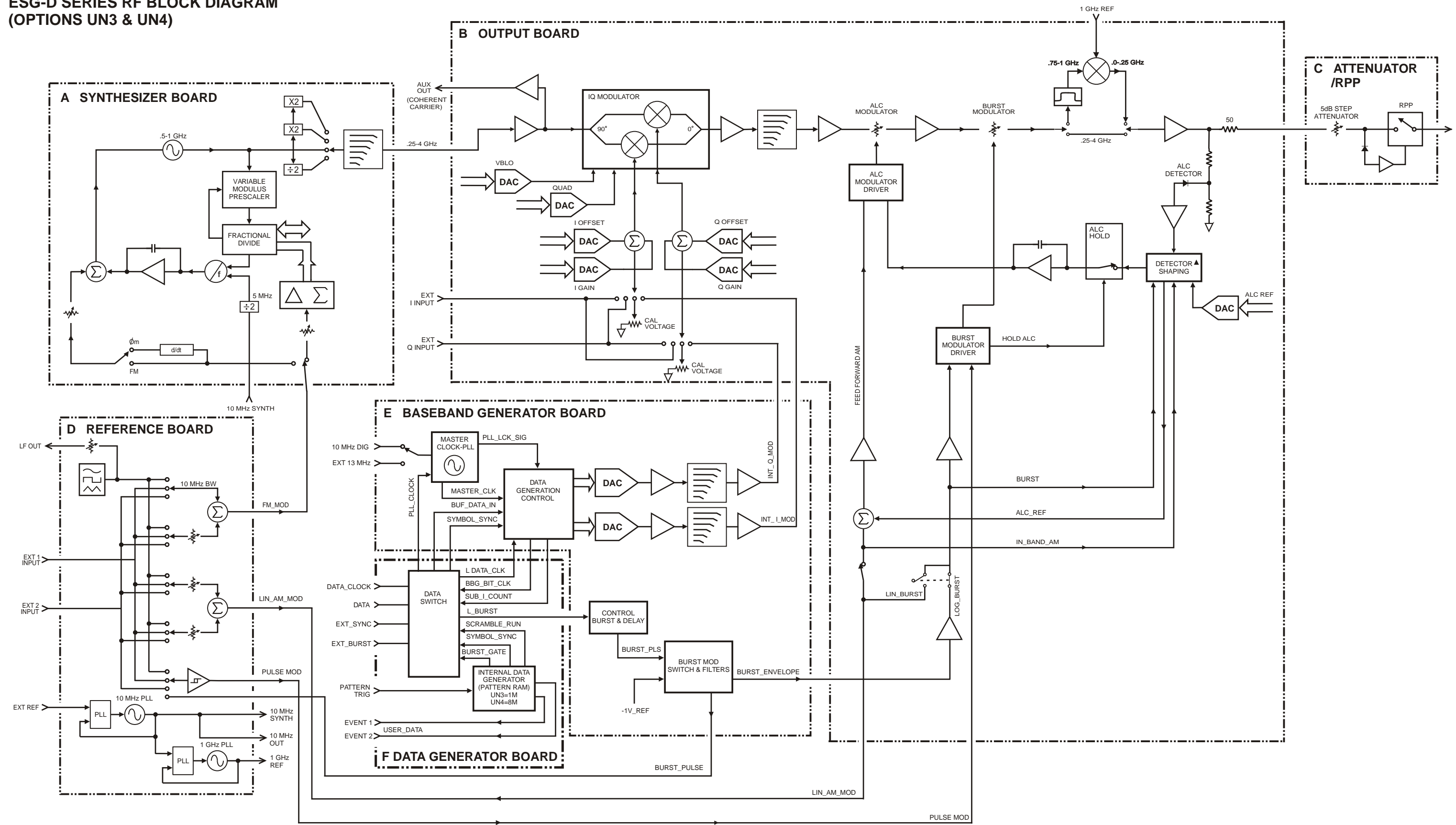


**ESG-A SERIES RF BLOCK DIAGRAM
(STANDARD & OPTION 1E6)**

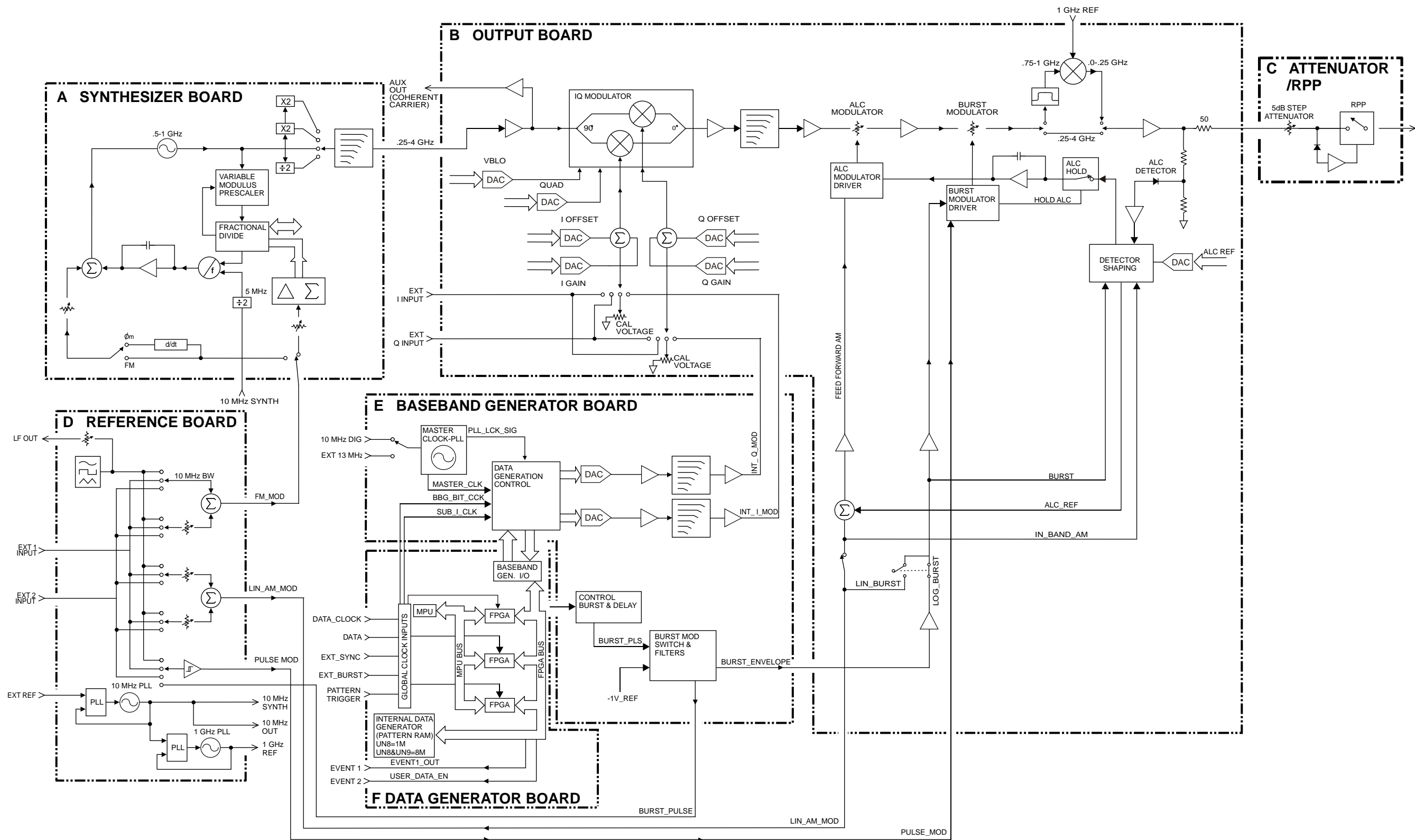
ESG-D SERIES RF BLOCK DIAGRAM



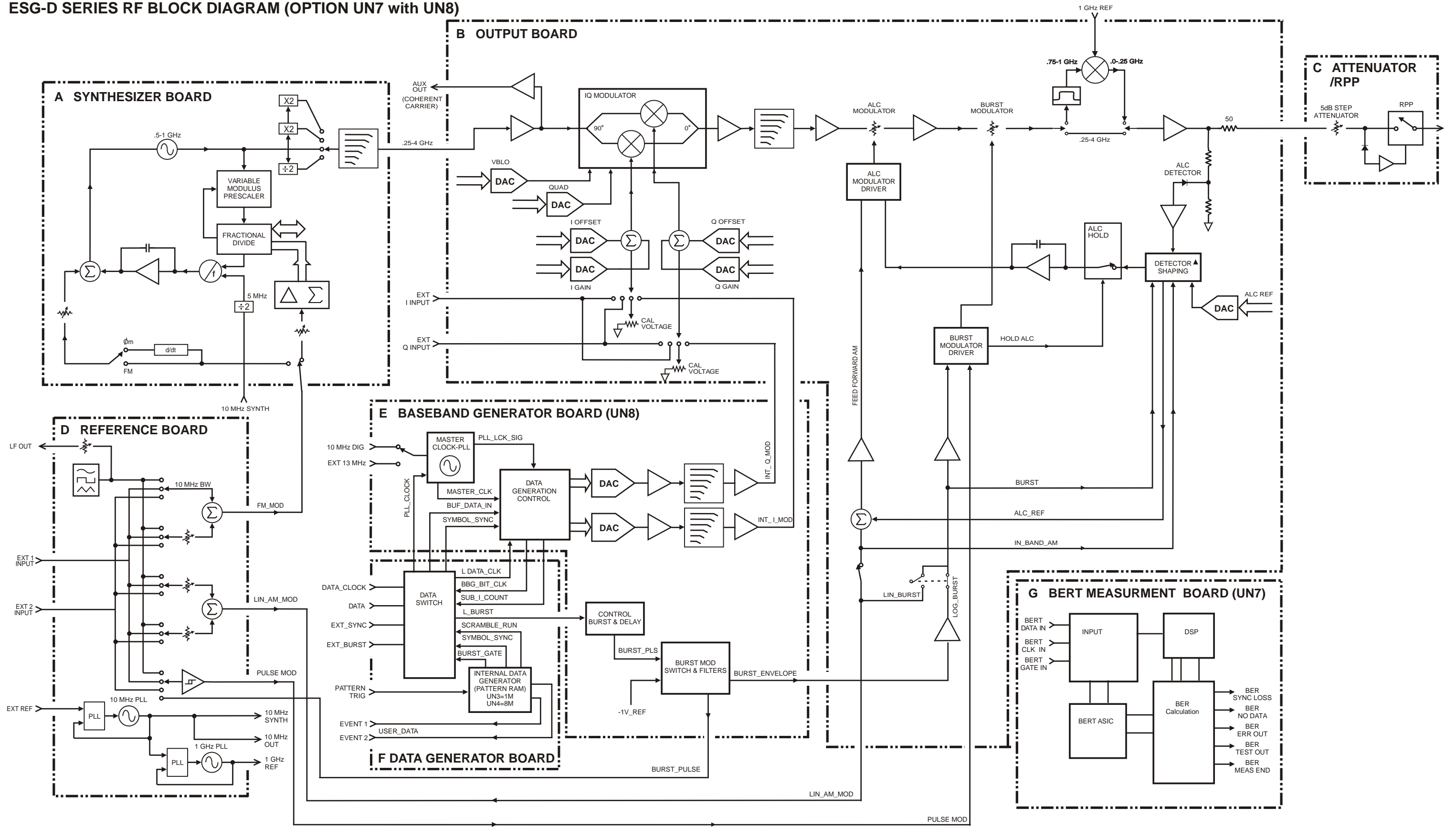
**ESG-D SERIES RF BLOCK DIAGRAM
(OPTIONS UN3 & UN4)**



**ESG-D SERIES RF BLOCK DIAGRAM
(OPTION UN8 or UN9) Rev C or D**

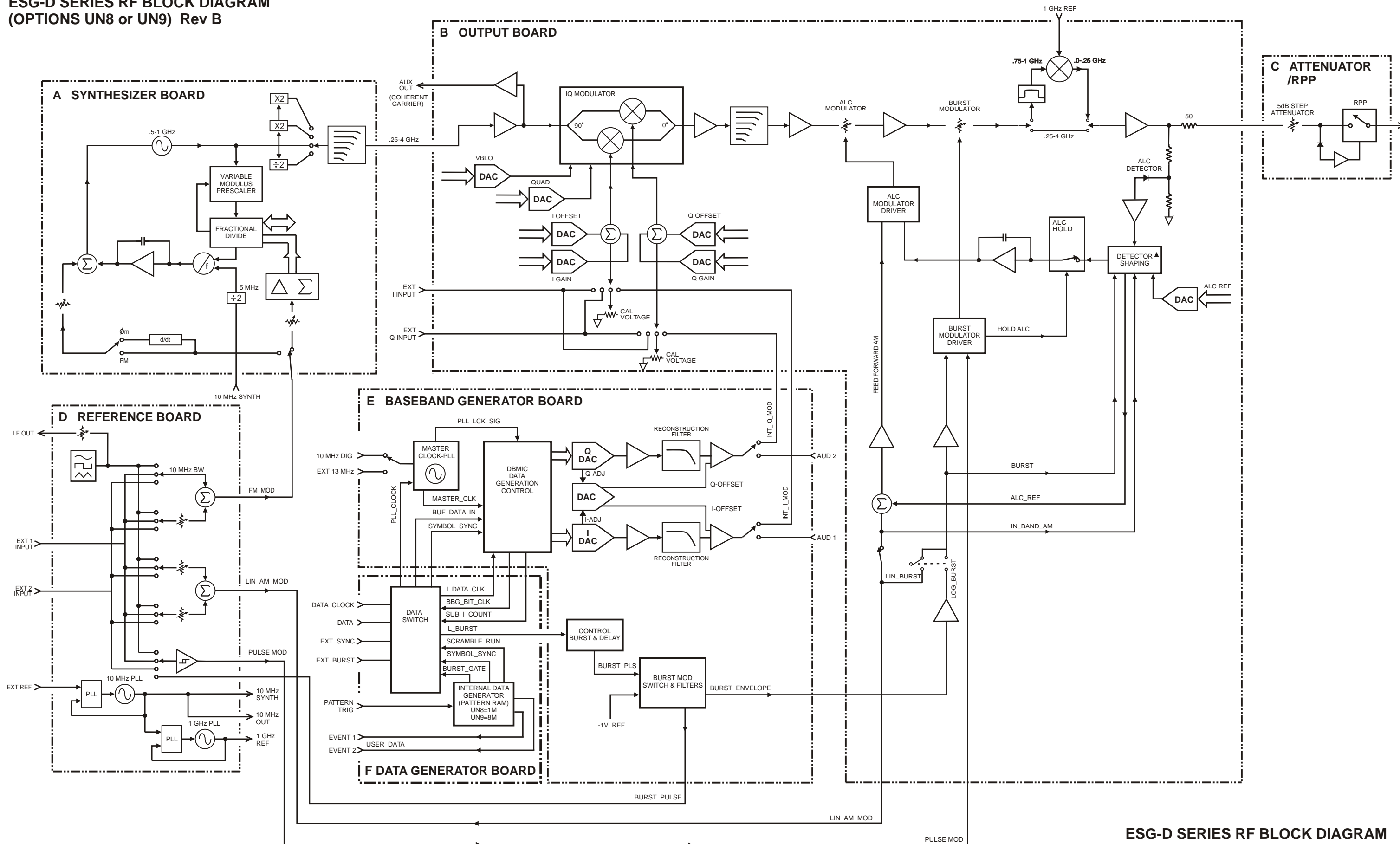


ESG-D SERIES RF BLOCK DIAGRAM (OPTION UN7 with UN8)



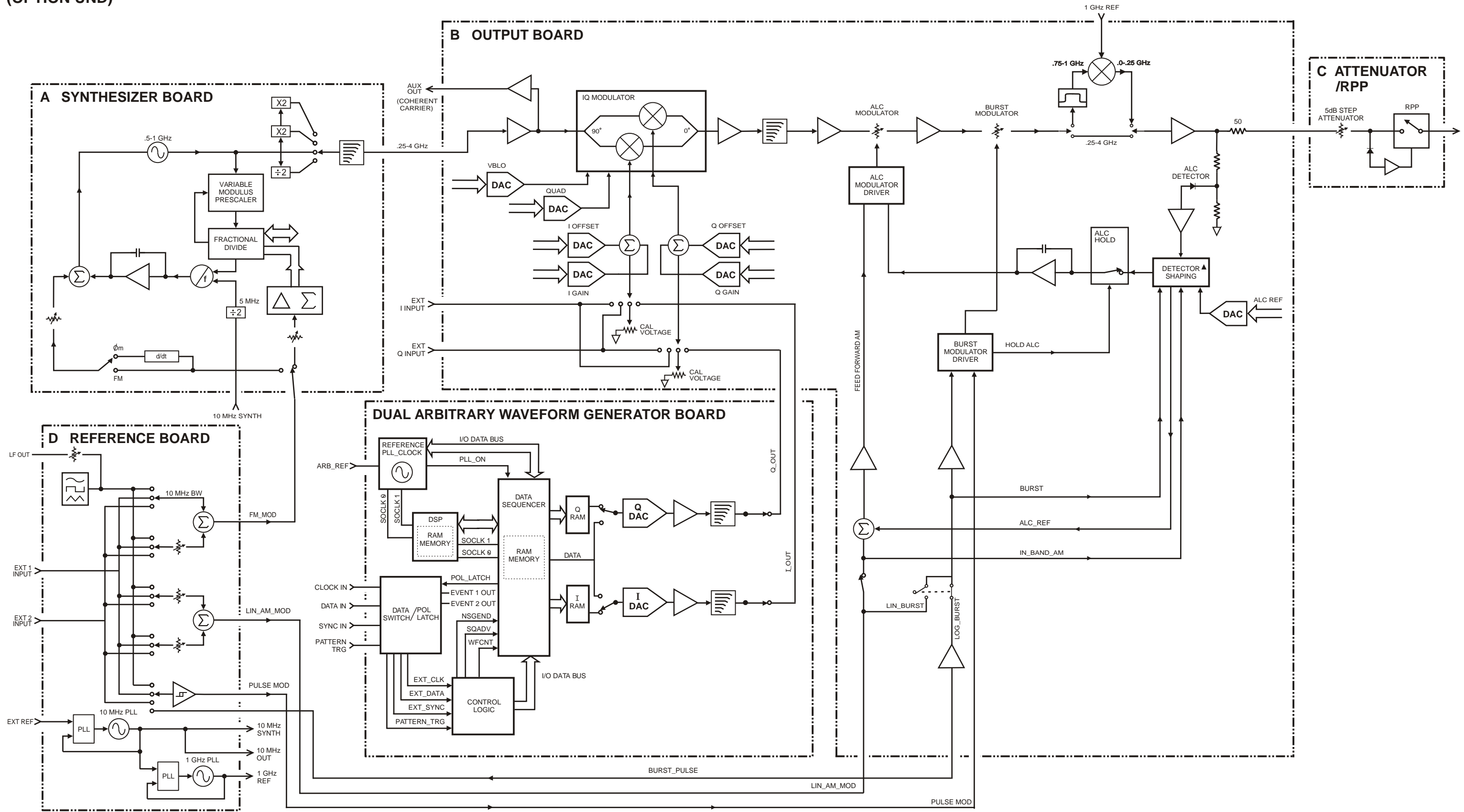
ESG-D SERIES RF BLOCK DIAGRAM (OPTION UN7 with UN8)

**ESG-D SERIES RF BLOCK DIAGRAM
(OPTIONS UN8 or UN9) Rev B**



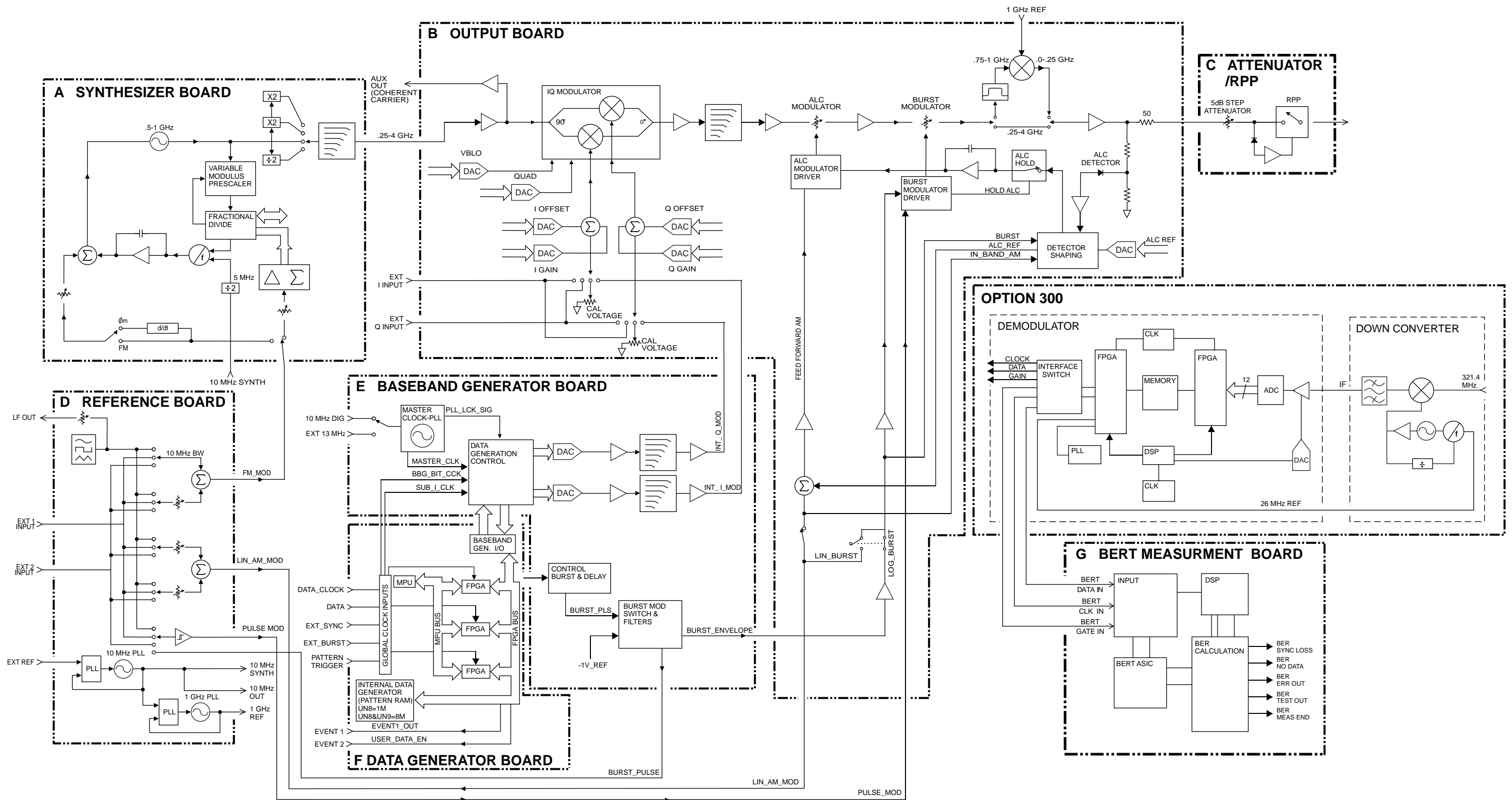
**ESG-D SERIES RF BLOCK DIAGRAM
(OPTIONS UN8 or UN9) Rev B**

**ESG-D SERIES RF BLOCK DIAGRAM
(OPTION UND)**

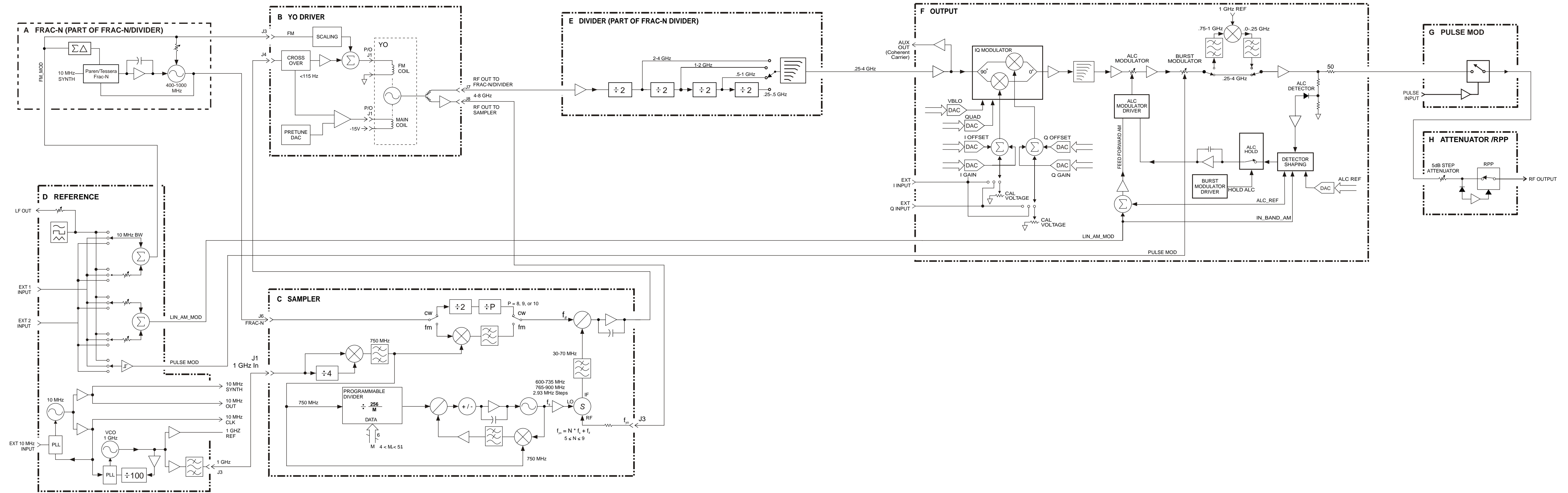


ESG-D SERIES RF BLOCK DIAGRAM (OPTION UND)

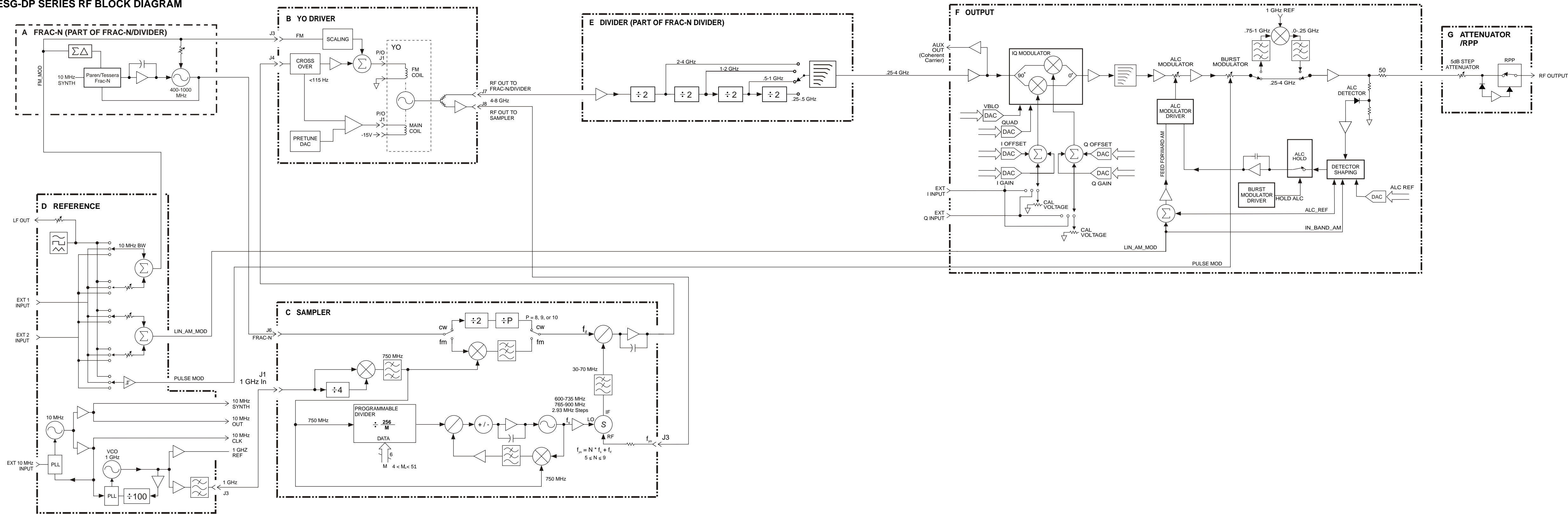
ESG-D SERIES RF BLOCK DIAGRAM (OPTION UN7, UN8/UN9, 300)



ESG-AP SERIES RF BLOCK DIAGRAM (STANDARD & 1E6)

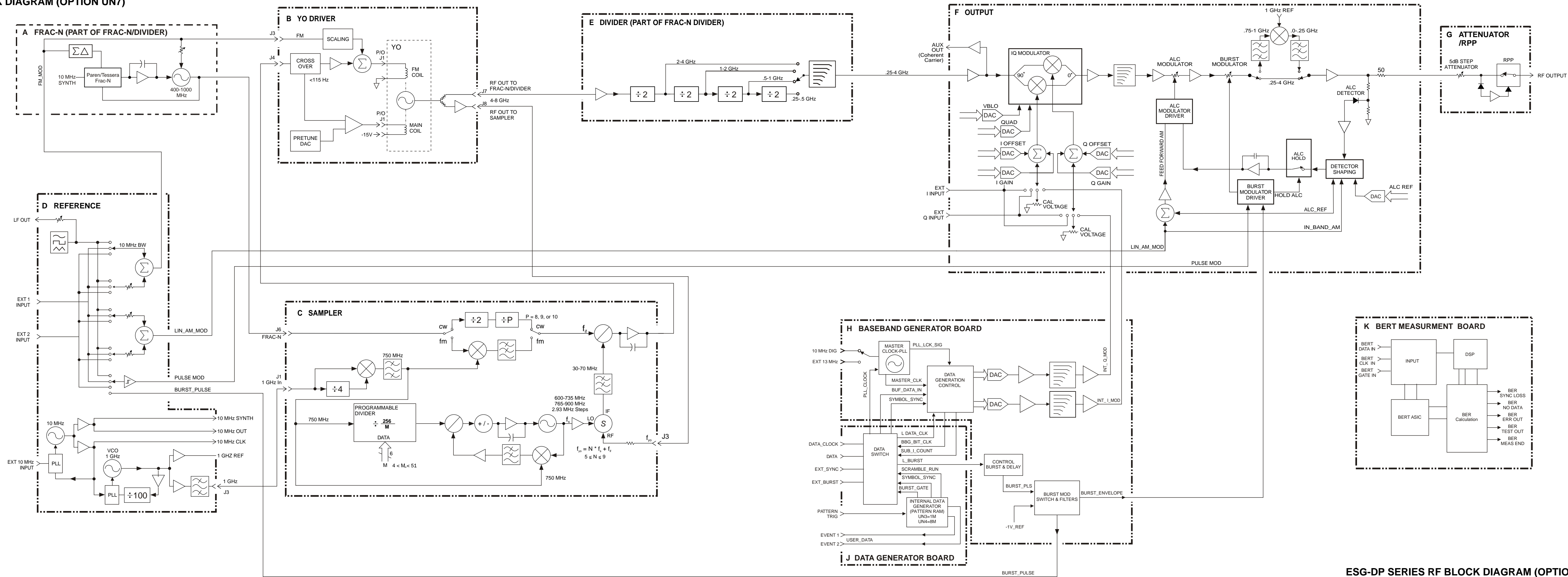


ESG-DP SERIES RF BLOCK DIAGRAM



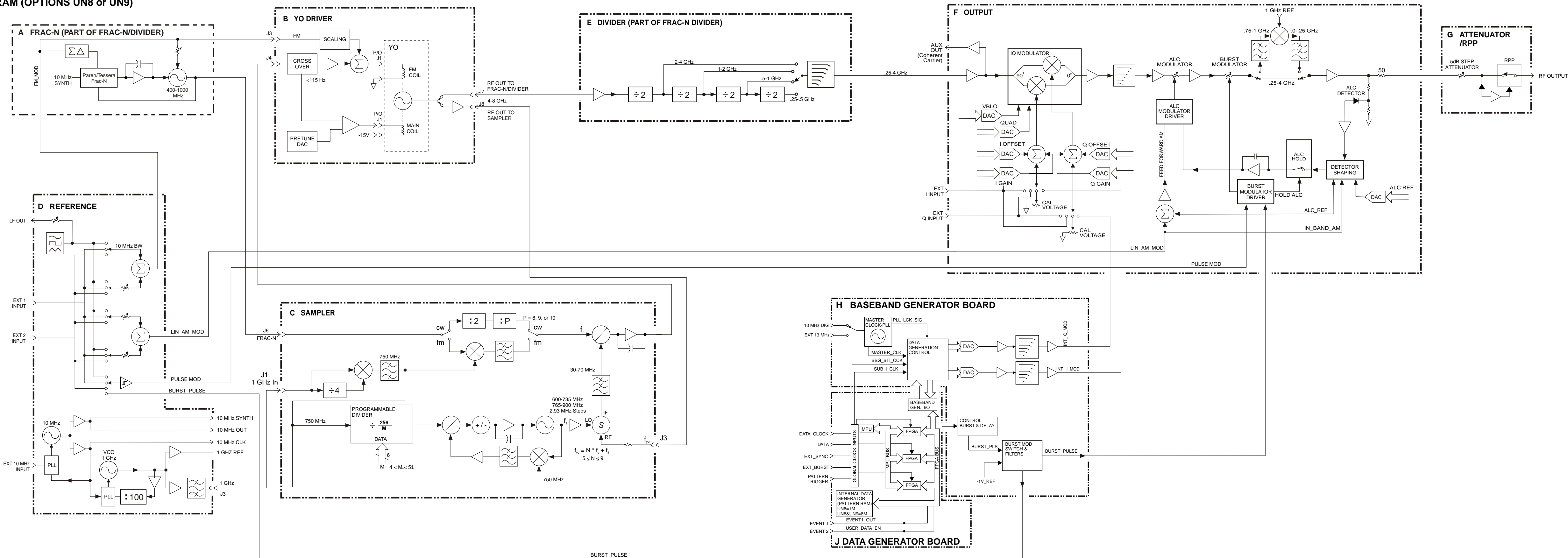
sk767b

ESG-DP SERIES RF BLOCK DIAGRAM (OPTION UN7)



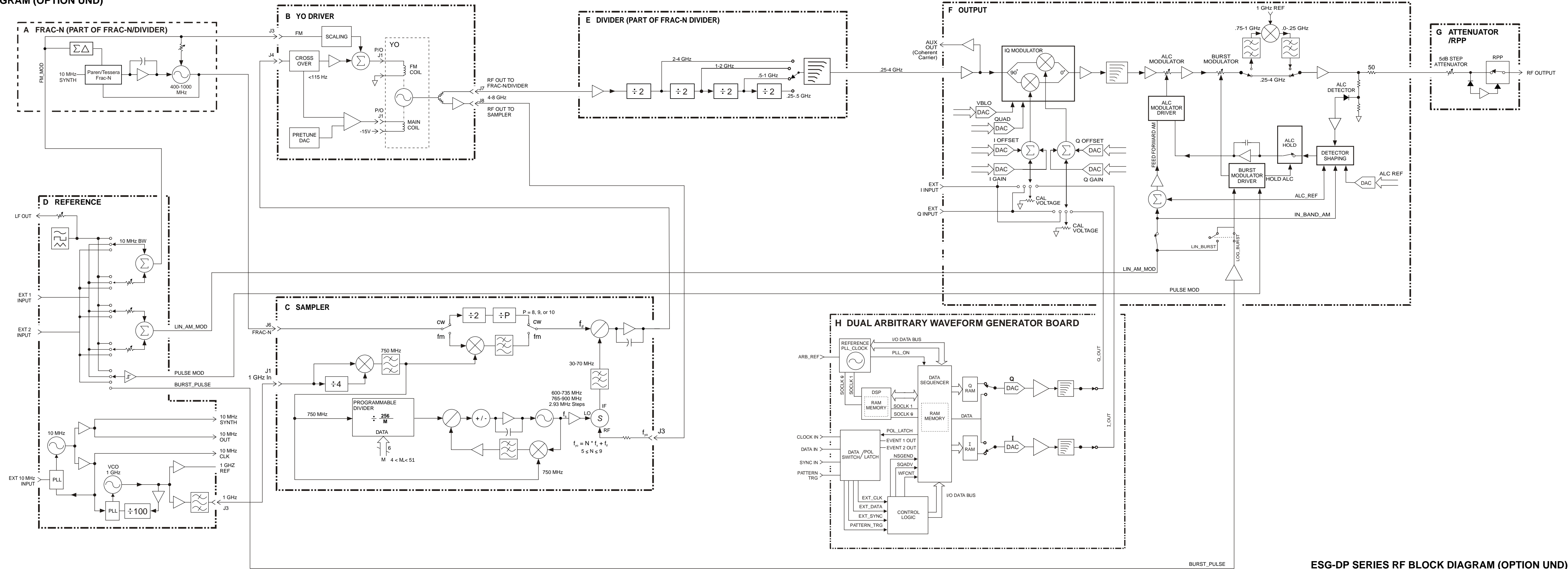
ESG-DP SERIES RF BLOCK DIAGRAM (OPTION UN7)

ESG-DP SERIES RF BLOCK DIAGRAM (OPTIONS UN8 or UN9)



ESG-DP SERIES RF BLOCK DIAGRAM (OPTIONS UN8 or UN9)

ESG-DP SERIES RF BLOCK DIAGRAM (OPTION UND)



ESG-DP SERIES RF BLOCK DIAGRAM (OPTION UND)

2 Assembly-Level Troubleshooting with Block Diagrams

This chapter provides the block diagrams and information necessary for you to test and troubleshoot the major assemblies of your signal generator.

Before You Begin Troubleshooting

Be sure to review the warning and caution statements described in [Chapter 7](#) prior to troubleshooting your signal generator.

Using this Chapter with Service Software

Some block diagrams in this chapter are accompanied by a table for use with the automated service software that came with your signal generator. These tables list the signal generator's test conditions and the expected ABUS node voltages. The service software has a utility program which measures and displays the node voltages for each test. Refer to your signal generator's calibration guide for information on using the software.

The block diagrams and ABUS node tables are arranged in the following order:

[A5 Dual Arbitrary Waveform Generator Block Diagram \(Option UND\)](#)

[A6 Bit Error Rate Test Block Diagram \(Option UN7\)](#)

[A7 Baseband Generator Block Diagram \(Options UN3 & UN4\)](#)

[A7 DBMIC Baseband Generator Block Diagram \(Options UN8 & UN9\)](#)

[A8 Data Generator Block Diagram \(Options UN3 & UN4\)](#)

[A8 Data Generator - Rev. A & B Block Diagram \(Options UN8 & UN9\)](#)

[A8 Flex Data Generator - Rev. C & D Block Diagram \(Options UN8 & UN9\)](#)

[A9 Output ABUS Nodes \(ESG-A Series\)](#)

[A9 Output Block Diagram \(ESG-A Series\)](#)

[A9 Output ABUS Nodes \(ESG-D Series\)](#)

[A9 Output ABUS Nodes \(ESG-AP, & ESG-DP Series\)](#)

[A9 Output Block Diagram \(ESG-D, ESG-AP, & ESG-DP Series\)](#)

[A11 Reference ABUS Nodes \(ESG-A & ESG-D Series\)](#)

[A11 Reference Block Diagram \(ESG-A & ESG-D Series\)](#)

[A11 Reference ABUS Nodes \(ESG-AP & ESG-DP Series\)](#)

[A11 Reference Block Diagram \(ESG-AP & ESG-DP Series\)](#)

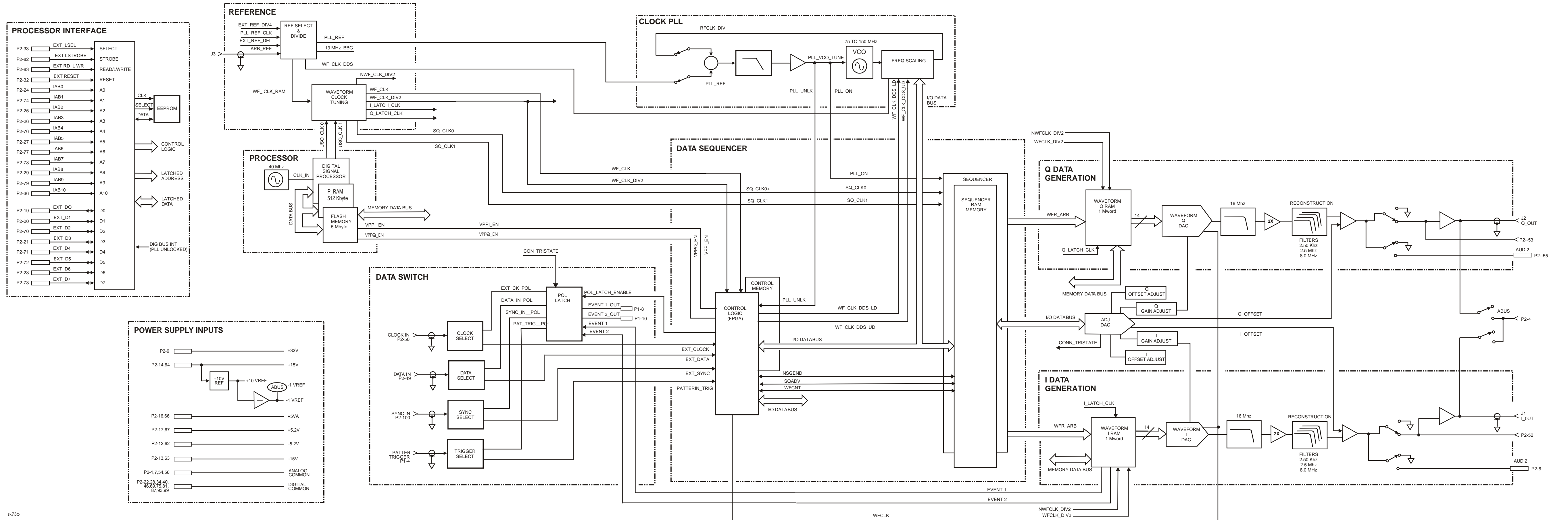
[A12 Synthesizer/Doubler ABUS Nodes \(ESG-A & ESG-D Series\)](#)

[A12 Synthesizer/Doubler Block Diagram \(ESG-A & ESG-D Series\)](#)

[A14 CPU/Motherboard ABUS Nodes](#)

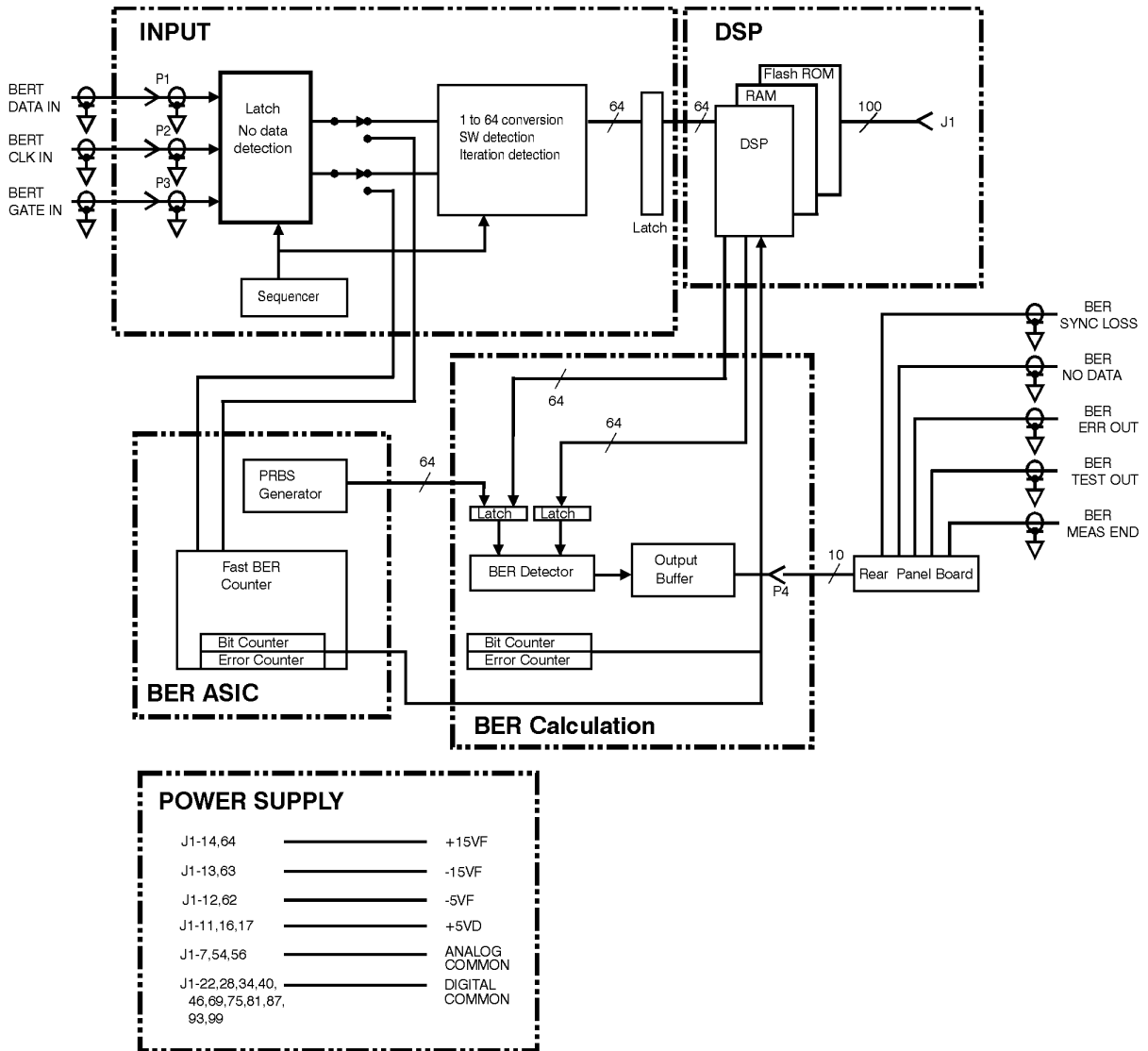
A14 CPU/Motherboard Block Diagram (1 of 2)
A14 CPU/Motherboard Block Diagram (2 of 2)
A20 Downconvertor Block Diagram (Option 300)
A21 Demodulator Block Diagram (Option 300)
A22 YIG Driver ABUS Nodes (ESG-AP & ESG-DP Series)
A22 YIG Driver Block Diagram (ESG-AP & ESG-DP Series)
A23 Sampler ABUS Nodes (ESG-AP & ESG-DP Series)
A23 Sampler Block Diagram (ESG-AP & ESG-DP Series)
A24 Frac-N/Divider ABUS Nodes (ESG-AP & ESG-DP Series)
A24 Frac-N/Divider Block Diagram (ESG-AP & ESG-DP Series)
AT1 Electronic Attenuator/RPP Block Diagram
AT1 Mechanical Attenuator and A19 RPP Block Diagram (Option UNB)
ESG-A Series Power Supply and Ground Interconnects Block Diagram
ESG-D Series Power Supply and Ground Interconnects Block Diagram (1 of 2)
ESG-D Series Power Supply and Ground Interconnects Block Diagram (2 of 2)
ESG-A Series Modulation and Signal Interconnects Block Diagram
ESG-D Series Modulation and Signal Interconnects Block Diagram (1 of 2)
ESG-D Series Modulation and Signal Interconnects Block Diagram (2 of 2)

A5 DUAL ARBITRARY WAVEFORM GENERATOR BLOCK DIAGRAM (OPTION UND)



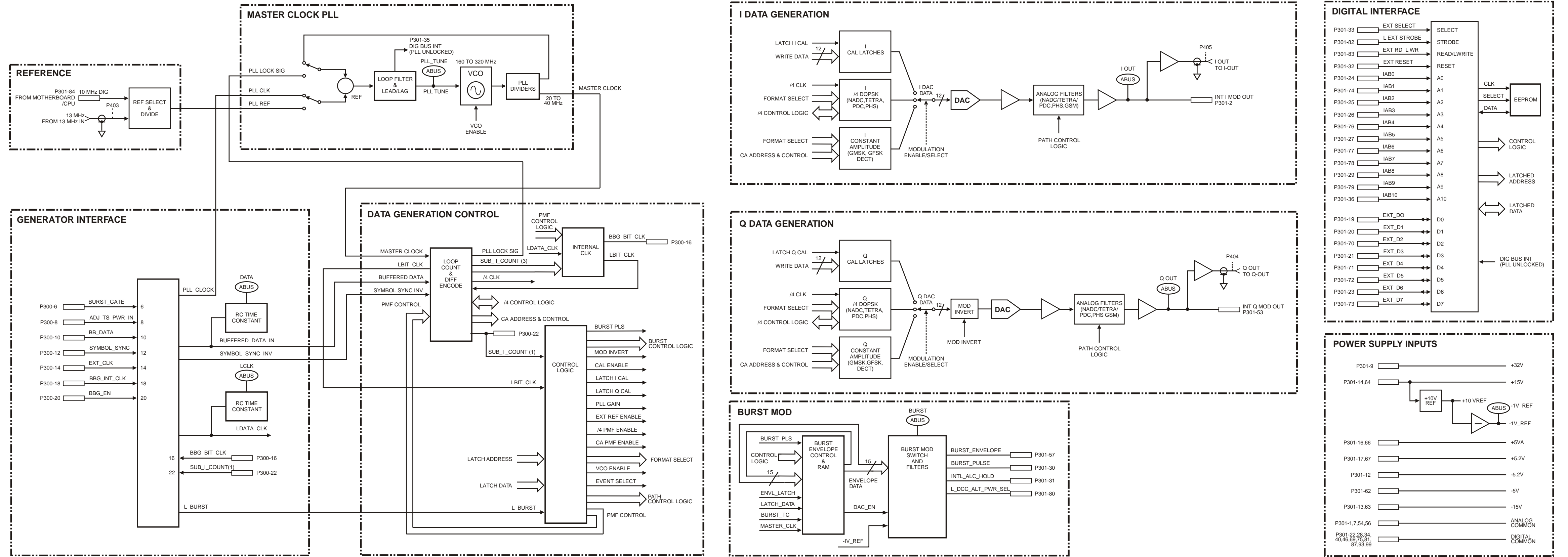
A5 DUAL ARBITRARY WAVEFORM GENERATOR BLOCK DIAGRAM (OPT UND)

A6 Bit Error Rate Test Block Diagram (Option UN7)



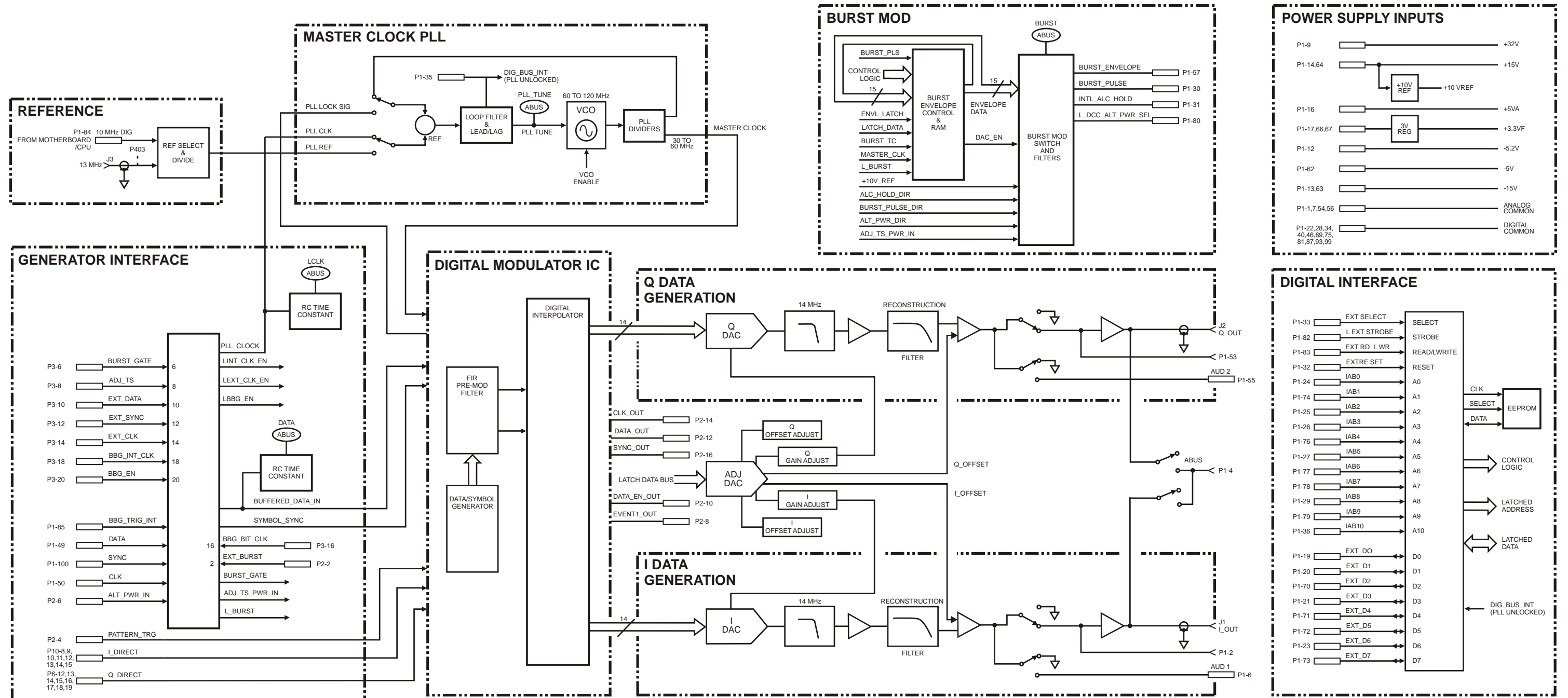
sk8001k

A7 BASEBAND GENERATOR BLOCK DIAGRAM (OPTIONS UN3 & UN4)

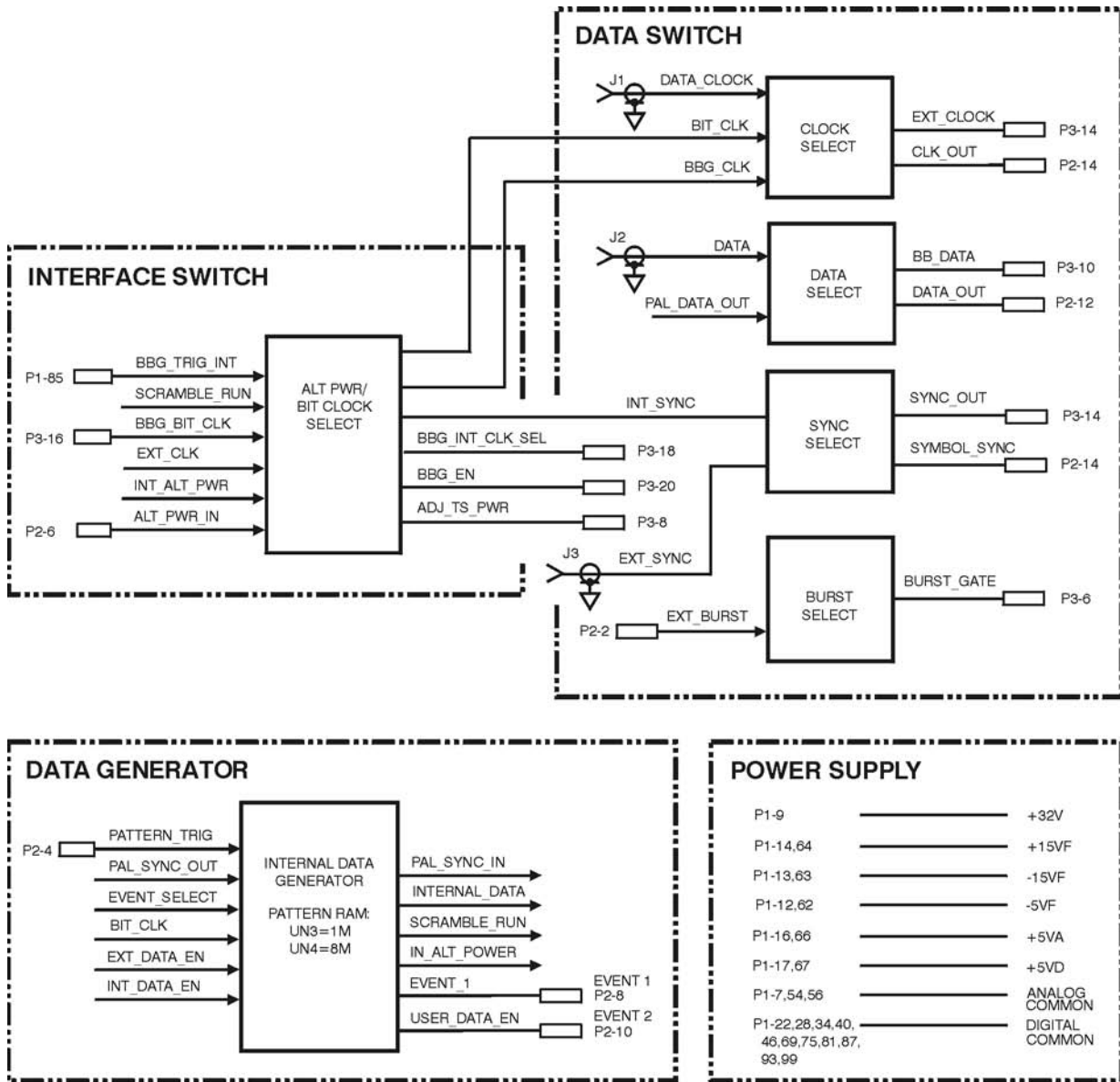


A7 BASEBAND GENERATOR BLOCK DIAGRAM (OPTIONS UN3 & UN4)

A7 DBMIC BASEBAND GENERATOR BLOCK DIAGRAM (OPTIONS UN8 and UN9)

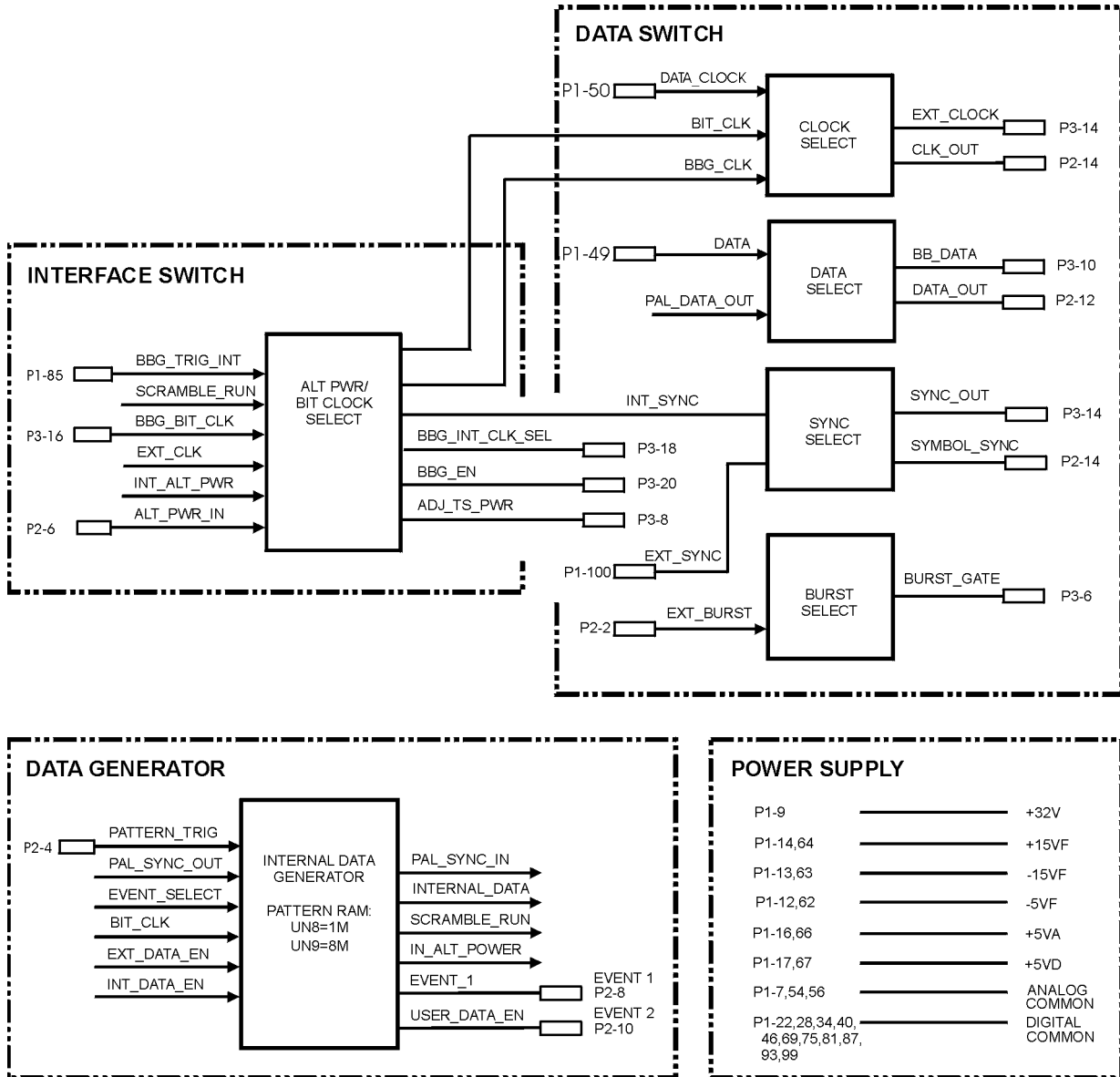


A8 Data Generator Block Diagram (Options UN3 & UN4)



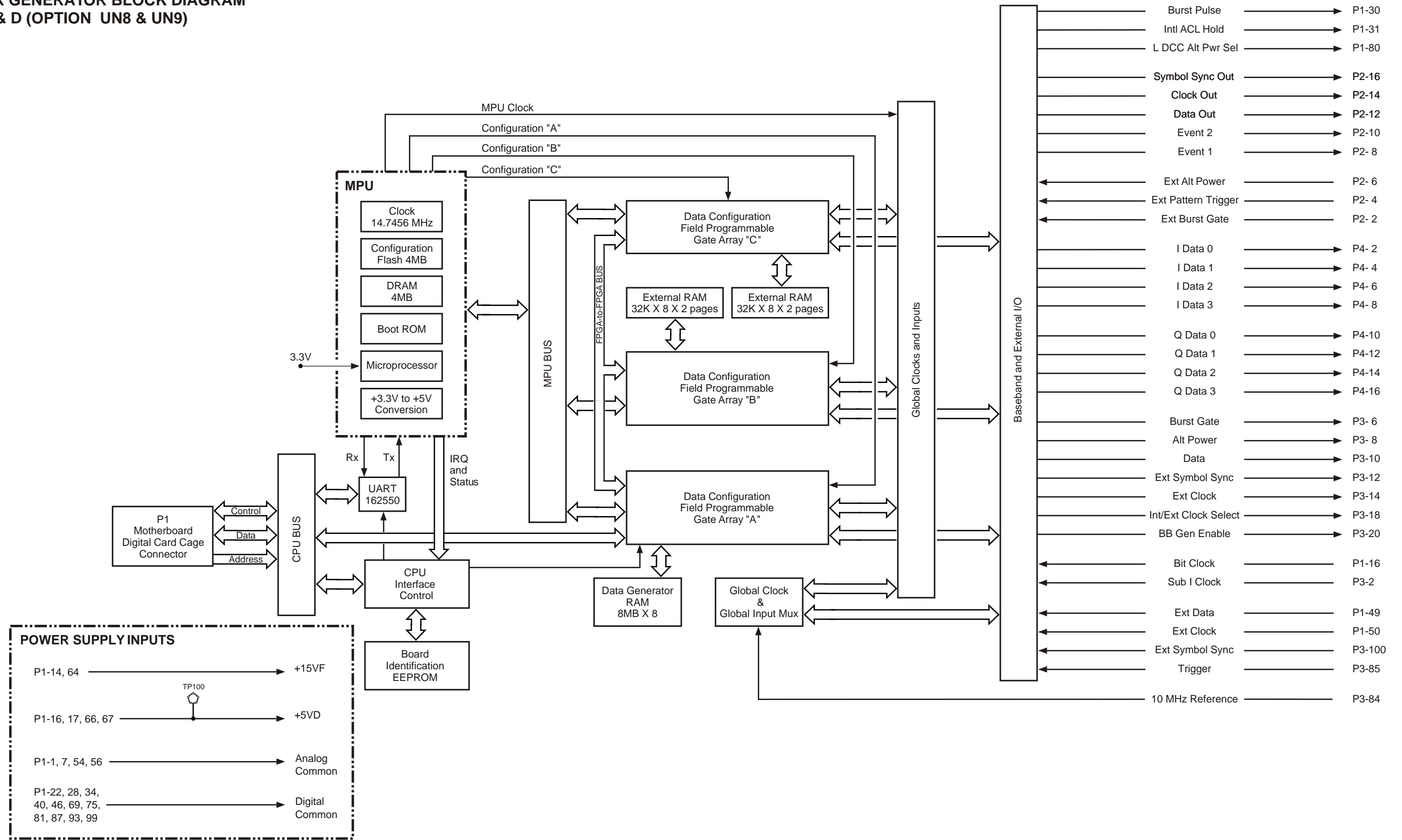
sk7119a

A8 Data Generator - Rev. A & B Block Diagram (Options UN8 & UN9)



sk757b

**A8 FLEX GENERATOR BLOCK DIAGRAM
REV. C & D (OPTION UN8 & UN9)**



**A8 FLEX GENERATOR BLOCK DIAGRAM
REV. C & D (OPTION UN8 & UN9)**

A9 Output ABUS Nodes (ESG-A Series)

NOTE The node voltages given in the following table are approximate values based on a sample of signal generators. Your signal generator may not reflect these exact values. Additionally, the resolution of these values varies from node to node. As a guideline, interpret your measurements based on the number of decimal places shown for the expected voltage.

A9 Output ABUS Nodes (ESG-A Series) (1 of 2)

| Test Conditions | Node Voltages (Corrected Values in Vdc) | | | | | | |
|---|---|--------------|---------------------------------------|--------------------|--------------------|------------------------------------|--------------|
| | ALC_MOD | BURST_MOD | ALC_DET | POW_REF_1 | POW_REF_2 | LOOP_INT | PTAT |
| PRESET; 0 dBm; RF On; No Modulation | ≈ 0.7 ^a | ≈ 19 | -0.23 to -0.02 | ≈ 5 ^b | ≈ 5 ^c | 0.3 to 1.7 | ≈ 8.5 to 9.9 |
| PRESET; 0 dBm; RF Off; No Modulation | ≈ 0.1 ^d | ≈ 19 | 0.0 | ≈ 5 ^b | ≈ 5 ^c | ≈ -10 | ≈ 8.5 to 9.9 |
| PRESET; 20 dBm; RF On (Unleveled) | ≈ 20 | ≈ 19 | ≈ -0.5 | ≈ 2.3 | ≈ 4.1 | ≈ 12 | ≈ 8.5 to 9.9 |
| Frequency Set to heterodyne Band; PRESET; Freq ≤ 249.9 MHz; 0 dBm; RF On; No Modulation | ≈ 0.2 to 0.5 | ≈ 19 | 4.1 to 4.8 | ≈ 4.3 to 5.0 | ≈ 4.3 to 5.0 | ≈ 0.0 | ≈ 8.5 to 9.9 |
| +5.0 Vdc applied to Q INPUT; PRESET; 0 dBm; RF On; I/Q On; I/Q Source EXT I/Q; I Input = No Connection; Burst Envelope On; If -0.5Vdc is applied to Q INPUT, the Q node changes to negative voltage | ≈ 0.6 (20 w/ no Q Input) | ≈ 4.8 to 5.6 | ≈ -0.08 to -0.2 (≈ 0.1 w/ no Q Input) | ≈ 4.5 ^b | ≈ 4.8 ^c | ≈ -0.2 to 0.6 (≈ 12 w/ no Q Input) | ≈ 8.5 to 9.9 |
| +1 Vdc Applied to EXT 1 INPUT; PRESET; 0 dBm; RF On; AM On; AM Depth 100%; AM Source Ext 1 DC | ≈ 1 | ≈ 19 | ≈ 0 | ≈ 4.6 ^b | ≈ 4.8 ^c | | ≈ 8.5 to 9.9 |

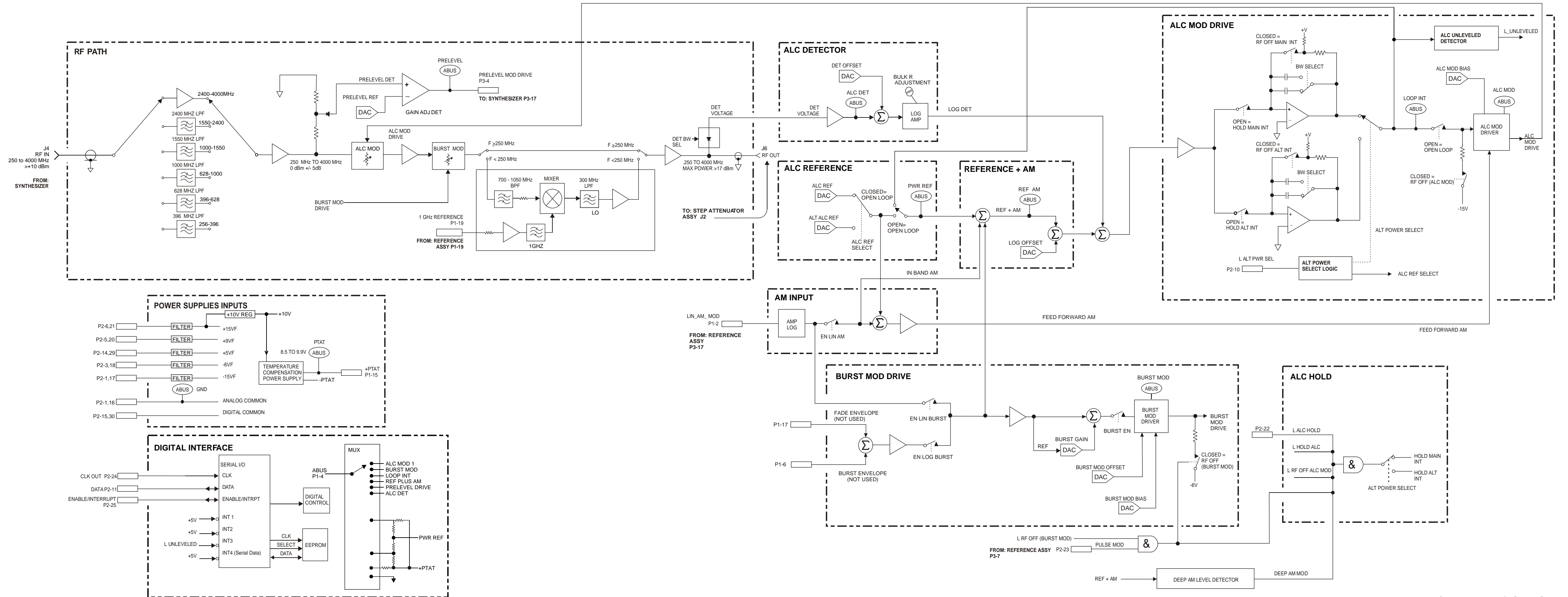
- If board E4400-60038 then Abus ≈ 0.3.
If board E4400-60141 then Abus ≈ 1.3.
- If Option UNB then Abus ≈ 3.9.
- If Option UNB then Abus ≈ 4.2.
- If board E4400-60141 then Abus ≈ 1.3.

A9 Output ABUS Nodes (ESG-A Series) (2 of 2)

| Test Conditions | Node Voltages (Corrected Values in Vdc) | | | | | | |
|--|---|-------|--------------------|--------|------------------------------------|-----|-----------------------------------|
| | I | Q | PRE_LEVEL | QUAD | GAIN_DET | GND | REF_AM |
| PRESET; 0 dBm; RF On; No Modulation | ≈ 0.7 | ≈ 0 | ≈ 2.1 ^a | ≈ -1.8 | -0.22 to ^b -0.05 | 0.0 | -0.52 to ^c 0.3 |
| PRESET; 0 dBm; RF Off; No Modulation | ≈ 0.7 | ≈ 0 | ≈ 2.1 ^d | ≈ -1.8 | -0.22 to ^b -0.05 | 0.0 | ≈ -0.52 to ^c 0.3 |
| PRESET; 20 dBm; RF On (Unleveled) | ≈ 0.7 | ≈ 0 | ≈ 2.1 ^a | ≈ -1.8 | -0.3 to ^b -0.19 | 0.0 | ≈ 2.3 |
| Frequency Set to heterodyne Band; PRESET; Freq ≤ 249.9 MHz; 0 dBm; RF On; No Modulation | ≈ 0.44 | ≈ 0 | ≈ 2 ^e | ≈ -3 | ≈ -0.04 ^b | 0.0 | -0.1 to 0.6 |
| +5.0 Vdc applied to Q INPUT: PRESET; 0 dBm; RF On; I/Q On; I/Q Source EXT I/Q; I Input = No Connection; Burst Envelope On; If -0.5Vdc is applied to Q INPUT, the Q node changes to negative voltage | ≈ 0.0 | ≈ 1.1 | ≈ 2 ^f | ≈ -1.8 | ≈ 0.6 (0.0 w/ no Q Input) | 0.0 | 0.2 to 0.9 |
| +1 Vdc Applied to EXT 1 INPUT: PRESET; 0 dBm; RF On; AM On; AM Depth 100%; AM Source Ext 1 DC | ≈ 0.7 | ≈ 0 | ≈ 2.1 ^a | ≈ -1.8 | ≈ -0.2 | 0.0 | ≈ 0.9 ^g |

- a. If board E4400-60155, 60141 or 60038 then Abus ≈ 3.
- b. If board E4400-60038 then Abus ≈ 1.2.
- c. If Option UNB then Abus ≈ 0.8.
- d. If board E4400-60038 then Abus ≈ 5.0.
If board E4400-60155 or 60141 then Abus ≈ 3.
- e. If board E4400-60155 or 60141 then Abus ≈ 4.
- f. If board E4400-60155 or 60141 then Abus ≈ 3.
- g. If Option UNB then Abus ≈ 1.4.

A9 OUTPUT BLOCK DIAGRAM (ESG-A SERIES)



A9 OUTPUT BLOCK DIAGRAM (ESG-A SERIES)

A9 Output ABUS Nodes (ESG-D Series)

NOTE The node voltages given in the following table are approximate values based on a sample of signal generators. Your signal generator may not reflect these exact values. Additionally, the resolution of these values varies from node to node. As a guideline, interpret your measurements based on the number of decimal places shown for the expected voltage.

A9 Output ABUS Nodes (ESG-D Series) (1 of 2)

| Test Conditions | Node Voltages (Corrected Values in Vdc) | | | | | | |
|---|---|--------------|---------------------------------------|--------------------|--------------------|------------------------------------|--------------|
| | ALC_MOD | BURST_MOD | ALC_DET | POW_REF_1 | POW_REF_2 | LOOP_INT | PTAT |
| PRESET; 0 dBm; RF On; No Modulation | ≈ 0.7 ^a | ≈ 19 | -0.23 to -0.02 | ≈ 5 ^b | ≈ 5 ^c | 0.3 to 1.7 | ≈ 8.5 to 9.9 |
| PRESET; 0 dBm; RF Off; No Modulation | ≈ 0.1 ^d | ≈ 19 | 0.0 | ≈ 5 ^b | ≈ 5 ^c | ≈ -10 | ≈ 8.5 to 9.9 |
| PRESET; 20 dBm; RF On (Unleveled) | ≈ 20 | ≈ 19 | ≈ -0.5 | ≈ 2.3 | ≈ 4.1 | ≈ 12 | ≈ 8.5 to 9.9 |
| Frequency Set to heterodyne Band; PRESET; Freq ≤ 249.9 MHz; 0 dBm; RF On; No Modulation | ≈ 0.2 to 0.5 | ≈ 19 | 4.1 to 4.8 | ≈ 4.3 to 5.0 | ≈ 4.3 to 5.0 | ≈ 0.0 | ≈ 8.5 to 9.9 |
| +5.0 Vdc applied to Q INPUT; PRESET; 0 dBm; RF On; I/Q On; I/Q Source EXT I/Q; I Input = No Connection; Burst Envelope On; If -0.5Vdc is applied to Q INPUT, the Q node changes to negative voltage | ≈ 0.6 (20 w/ no Q Input) | ≈ 4.8 to 5.6 | ≈ -0.08 to -0.2 (≈ 0.1 w/ no Q Input) | ≈ 4.5 ^b | ≈ 4.8 ^c | ≈ -0.2 to 0.6 (≈ 12 w/ no Q Input) | ≈ 8.5 to 9.9 |
| +1 Vdc Applied to EXT 1 INPUT; PRESET; 0 dBm; RF On; AM On; AM Depth 100%; AM Source Ext 1 DC | ≈ 1 | ≈ 19 | ≈ 0 | ≈ 4.6 ^b | ≈ 4.8 ^c | ≈ 8.5 to 9.9 | |

- If board E4400-60038 then Abus ≈ 0.3.
If board E4400-60141 then Abus ≈ 1.3.
- If Option UNB then Abus ≈ 3.9.
- If Option UNB then Abus ≈ 4.2.
- If board E4400-60141 then Abus ≈ 1.3.

A9 Output ABUS Nodes (ESG-D Series) (2 of 2)=

| Test Conditions | Node Voltages (Corrected Values in Vdc) | | | | | | |
|--|---|-------|--------------------|--------|------------------------------------|-----|-----------------------------------|
| | I | Q | PRE_LEVEL | QUAD | GAIN_DET | GND | REF_AM |
| PRESET; 0 dBm; RF On; No Modulation | ≈ 0.7 | ≈ 0 | ≈ 2.1 ^a | ≈ -1.8 | -0.22 to ^b -0.05 | 0.0 | -0.52 to ^c 0.3 |
| PRESET; 0 dBm; RF Off; No Modulation | ≈ 0.7 | ≈ 0 | ≈ 2.1 ^d | ≈ -1.8 | -0.22 to ^b -0.05 | 0.0 | ≈ -0.52 to ^c 0.3 |
| PRESET; 20 dBm; RF On (Unleveled) | ≈ 0.7 | ≈ 0 | ≈ 2.1 ^a | ≈ -1.8 | -0.3 to ^b -0.19 | 0.0 | ≈ 2.3 |
| Frequency Set to heterodyne Band; PRESET; Freq ≤ 249.9 MHz; 0 dBm; RF On; No Modulation | ≈ 0.44 | ≈ 0 | ≈ 2 ^e | ≈ -3 | ≈ -0.04 ^b | 0.0 | -0.1 to 0.6 |
| +5.0 Vdc applied to Q INPUT: PRESET; 0 dBm; RF On; I/Q On; I/Q Source EXT I/Q; I Input = No Connection; Burst Envelope On; If -0.5Vdc is applied to Q INPUT, the Q node changes to negative voltage | ≈ 0.0 | ≈ 1.1 | ≈ 2 ^f | ≈ -1.8 | ≈ 0.6 (0.0 w/ no Q Input) | 0.0 | 0.2 to 0.9 |
| +1 Vdc Applied to EXT 1 INPUT: PRESET; 0 dBm; RF On; AM On; AM Depth 100%; AM Source Ext 1 DC | ≈ 0.7 | ≈ 0 | ≈ 2.1 ^a | ≈ -1.8 | ≈ -0.2 | 0.0 | ≈ 0.9 ^g |

- a. If board E4400-60155, 60141 or 60038 then Abus ≈ 3.
- b. If board E4400-60038 then Abus ≈ 1.2.
- c. If Option UNB then Abus ≈ 0.8.
- d. If board E4400-60038 then Abus ≈ 5.0.
- e. If board E4400-60155 or 60141 then Abus ≈ 3.
- f. If board E4400-60155 or 60141 then Abus ≈ 4.
- g. If Option UNB then Abus ≈ 1.4.

A9 Output ABUS Nodes (ESG-AP, & ESG-DP Series)

NOTE The node voltages given in the following table are approximate values based on a sample of signal generators. Your signal generator may not reflect these exact values. Additionally, the resolution of these values varies from node to node. As a guideline, interpret your measurements based on the number of decimal places shown for the expected voltage.

A9 Output ABUS Nodes (ESG-AP & ESG-DP Series) (1 of 2)

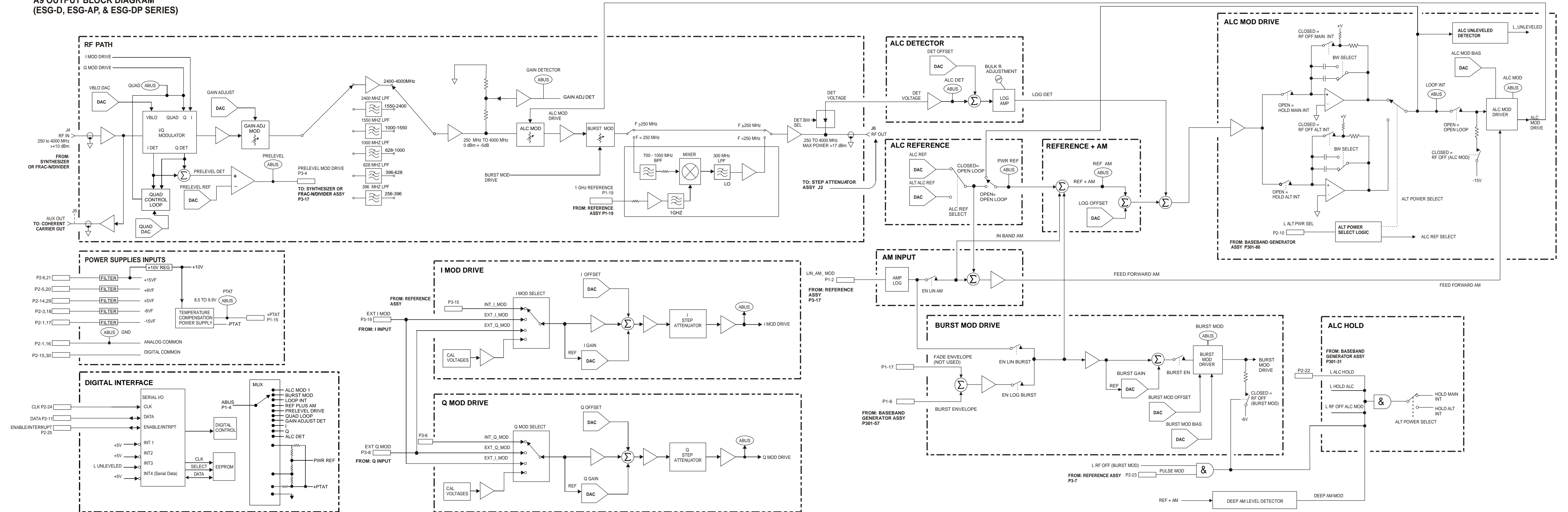
| Test Conditions | Node Voltages (Corrected Values in Vdc) | | | | | | |
|--|---|---|---------|-----------|-----------|---|---------------------|
| | ALC_MOD | BURST_MOD | ALC_DET | POW_REF_1 | POW_REF_2 | LOOP_INT | PTAT |
| PRESET; 0 dBm; RF On; No Modulation; 50 Ω load on output | ≈ 0.2 to 2 ^a | ≈ 0.5 to 5 at ≤ 2.4 GHz; ≤ 20 at 4 GHz | -0.3 | 3.5 | 4.2 | ≈ -2 to 2 ^a (varies w/ freq) | 9.5 (8.5 to 9.9) |

a. These values will be > 10 V if ALC is unleveled.

A9 Output ABUS Nodes (ESG-AP & ESG-DP Series) (2 of 2)

| Test Conditions | Node Voltages (Corrected Values in Vdc) | | | | | | |
|--|---|---|-----------------------------------|------|---|-----|--|
| | I | Q | PRE_LEVEL | QUAD | GAIN_DET | GND | REF_AM |
| PRESET; 0 dBm; RF On; No Modulation; 50 Ω load on output | 1.9 | 0 | ≈ -2 to 12 (varies w/ freq) | 0.7 | -0.35 to 0.02 at ≤ 2.4 GHz; 0.1 to 0.7 at > 2.4 GHz | 0 | ≈ 0.6 (varies w/ freq & power level) |

**A9 OUTPUT BLOCK DIAGRAM
(ESG-D, ESG-AP, & ESG-DP SERIES)**



**A9 OUTPUT BLOCK DIAGRAM
(ESG-D, ESG-DP, & ESG-DP SERIES)**

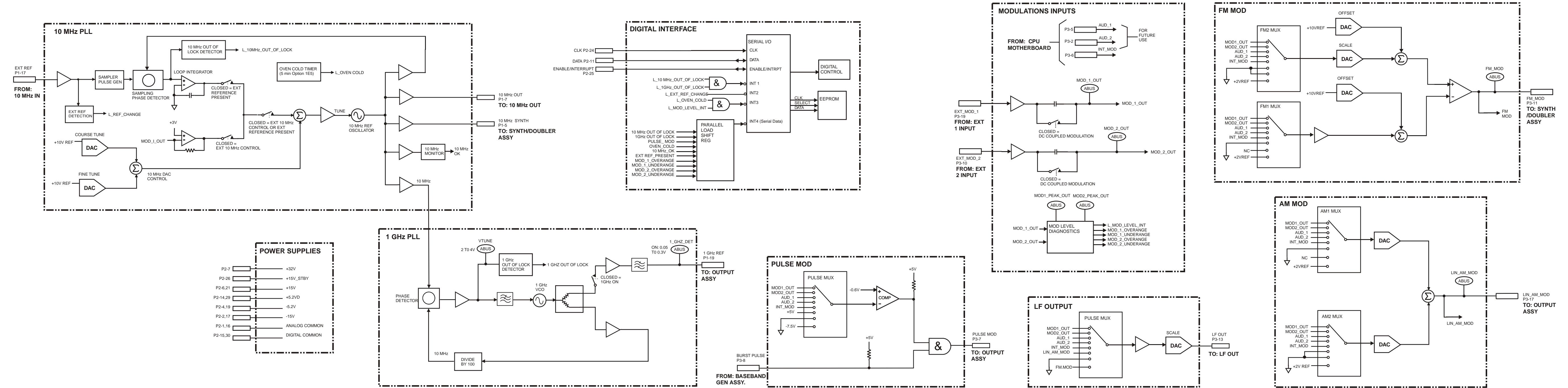
A11 Reference ABUS Nodes (ESG-A & ESG-D Series)

NOTE The node voltages given in the following table are approximate values based on a sample of signal generators. Your signal generator may not reflect these exact values. Additionally, the resolution of these values varies from node to node. As a guideline, interpret your measurements based on the number of decimal places shown for the expected voltage.

A11 Reference ABUS Nodes (ESG-A & ESG-D Series)

| Test Conditions | Node Voltages (Corrected Values in Vdc) | | | | | | | |
|--|---|----------|--------|---------|---------|--------|----------|--------|
| | MOD1_OUT | MOD2_OUT | VTUNE | MOD1_PK | MOD2_PK | LIN_AM | 1GHZ_DET | FM_MOD |
| PRESET; No Modulation | 0.00 | 0.00 | 2 to 4 | < 0.5 | < 0.5 | 0.00 | 0.0 | < 0.3 |
| Frequency Set to Heterodyne Band: PRESET; Freq ≤ 249.9 MHz; No Modulation | | | 2 to 4 | | | | > 0.15 | |
| +1 Vdc Applied to EXT 1 INPUT: PRESET; FM On; FM Source Ext 1 DC | ≈ -1.9 | 0.00 | 2 to 4 | < 0.5 | < 0.5 | | 0.0 | ≈ 2.2 |
| +1 Vdc Applied to EXT 2 INPUT: PRESET; FM On; FM Source Ext 2 DC | ≈ 0 | 0.00 | 2 to 4 | ≈ 7.5 | < 0.5 | | 0.0 | ≈ 0 |
| 1 Vpp @ 1 kHz Applied to EXT 1 INPUT: PRESET; FM On; FM Source Ext 1 AC | ≈ -1.9 | 0.00 | 2 to 4 | < 0.5 | < 0.5 | ≈ 2.0 | 0.0 | |
| 1 Vpp @ 1 kHz Applied to EXT 2 INPUT: PRESET; FM On; FM Source Ext 2 AC | ≈ 0 | 0.00 | 2 to 4 | ≈ 7.5 | < 0.5 | ≈ 0 | 0.0 | |
| +1 Vdc Applied to EXT 1 INPUT: PRESET; AM On; AM Depth 100%; AM Source Ext 1 DC | 0.00 | ≈ -1.9 | 2 to 4 | < 0.5 | < 0.5 | | 0.0 | ≈ 2.2 |
| +1 Vdc Applied to EXT 2 INPUT: PRESET; AM On; AM Depth 100%; AM Source Ext 2 DC | 0.00 | ≈ 0 | 2 to 4 | < 0.5 | ≈ 7.5 | | 0.0 | ≈ 0 |
| 1 Vpp @ 1 kHz Applied to EXT 1 INPUT: PRESET; AM On; AM Depth 100%; AM Source Ext 1 AC | 0.00 | ≈ -1.9 | 2 to 4 | < 0.5 | < 0.5 | ≈ 2.0 | 0.0 | |
| 1 Vpp @ 1 kHz Applied to EXT 2 INPUT: PRESET; AM On; AM Depth 100%; AM Source Ext 2 AC | 0.00 | ≈ 0 | 2 to 4 | < 0.5 | ≈ 7.5 | ≈ 0 | 0.0 | |

**A11 REFERENCE BLOCK DIAGRAM
(ESG-A & ESG-D SERIES)**



**A11 REFERENCE BLOCK DIAGRAM
(ESG-A & ESG-D)**

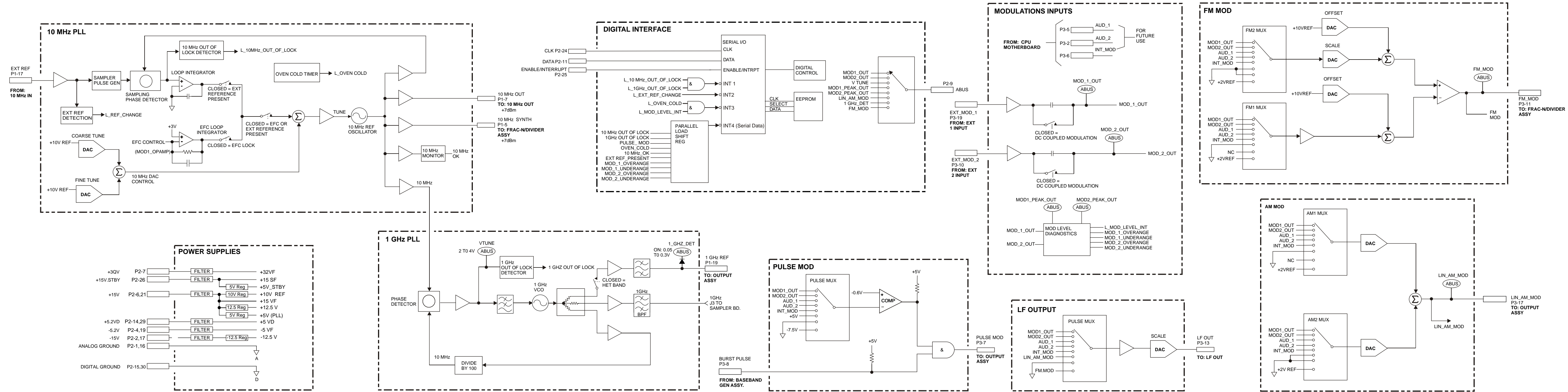
A11 Reference ABUS Nodes (ESG-AP & ESG-DP Series)

NOTE The node voltages given in the following table are approximate values based on a sample of signal generators. Your signal generator may not reflect these exact values. Additionally, the resolution of these values varies from node to node. As a guideline, interpret your measurements based on the number of decimal places shown for the expected voltage.

A11 Reference ABUS Nodes (ESG-AP & ESG-DP Series)

| Test Conditions | Node Voltages (Corrected Values in Vdc) | | | | | | | |
|-------------------------------------|---|----------|--------------------------|---------|---------|--------|--|--------|
| | MOD1_OUT | MOD2_OUT | VTUNE | MOD1_PK | MOD2_PK | LIN_AM | 1GHZ_DET | FM_MOD |
| PRESET; 0 dBm; RF On; No Modulation | ≈ 0 | ≈ 0 | 7 to 27 (Fixed vs. Freq) | 0.5 | 0.5 | ≈ 0 | ≈ 0.25 (< 250 MHz) ≈ 0.02 (> 250 MHz) | < 0.3 |

A11 REFERENCE BLOCK DIAGRAM (ESG-AP & ESG-DP SERIES)



A11 REFERENCE BLOCK DIAGRAM (ESG-AP & ESG-DP SERIES)

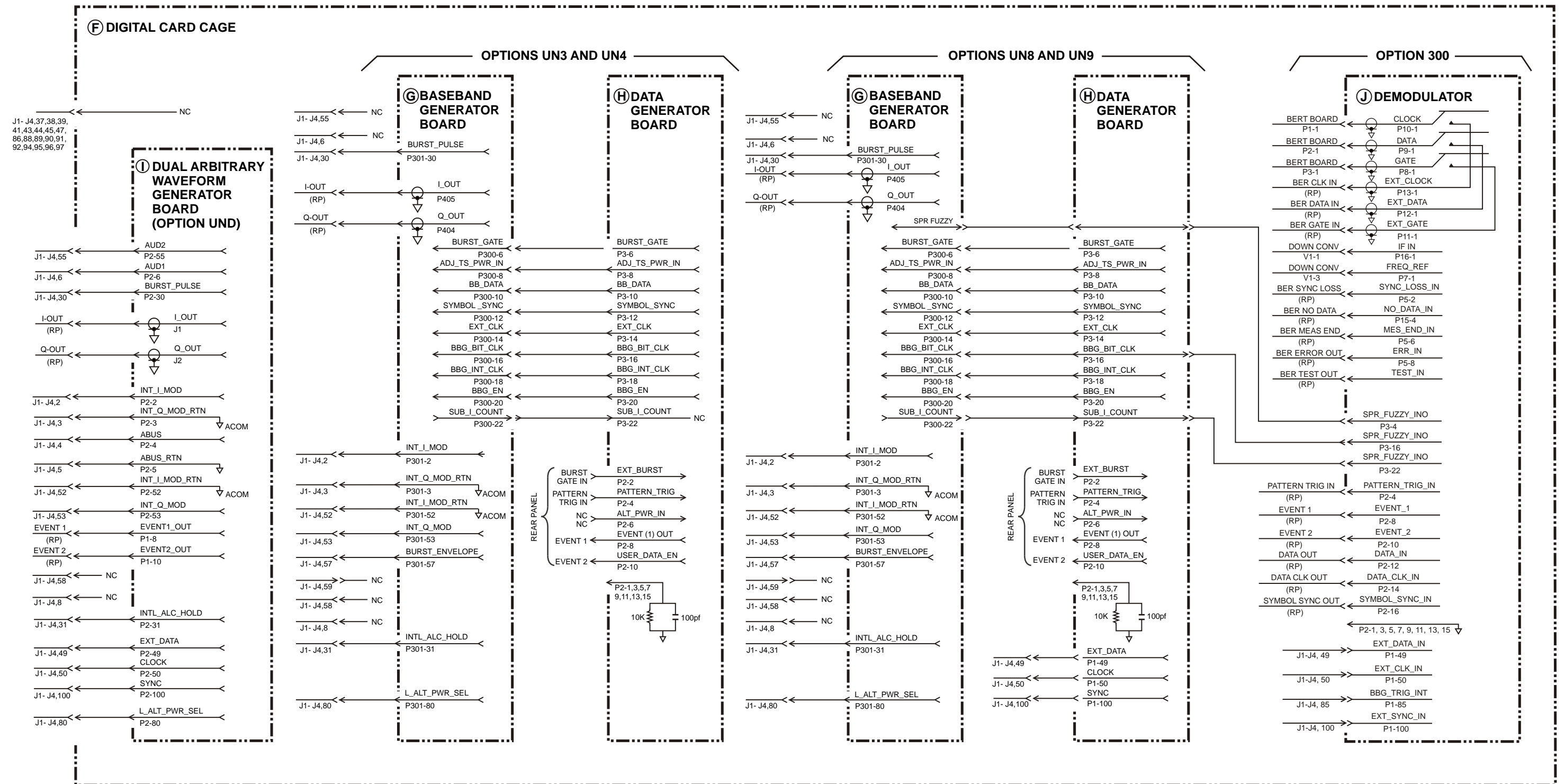
A12 Synthesizer/Doubler ABUS Nodes (ESG-A & ESG-D Series)

NOTE The node voltages given in the following table are approximate values based on a sample of signal generators. Your signal generator may not reflect these exact values. Additionally, the resolution of these values varies from node to node. As a guideline, interpret your measurements based on the number of decimal places shown for the expected voltage.

A12 Synthesizer/Doubler ABUS Nodes

| Test Conditions | Node Voltages (Corrected Values in Vdc) | | | | | |
|--|---|-----------------|-----------------|--------|----------------|--------|
| | F2 | RF_OUT | TUNE | LOOP | 10V | FM |
| PRESET; Freq 500.000001 MHz; No Modulation | ≈ 4 | -0.4 to -0.7 | 3.0 to 4.8 | ≈ -0.6 | 9.9 to 10.1 | < 0.2 |
| PRESET; Freq 750 MHz; No Modulation | ≈ 5.5 | -0.4 to -0.7 | 10.2 to 12.8 | ≈ -1.5 | 9.9 to 10.1 | < 0.2 |
| PRESET; Freq 1000 MHz; No Modulation | ≈ 7.2 | -0.4 to -0.7 | 17.7 to 23.2 | ≈ -5.5 | 9.9 to 10.1 | < 0.2 |
| +1 Vdc Applied to EXT 1 INPUT; PRESET; FM On; FM Source Ext 1 DC | | | | | | ≈ -2.0 |
| +1 Vdc Applied to EXT 1 INPUT; PRESET; Freq < 250 MHz; FM On; FM Source Ext 1 DC | | | | | | ≈ -2.0 |

ESG-D SERIES MODULATION AND SIGNAL INTERCONNECTS (2 of 2)



A14 CPU/Motherboard ABUS Nodes

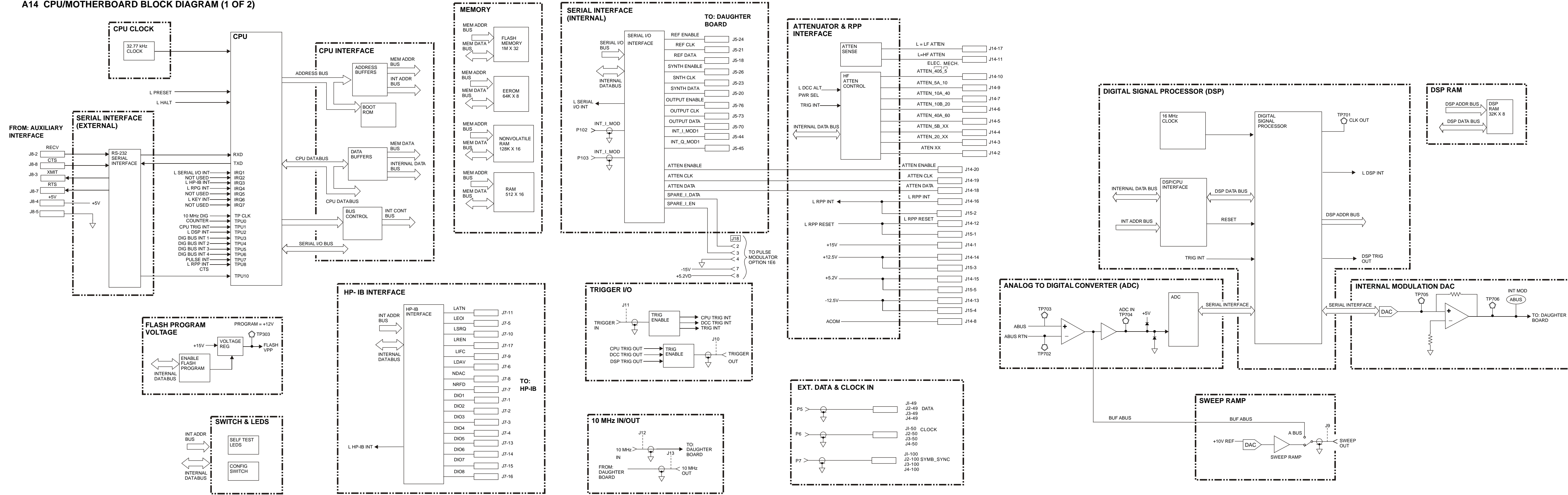
NOTE The node voltages given in the following table are approximate values based on a sample of signal generators. Your signal generator may not reflect these exact values. Additionally, the resolution of these values varies from node to node. As a guideline, interpret your measurements based on the number of decimal places shown for the expected voltage.

A14 CPU/Motherboard ABUS Nodes

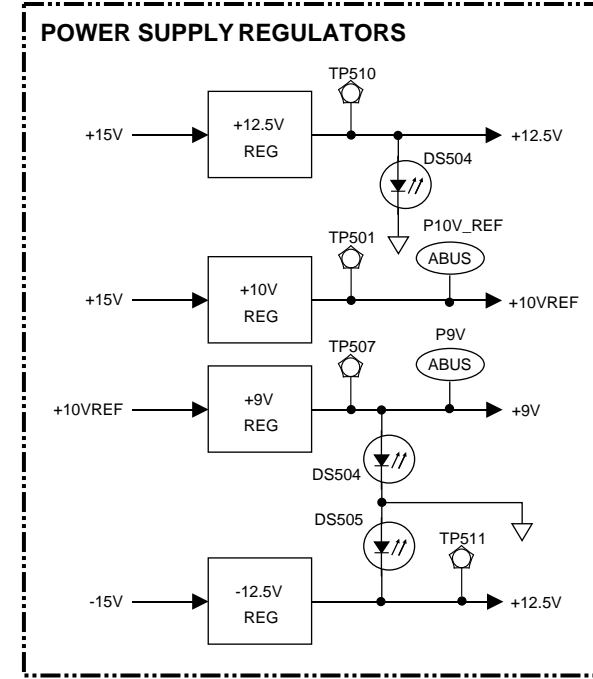
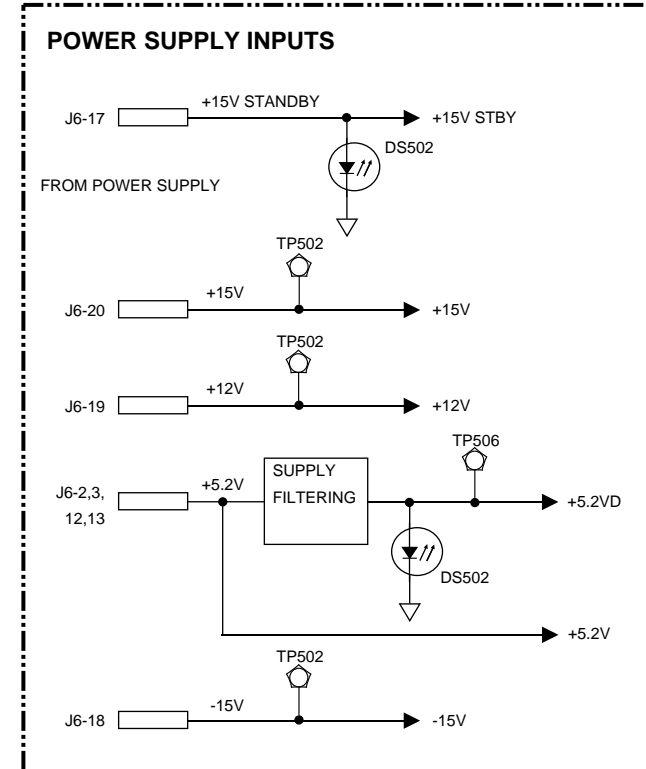
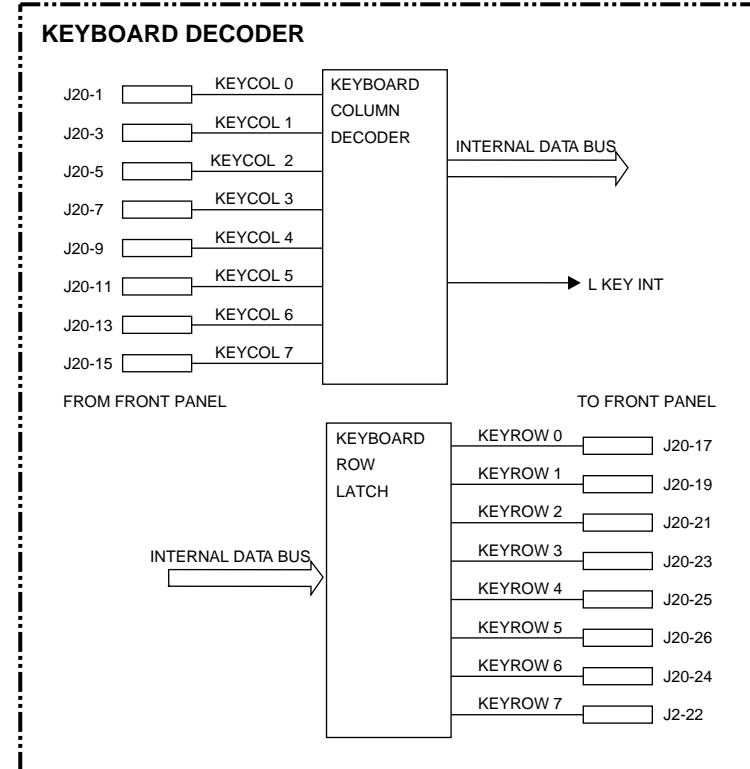
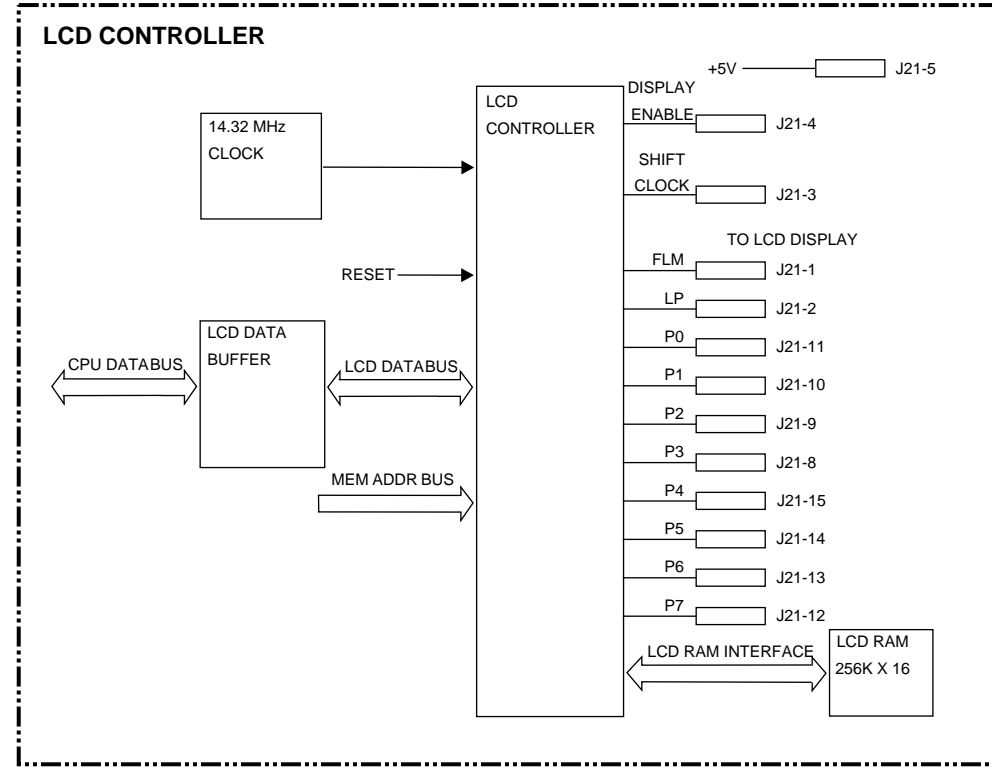
| Test Conditions | Node Voltages (Corrected Values in Vdc) | | | | | | | |
|---|---|------------------|---------|----------|------|------|-----|------|
| | DISP | LCD | INT_MOD | P10V_REF | M6V | M5V | P9V | ACOM |
| PRESET; | | ≈ 7 ^a | 0.00 | 10 | -6.0 | -5.2 | 9.0 | 0.00 |
| PRESET; Vary Display Brightness 1 to 50 | -0.4 to -1.3 | | | | | | | |

a. Approximately -5.3 V if jumpers for P104, P105, and P106 are set to negative position.

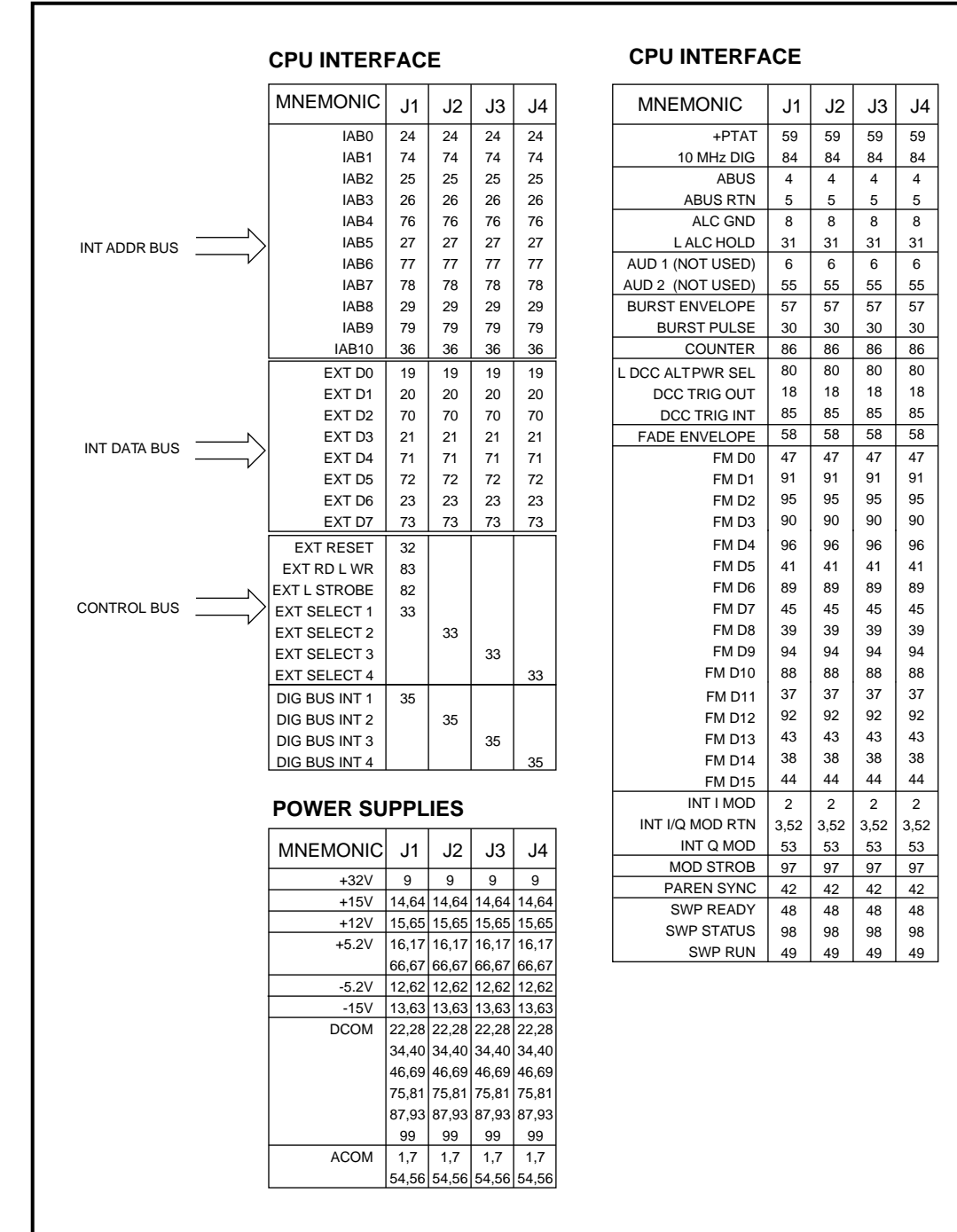
A14 CPU/MOTHERBOARD BLOCK DIAGRAM (1 OF 2)



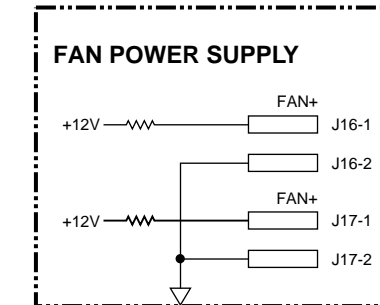
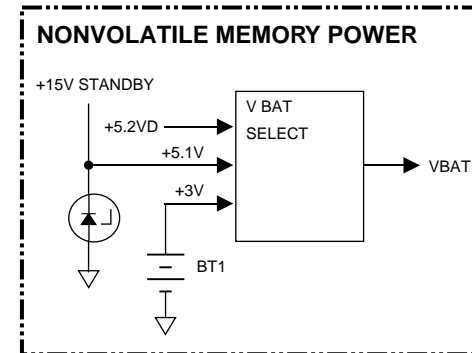
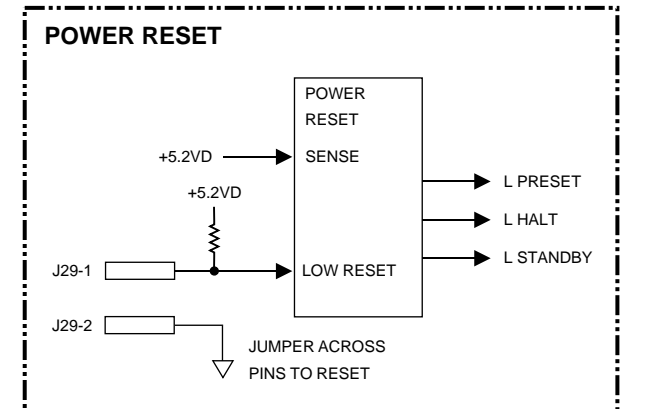
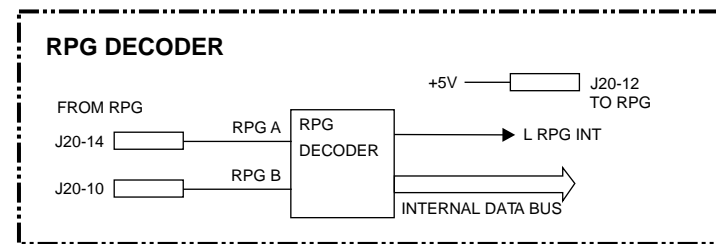
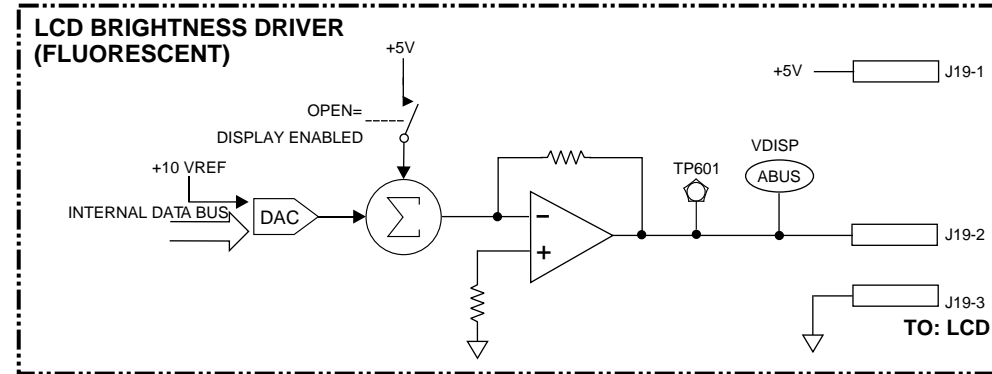
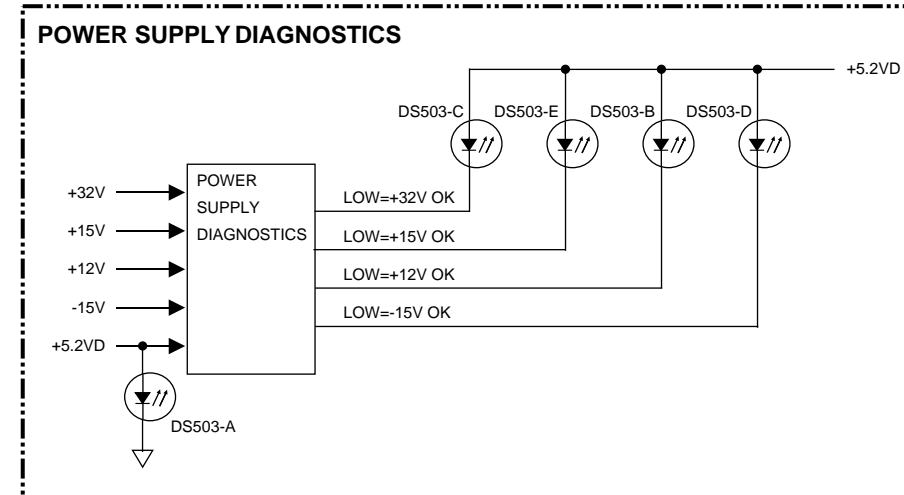
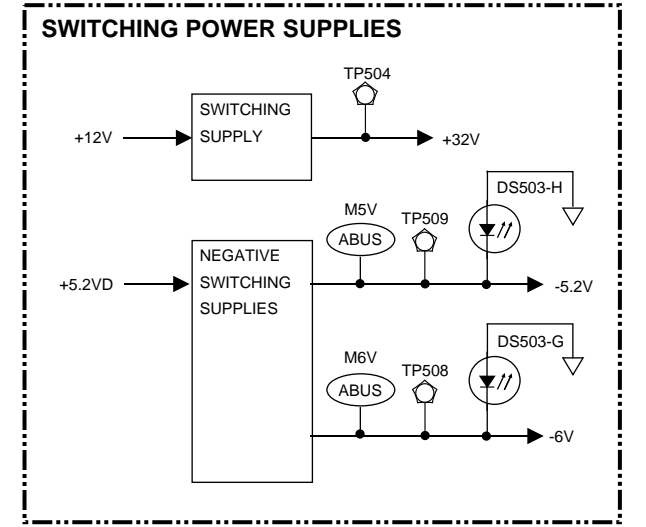
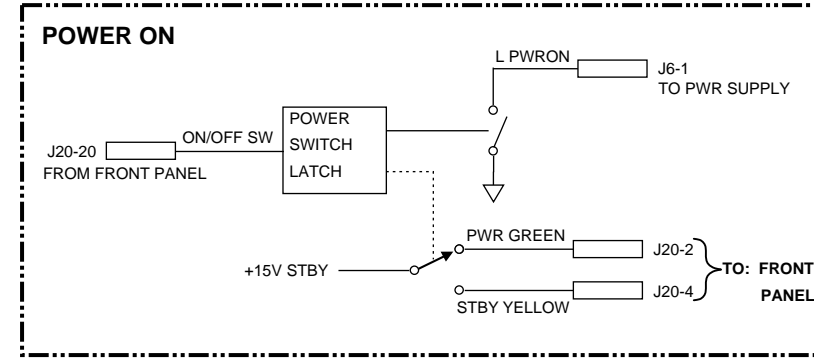
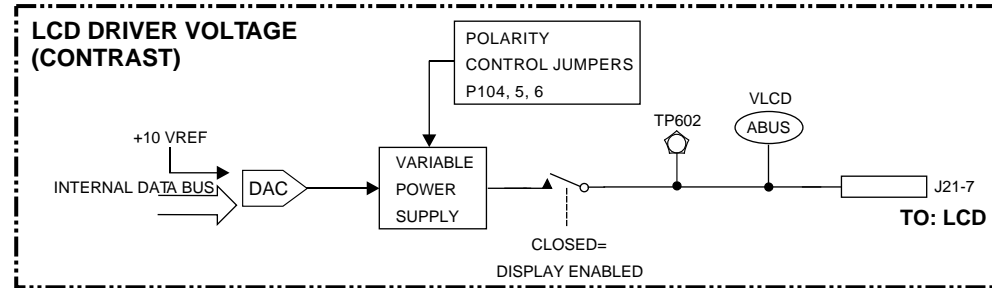
A14 CPU/MOTHERBOARD BLOCK DIAGRAM (1 OF 2)



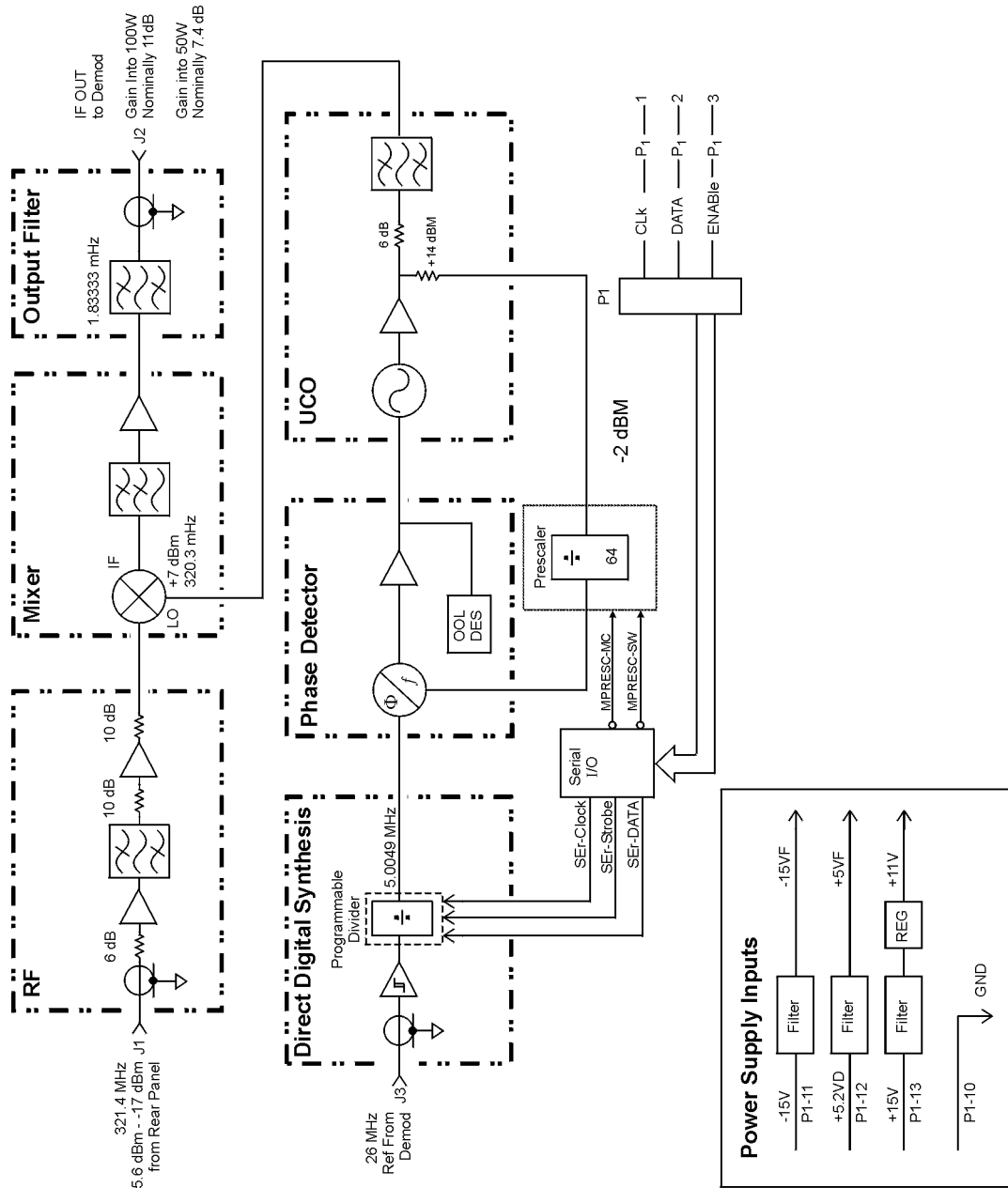
DIGITAL CARD CAGE CONNECTIONS



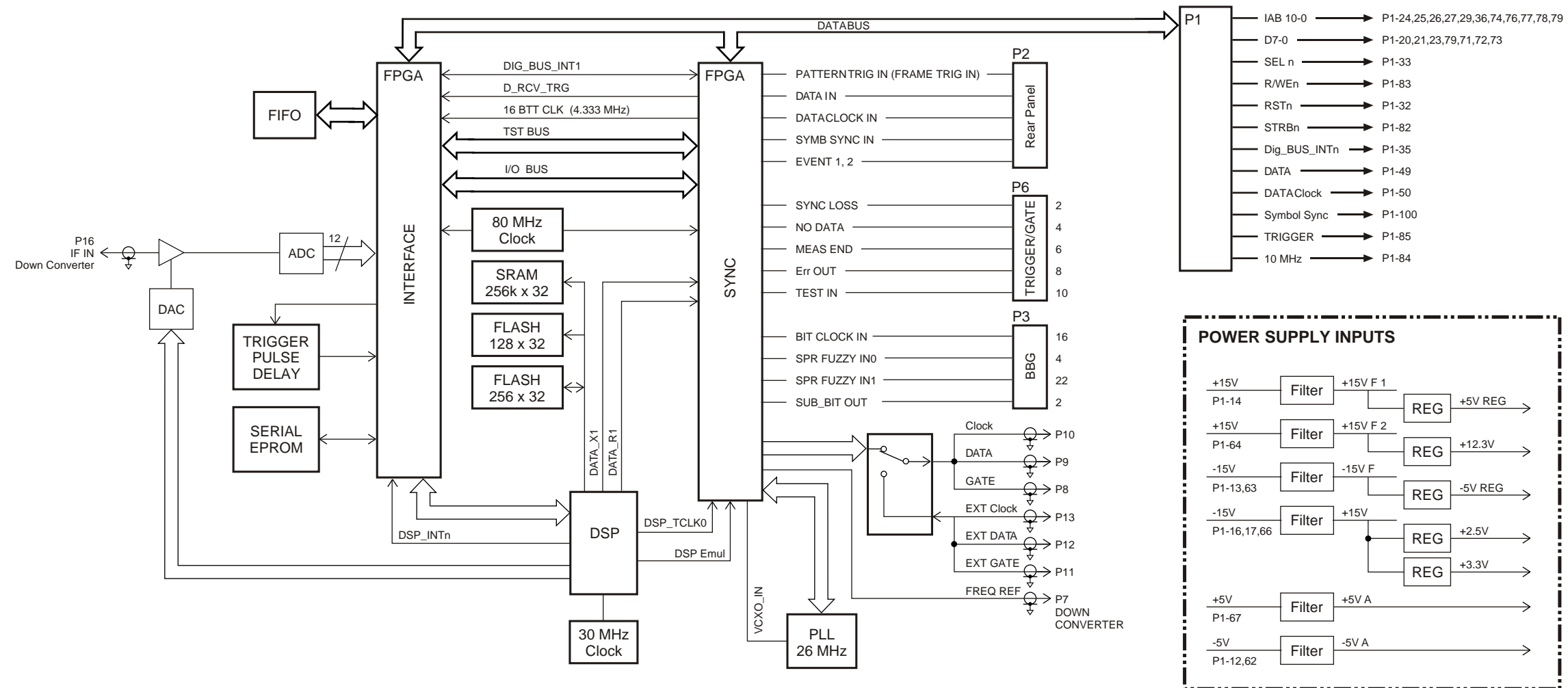
DAUGHTER BOARD CONNECTIONS



A20 Downconverter Block Diagram (Option 300)



A21 DEMODULATOR BLOCK DIAGRAM (OPTION 300)



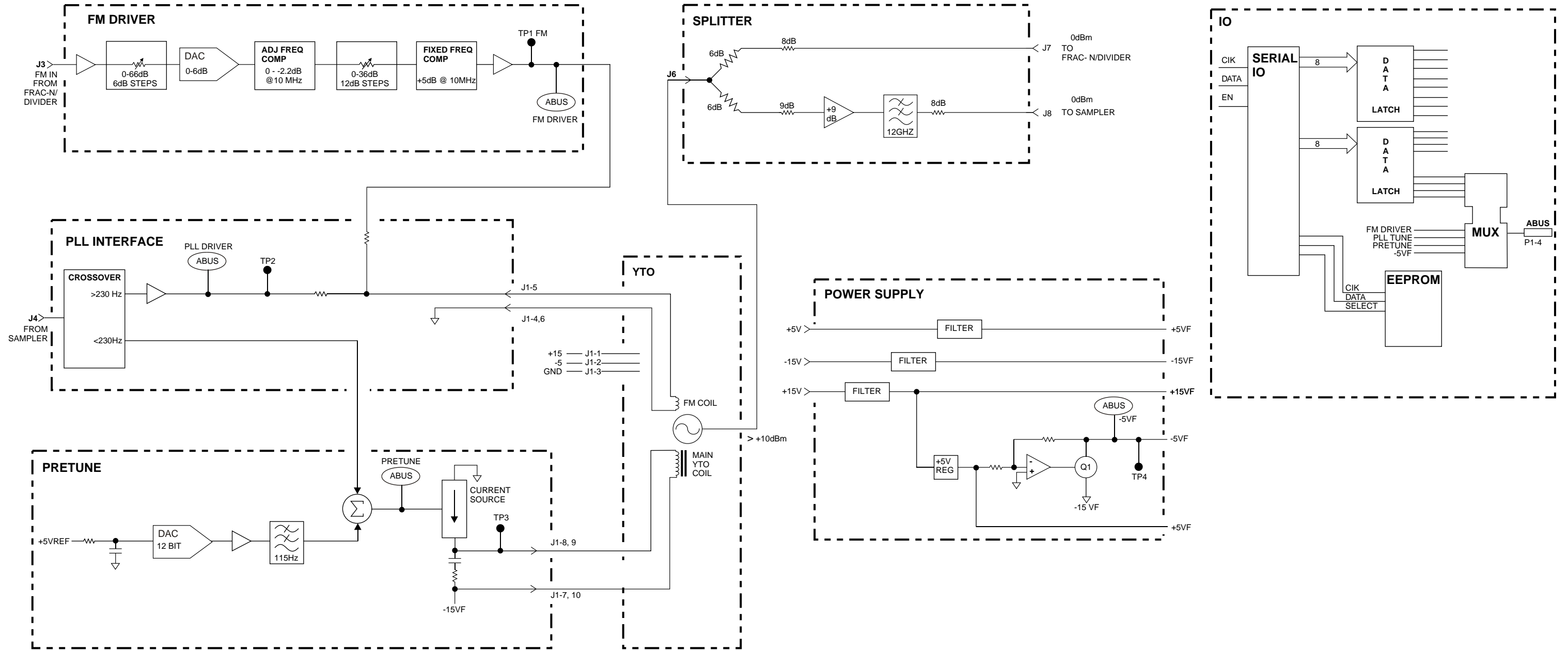
A22 YIG Driver ABUS Nodes (ESG-AP & ESG-DP Series)

NOTE The node voltages given in the following table are approximate values based on a sample of signal generators. Your signal generator may not reflect these exact values. Additionally, the resolution of these values varies from node to node. As a guideline, interpret your measurements based on the number of decimal places shown for the expected voltage.

A22 YIG Driver ABUS Nodes (ESG-AP & ESG-DP Series)

| Test Conditions: PRESET; 0 dBm; RF On; No Modulation | Node Voltages (Corrected Values in Vdc) | | | |
|--|--|-----------|-----|--------------------------|
| | FM_DRVVR | PLL_DRVVR | N5V | PRETUNE (-5.3 to 0.1) |
| | 0 | 0 | -5 | |
| Freq 0.25 MHz | | | | -4 |
| Freq 750 MHz | | | | -3 |
| Freq 1 GHz | | | | -4 |
| Freq 1.001 GHz | | | | -2 |
| Freq 2 GHz | | | | -4 |
| Freq 2.5 GHz | | | | -2.5 |
| Freq 4 GHz | | | | -4 |

A22 YIG DRIVER BLOCK DIAGRAM



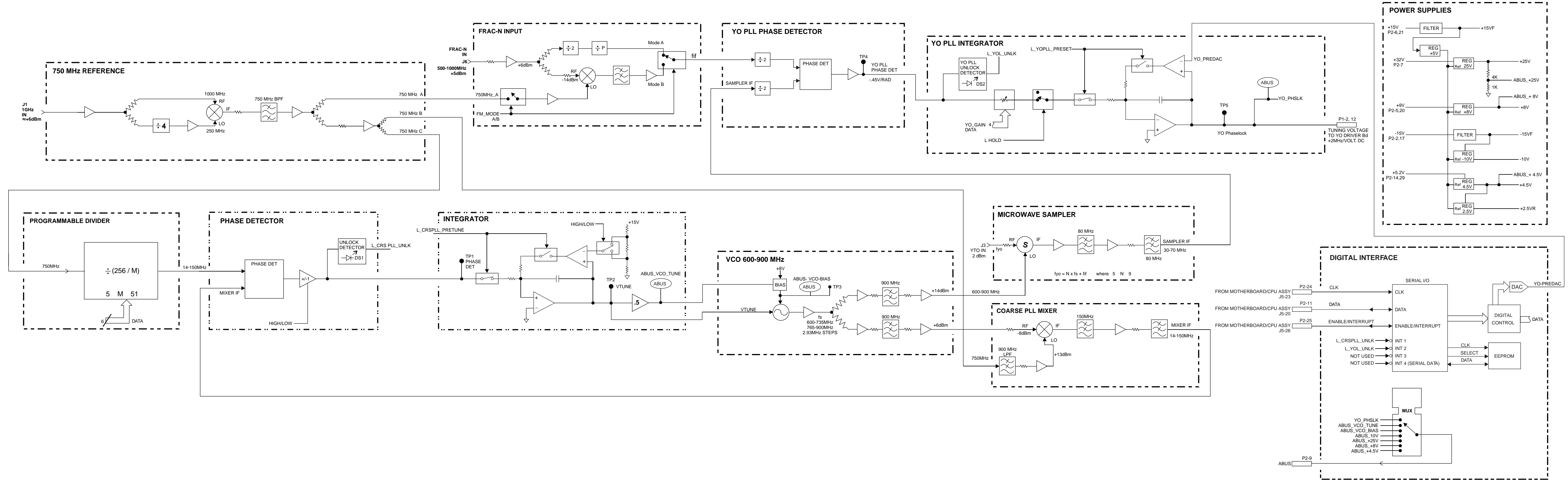
A23 Sampler ABUS Nodes (ESG-AP & ESG-DP Series)

NOTE The node voltages given in the following table are approximate values based on a sample of signal generators. Your signal generator may not reflect these exact values. Additionally, the resolution of these values varies from node to node. As a guideline, interpret your measurements based on the number of decimal places shown for the expected voltage.

A23 Sampler ABUS Nodes (ESG-AP & ESG-DP Series)

| Test Conditions: PRESET; 0 dBm; RF On; No Modulation | Node Voltages (Corrected Values in Vdc) | | | | | | |
|--|---|----|-------|------|------|-------------------------|------------------------|
| | YO_PHSLK | 8V | P525V | P4_5 | AGND | VCO_TUNE (5.5 to 12) | VCO_BIAS (4 to 7.5) |
| | ≈ -4 to 2 (varies w/ freq) | 8 | 5 | 4.5 | 0 | | |
| Freq 0.25 MHz | | | | | | 10 | 6 |
| Freq 750 MHz | | | | | | 9 | 5 |
| Freq 1 GHz | | | | | | 10 | 6 |
| Freq 1.001 GHz | | | | | | 7 | 5 |
| Freq 2 GHz | | | | | | 10 | 6 |
| Freq 2.5 GHz | | | | | | 8 | 5 |
| Freq 4 GHz | | | | | | 10 | 6 |

A23 SAMPLER (ESG-AP AND ESG DP SERIES)



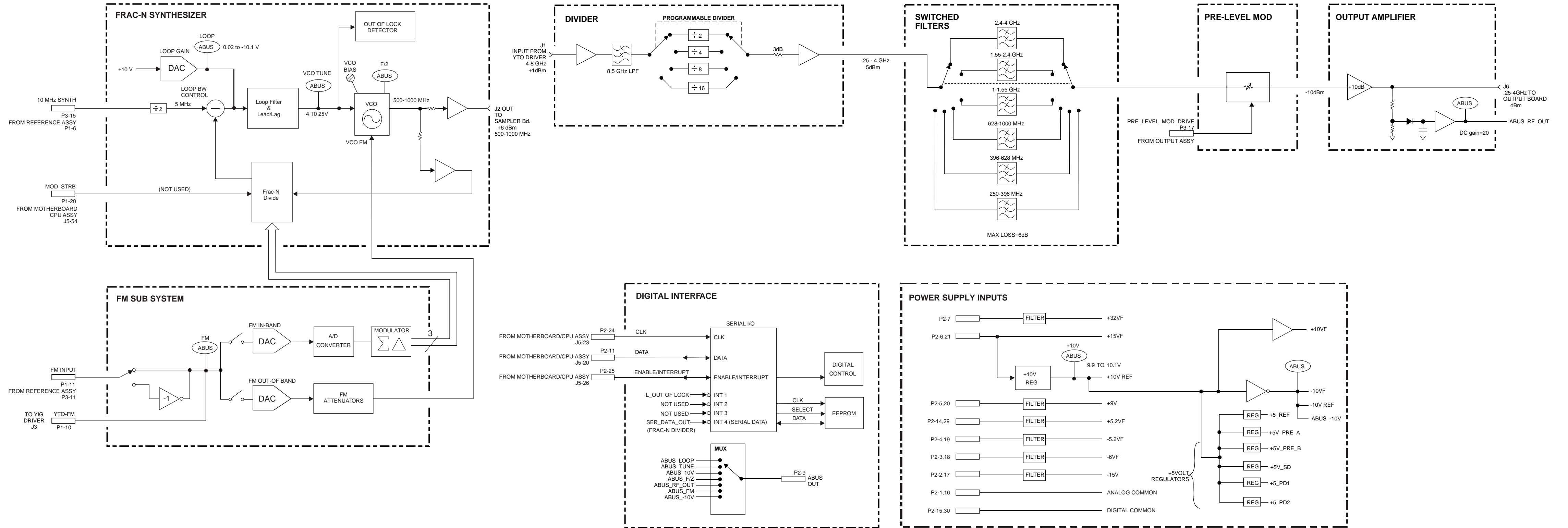
A24 Frac-N/Divider ABUS Nodes (ESG-AP & ESG-DP Series)

NOTE The node voltages given in the following table are approximate values based on a sample of signal generators. Your signal generator may not reflect these exact values. Additionally, the resolution of these values varies from node to node. As a guideline, interpret your measurements based on the number of decimal places shown for the expected voltage.

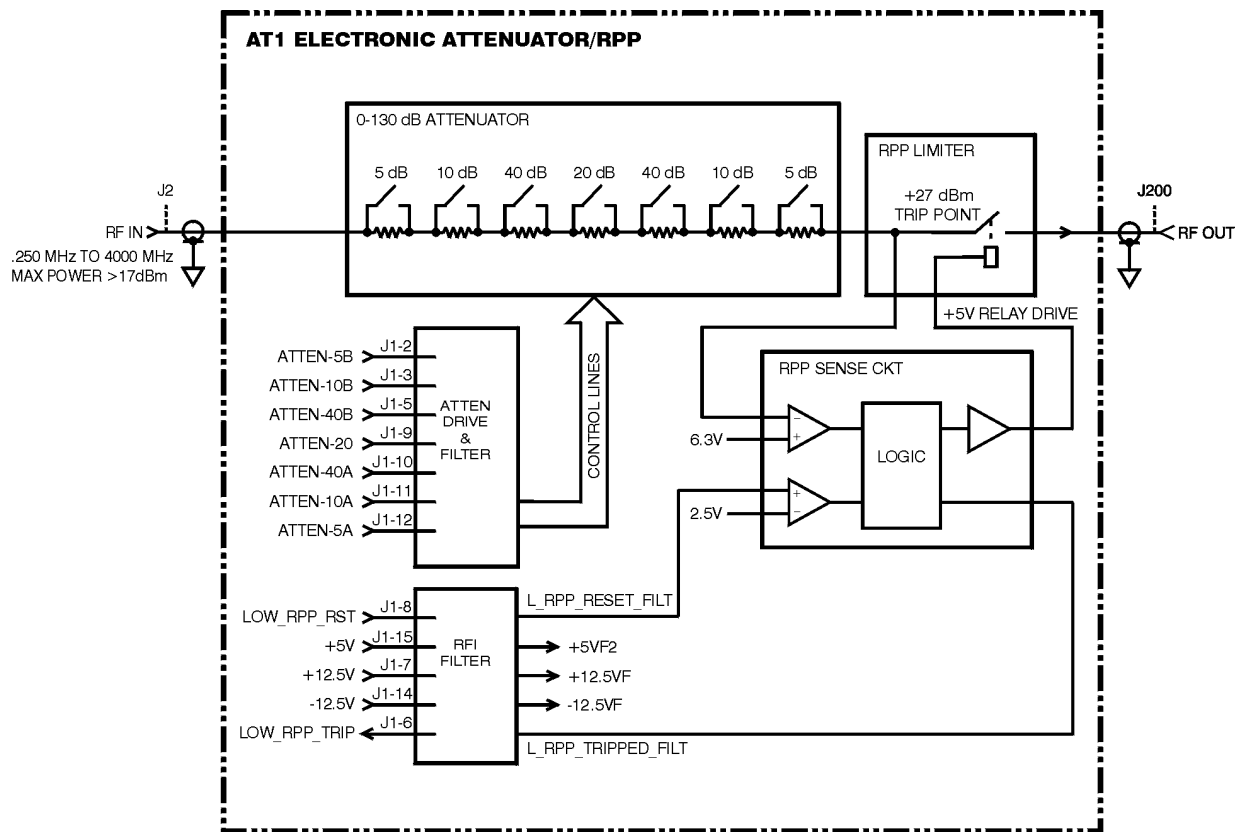
A24 Frac-N/Divider ABUS Nodes

| Test Conditions: PRESET; 0 dBm; RF On; No Modulation | Node Voltages (Corrected Values in Vdc) | | | | | | | |
|---|---|-----|------|-------|-----|-----|-------------------|---------------------|
| | RF_OUT | 10V | FM | M10V | GND | F2 | TUNE (3 to 23) | LOOP (-10 to 0) |
| | 1 to 6 | 10 | 0.15 | -10.0 | 0 | | | -1 to -5 typical |
| Freq 0.25 MHz | | | | | | 3.6 | 6 | |
| Freq 750 MHz | | | | | | 4 | 3 to 23 | |
| Freq 1 GHz | | | | | | 3.8 | 7 | |
| Freq 1.001 GHz | | | | | | 4.1 | 10 | |
| Freq 2 GHz | | | | | | 3.8 | 7 | |
| Freq 2.5 GHz | | | | | | 4.7 | 3 to 23 | |
| Freq 4 GHz | | | | | | 3.8 | 7 | |

A24 FRAC-N/DIVIDER (ESG-AP & ESG-DP SERIES)

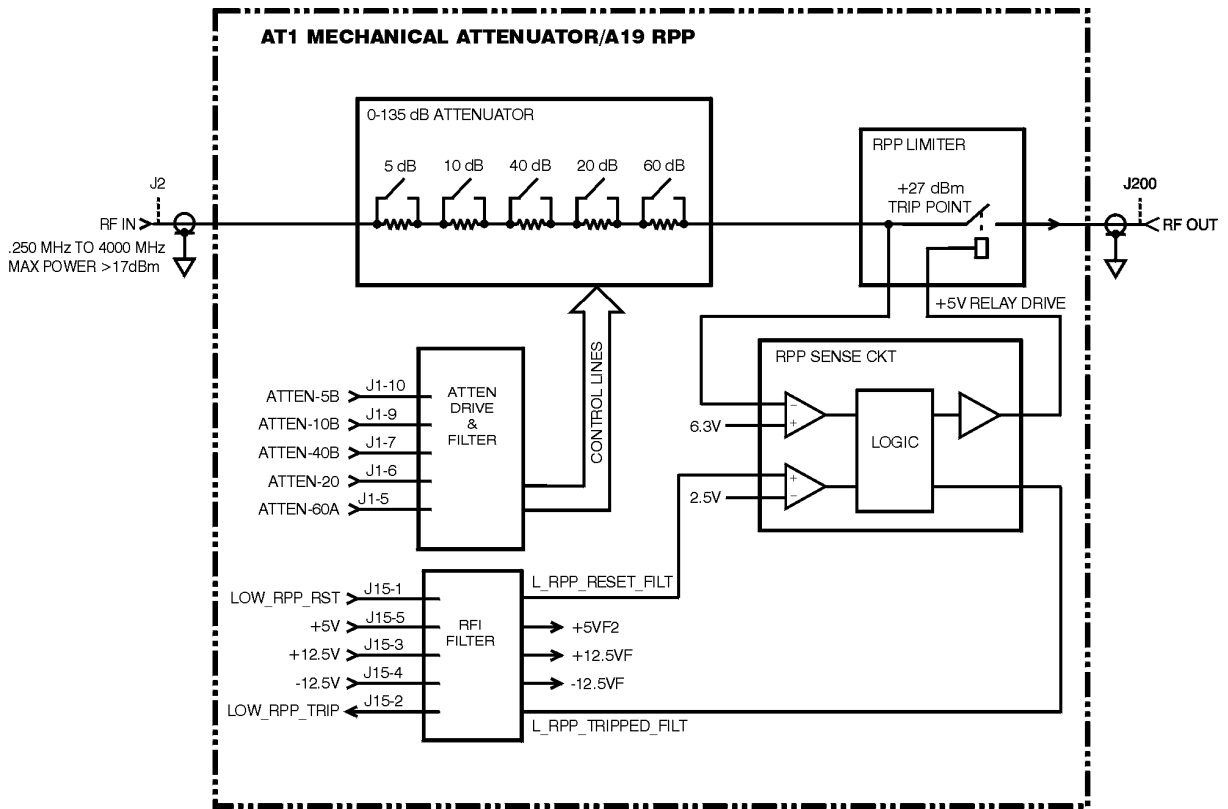


AT1 Electronic Attenuator/RPP Block Diagram



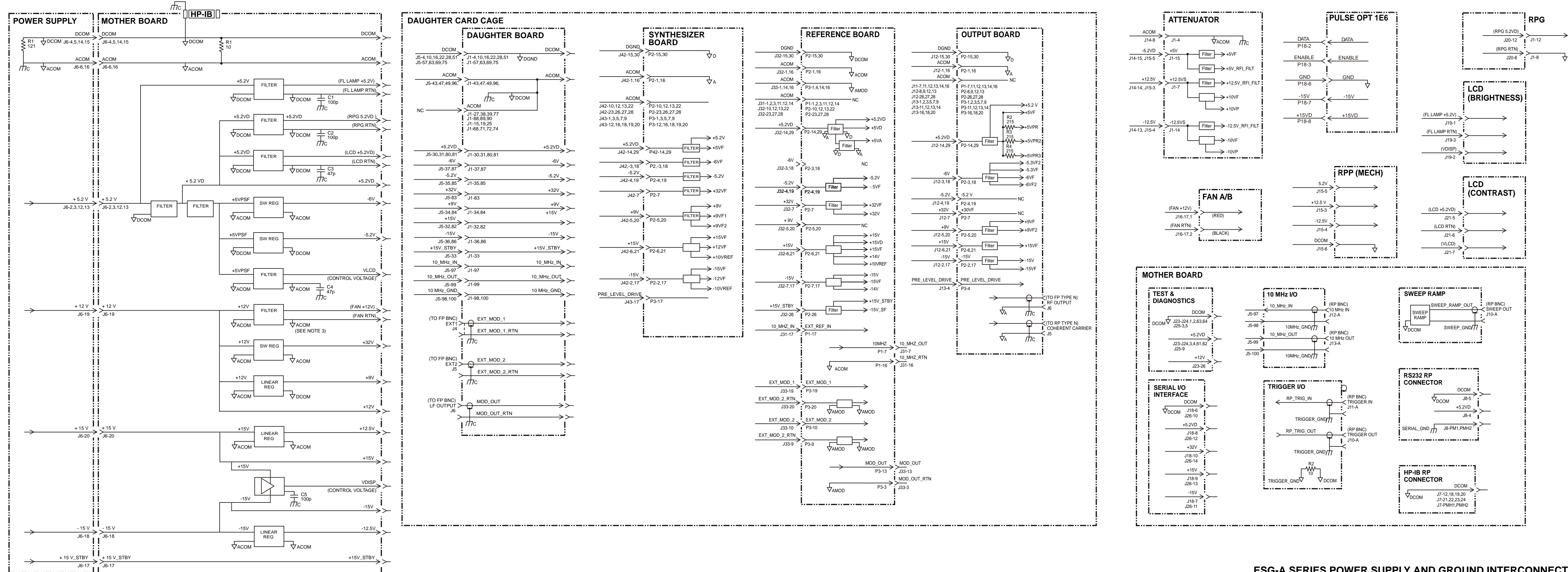
sk7112b

AT1 Mechanical Attenuator and A19 RPP Block Diagram (Option UNB)

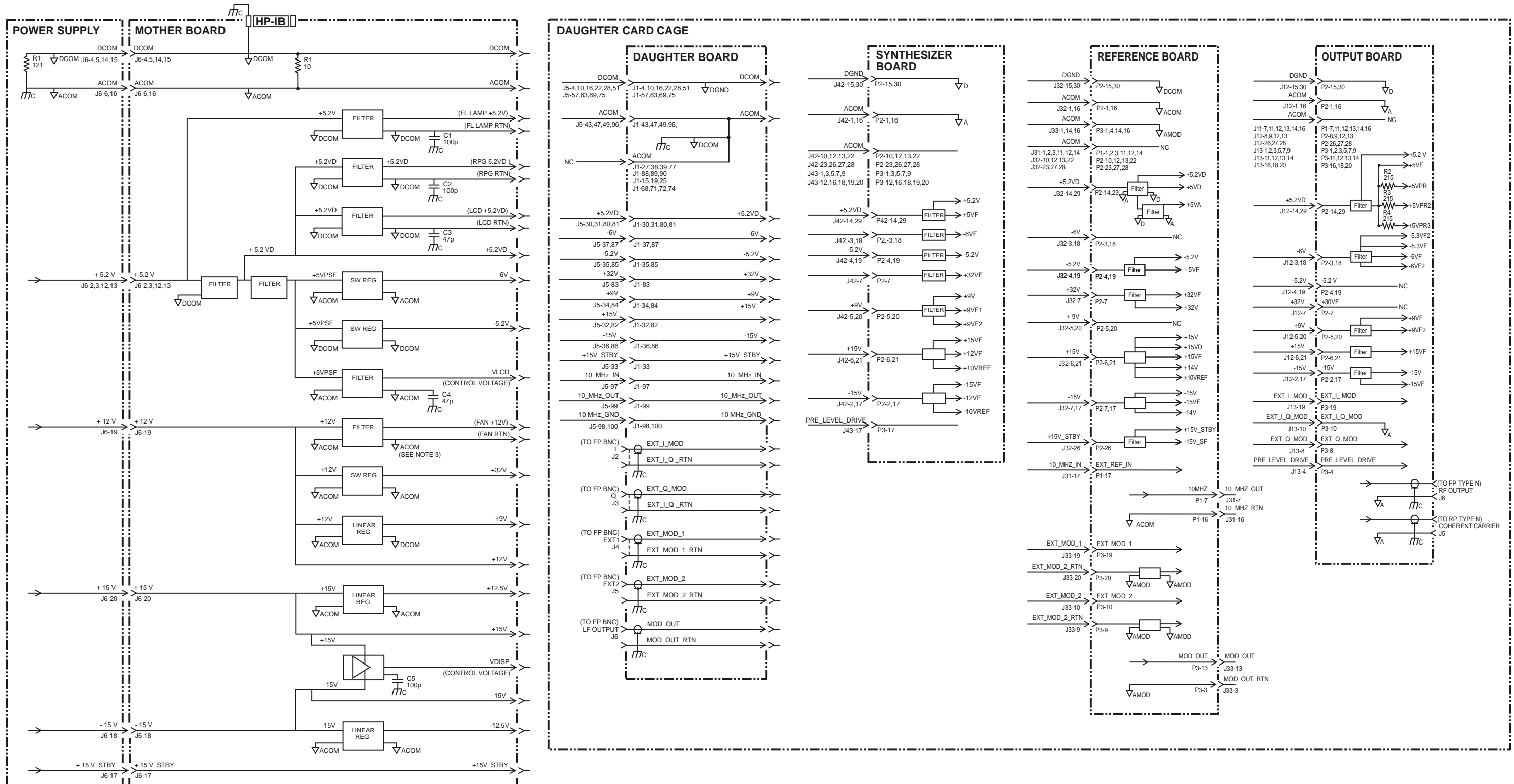


sk71 13b

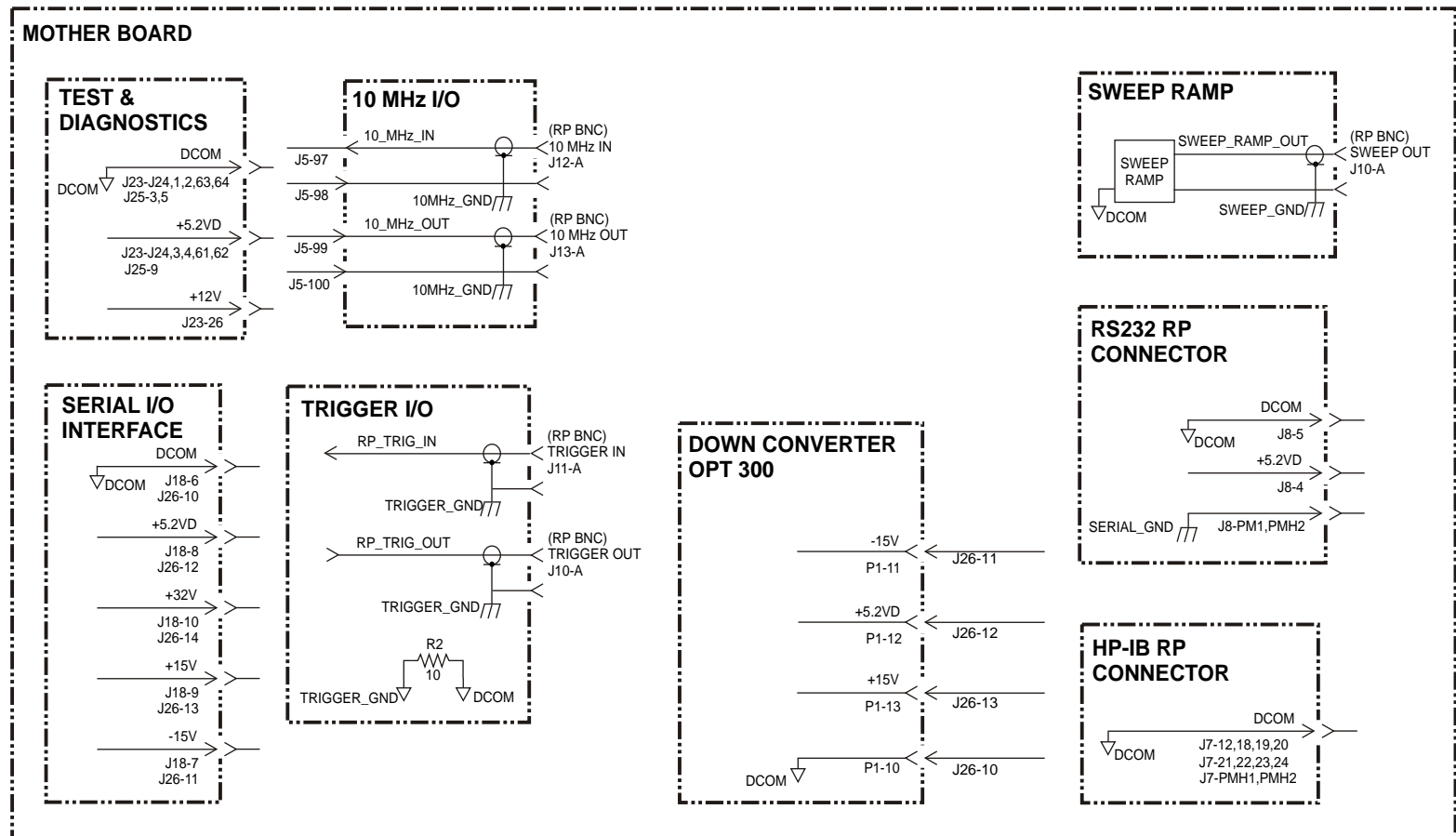
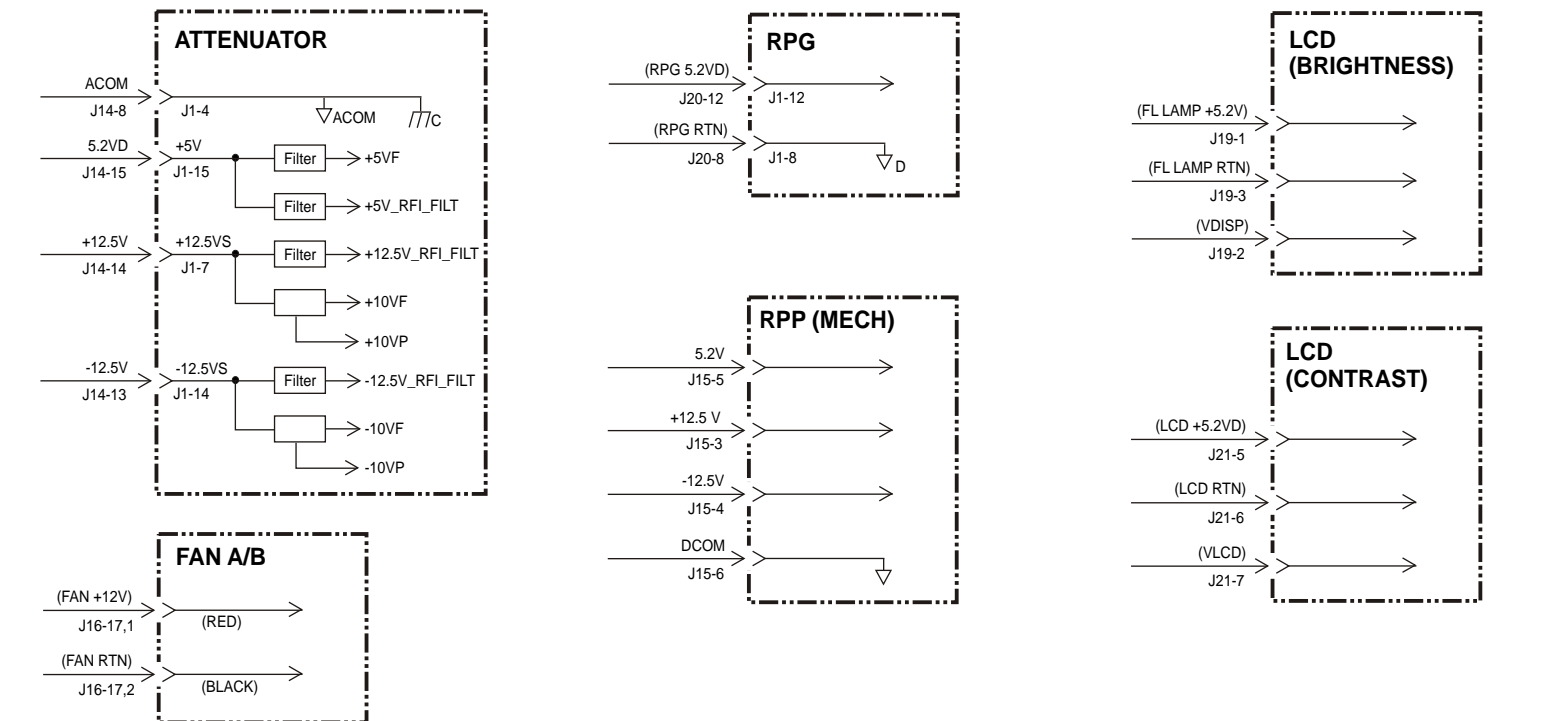
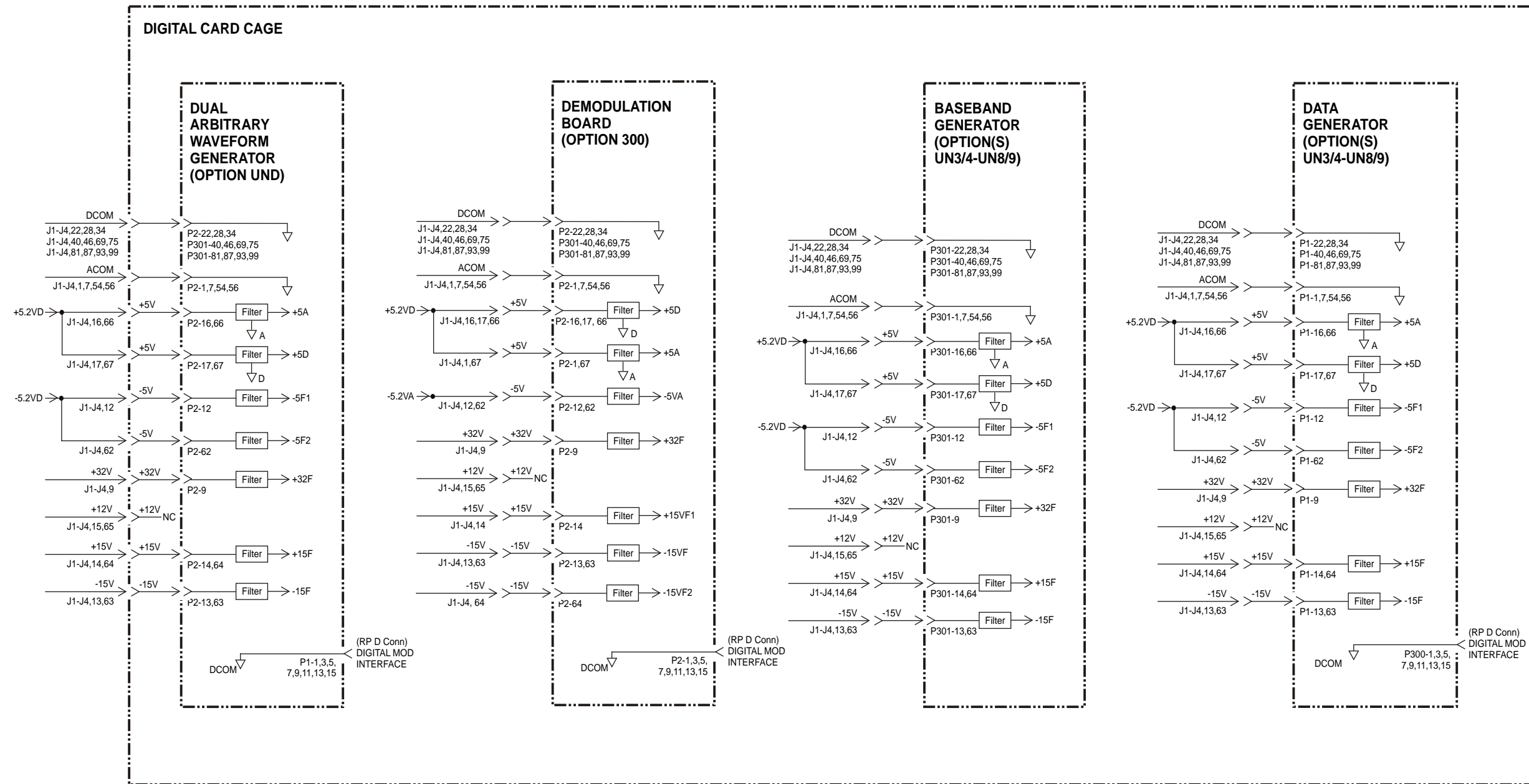
ESG-A SERIES POWER SUPPLY AND GROUND INTERCONNECTS



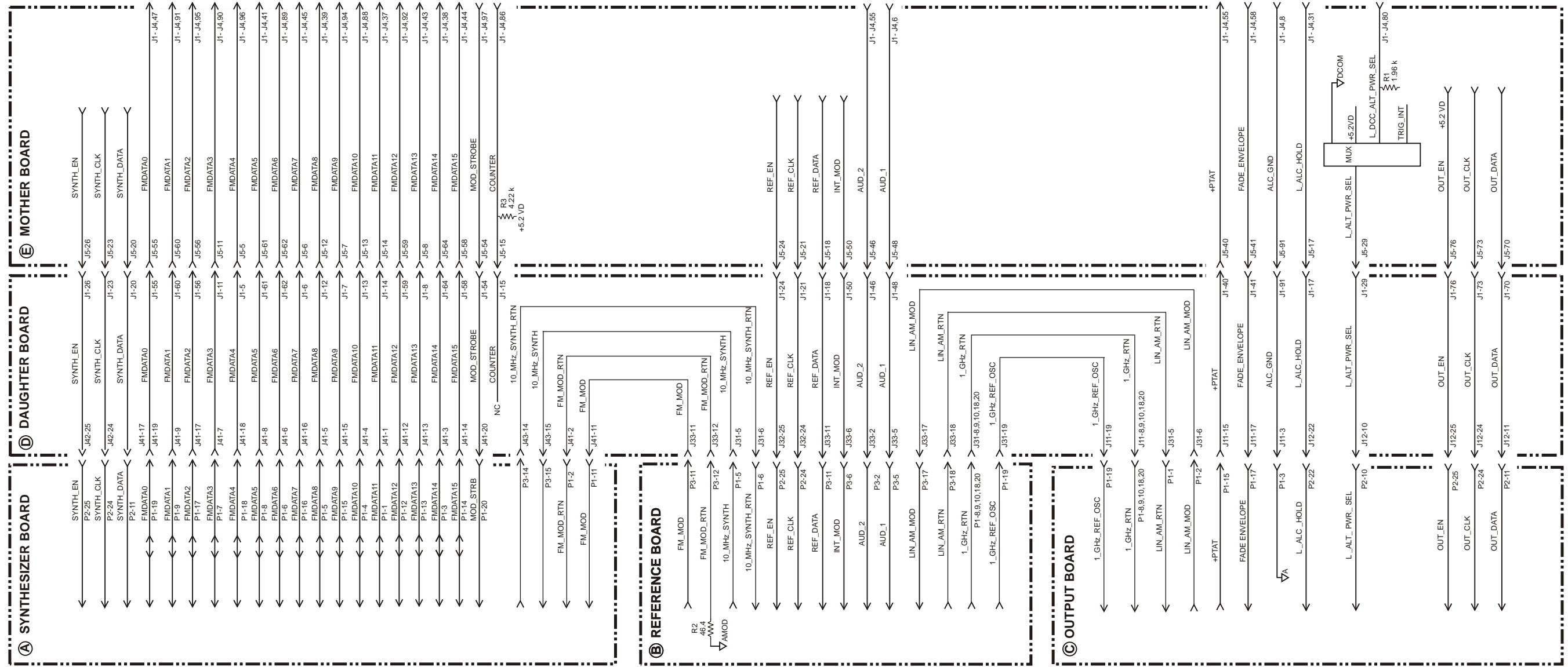
ESG-D SERIES POWER SUPPLY & GROUND INTERCONNECTS (1 OF 2)

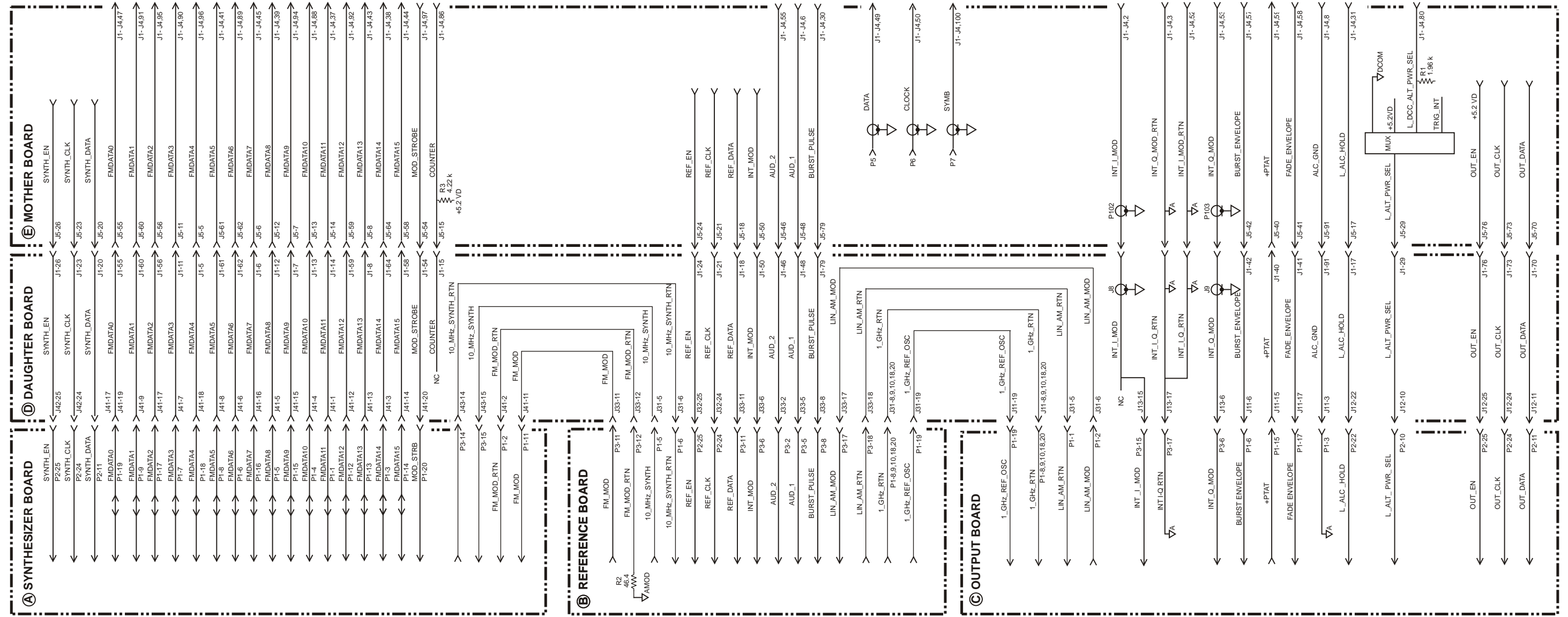


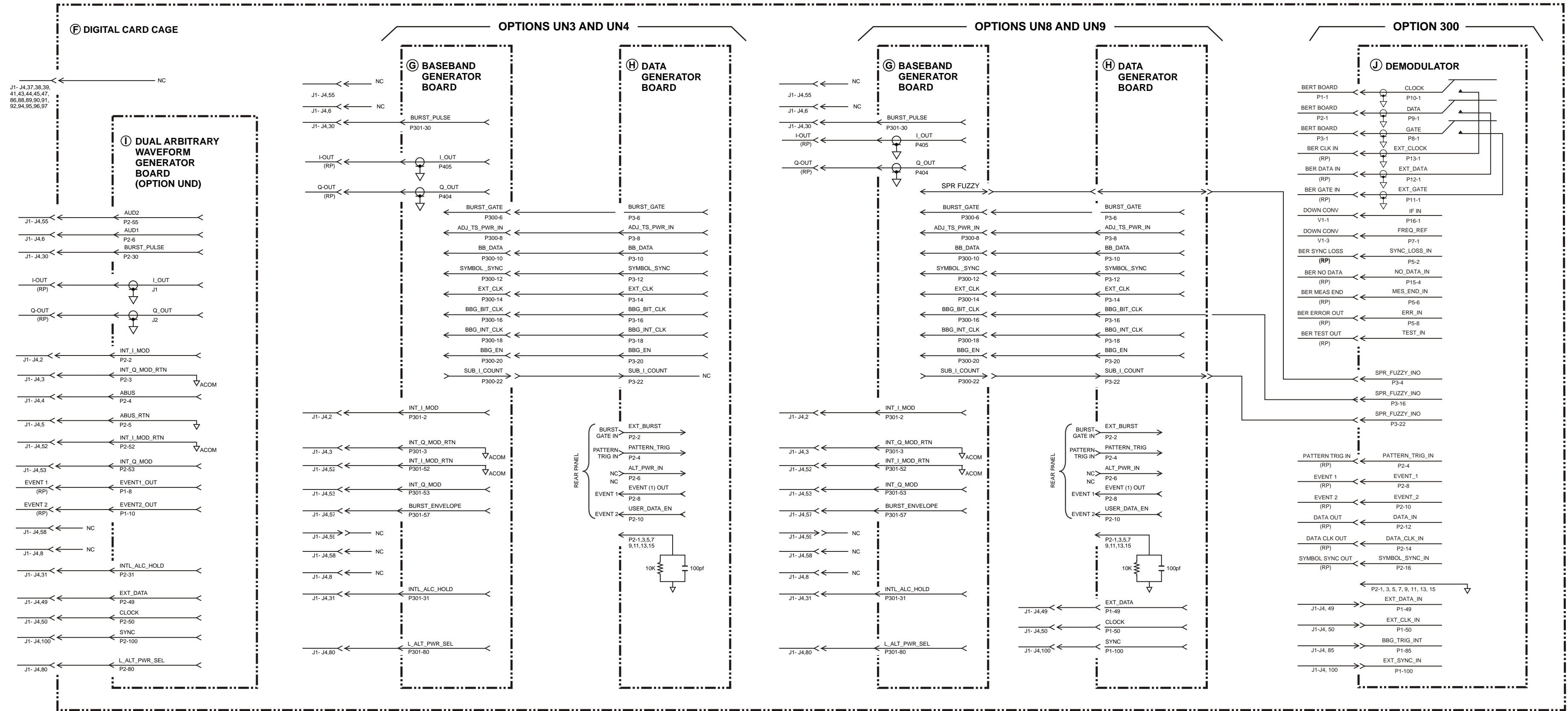
ESG-D SERIES POWER SUPPLY & GROUND INTERCONNECTS (2 OF 2)



ESG-A SERIES MODULATION AND SIGNAL INTERCONNECTS







3 Replaceable Parts (ESG-A and ESG-D Series)

This chapter provides important ordering information and lists the part numbers for the various replaceable parts, kits, and accessories available for your signal generator. This chapter is also useful for locating and identifying assemblies and cables.

Ordering Information

To order a part listed in the replaceable parts lists, do the following:

1. Determine the part number.
2. Determine the quantity required.
3. Mail this information to the nearest Agilent Technologies office or, in the U.S., call the hotline number listed in the following section.

To order a part not listed in the replaceable parts lists, mail the following information to the nearest Agilent Technologies office or, in the U.S., call the hotline number listed in the following section.

1. the instrument model number
2. the serial number and options, if any (see rear panel)
3. a description of the part
4. a description of the part's function
5. the quantity required

Call (800) 227-8164 to Order Parts Fast (U.S. Only)

When you have gathered the information required to place an order, contact Agilent Technologies' direct ordering team by calling the toll-free hotline number shown above. Orders may be placed Monday through Friday, 6 AM to 5 PM (Pacific Standard Time).

The parts specialists have direct on-line access to replacement parts inventory corresponding to the replaceable parts lists in this manual. Four day delivery time is standard; there is a charge for hotline one-day delivery.

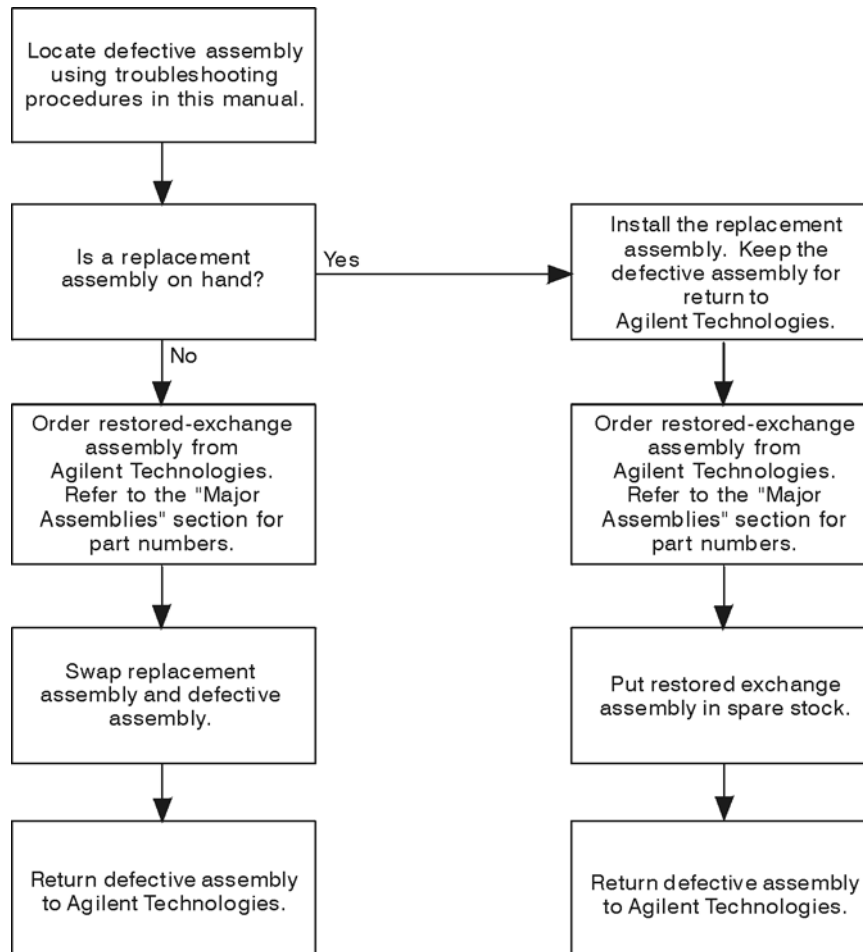
This information applies to the United States only. Outside the United States, you must contact the nearest Agilent Technologies sales and service office. (Refer to [Table 1-1](#) on page 1-9.)

Save Money with Rebuilt-Exchange Assemblies

Under the rebuilt-exchange assembly program, certain factory-repaired and tested assemblies are available on a trade-in basis. These assemblies cost less than a new assembly, and meet all factory specifications required of a new assembly.

The defective assembly must be returned for credit under the terms of the rebuilt-exchange assembly program. The figure below illustrates the assembly exchange procedure in flowchart format.

Assembly Exchange Procedure



Shipping the Defective Assembly Back to Agilent Technologies

1. When you receive the rebuilt assembly, be careful not to damage the box in which it was shipped. You will use that box to return the defective assembly. The box you receive should contain the following:
 - the rebuilt assembly
 - an exchange assembly failure report
 - a return address label
2. Complete the failure report.
3. Place the failure report and the defective assembly in the box. Be sure to remove the enclosed return address label.
4. Seal the box with tape.

If you are inside the United States, stick the preprinted return address label over the label that is already on the box and return the box to Agilent Technologies. (Agilent Technologies pays postage on boxes mailed within the United States.)

If you are outside the USA, do not use the return address label; instead, address the box to the nearest Agilent Technologies sales and service office. (Refer to [Table 1-1](#) on page 1-9.)

Abbreviations Used in Part Descriptions

This section defines the reference designators, abbreviations, and option numbers that are used in the part descriptions throughout this chapter.

Reference Designations

| Reference Designator | Definition |
|----------------------|--------------------------------|
| A | assembly |
| AT | attenuator |
| B | fan |
| DS | lamp |
| J | electrical connector; jack |
| P | electrical connector; plug |
| W | cable; transmission path; wire |

Abbreviations

| Abbreviation | Definition |
|--------------|-------------------------------|
| Assy | assembly |
| Bd | board |
| BC | beryllium |
| BN | buttonhead (screws) |
| CPU | central processing unit |
| CW | conical washer (screws) |
| CY | copper |
| D | diameter |
| ESD | electrostatic discharge |
| EXT | external |
| FL | flathead (screws) |
| Ft | feet |
| Hex | hexagonal |
| GPIB | general purpose interface bus |
| HX | hexagonal recess (screws) |
| I | in-phase |
| ID | inside diameter |
| L | length |

| Abbreviation | Definition |
|---------------------|--|
| LF | low frequency |
| M | meters or metric hardware |
| OD | outside diameter |
| PC | patch lock (screws) or printed circuit |
| PN | panhead (screws) |
| Q | quadrature |
| Qty | quantity |
| REF | reference |
| RF | radio frequency |
| RFI | radio frequency interference |
| RPP | reverse power protection |
| SH | socket head cap (screws) |
| SMA | subminiature type-A |
| SMB | subminiature type-B |
| TX | TORX recess (screws) |
| V | volt |

Hardware Options

| Options | Definition |
|----------------|--|
| 300 | Base Station BERT Extension for Option UN7 |
| 1E5 | Precision Frequency Reference |
| 1E6 | High Performance Pulse Input |
| 1EM | Rear Panel Connections |
| UN3 | Baseband Generator - 1 Meg |
| UN4 | Baseband Generator - 8 Meg |
| UN7 | Bit Error Rate Test |
| UN8 | Real-Time I/Q Baseband Generator - 1 Meg |
| UN9 | Adds 7 Meg RAM to UN8 |
| UNA | Alternate Timeslot Power |
| UNB | High Power with Mechanical Attenuator |
| UND | Dual Arbitrary Waveform Generator |

Major Assemblies

This section lists part numbers for the major assemblies in your signal generator. The following instrument views are provided to help you locate specific assemblies.

- “[Top View](#)” on page 3-8
- “[Top View \(ESG-D Series - Option 300\)](#)” on page 3-10
- “[Right Side Assemblies](#)” on page 3-12
- “[Disassembled Front Panel View](#)” on page 3-13
- “[Inside Rear Panel View](#)” on page 3-14

Top View

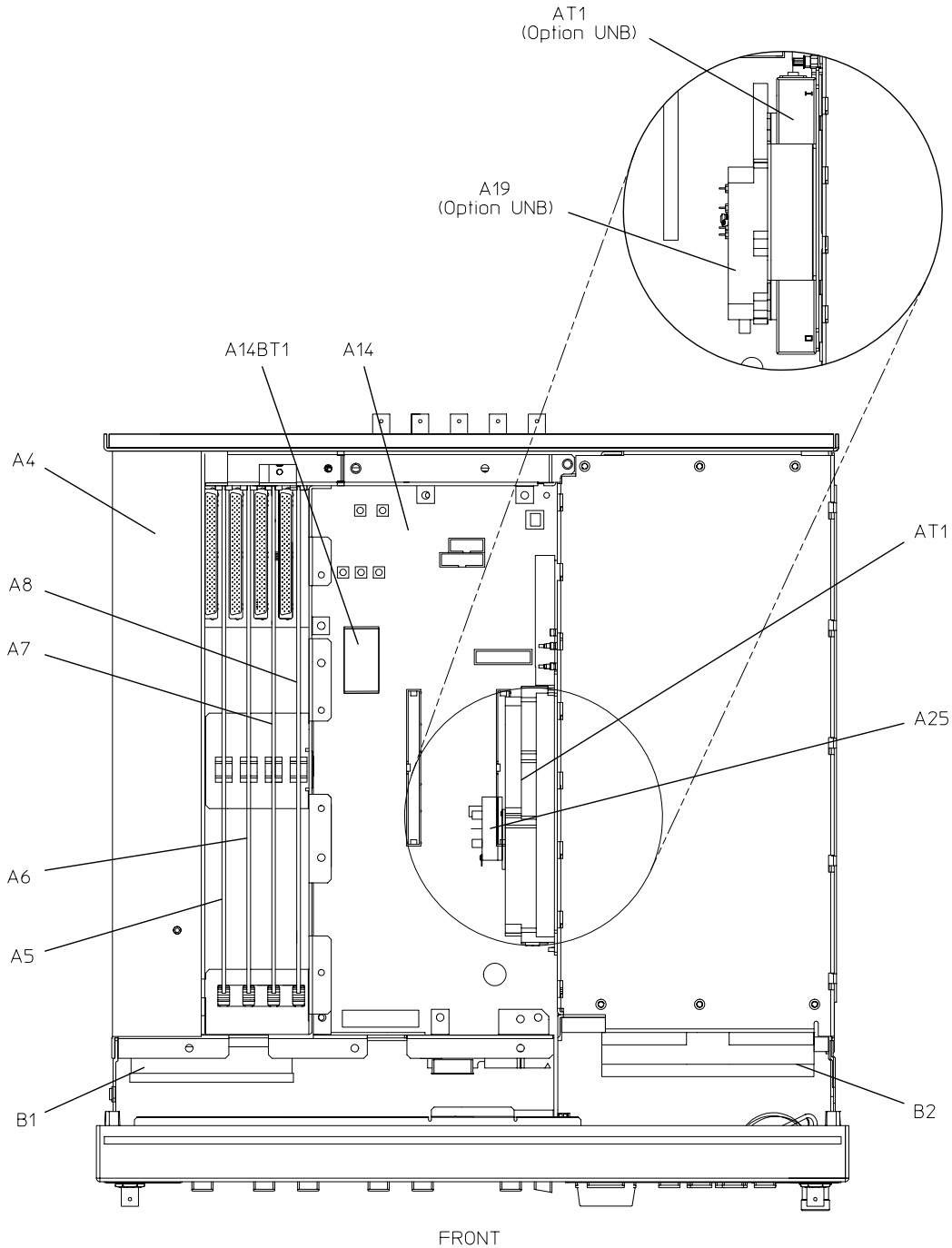
Refer to [Table 3-1](#) and [Figure 3-1](#).

Table 3-1 Top View

| Reference Designator | Part Number | Qty | Description |
|----------------------|-------------|-----|--|
| A4 | 0950-2791 | 1 | Assy-Power Supply |
| A5 | E4400-60187 | 1 | Bd Assy-Dual Arbitrary Waveform Generator (Option UND) |
| A5 | E4400-69187 | | Exchange Bd Assy-Dual Arbitrary Waveform Generator (Option UND) |
| A6 | E4400-60072 | 1 | Bd Assy-Bit Error Rate Test (Option UN7) |
| A6 | E4400-69072 | | Exchange Bd Assy-Bit Error Rate Test (Option UN7) |
| A7 | E4400-60048 | 1 | Bd Assy-Baseband Generator (Options UN3, UN4) |
| A7 | E4400-69048 | | Exchange Bd Assy-Baseband Generator (Options UN3, UN4) |
| A7 | E4400-60070 | 1 | Bd Assy-Real-Time I/Q Baseband Generator (Options UN8, UN8+UN9) |
| A7 | E4400-69070 | | Exchange Bd Assy-Real-Time I/Q Baseband Generator (Options UN8, UN8+UN9) |
| A8 | E4400-60043 | 1 | Bd Assy-Data Generator, 1 Meg (Option UN3) |
| A8 | E4400-69043 | | Exchange Bd Assy-Data Generator, 1 Meg (Option UN3) |
| A8 | E4400-60057 | 1 | Bd Assy-Data Generator, 8 Meg (Option UN4) |
| A8 | E4400-69057 | | Exchange Bd Assy-Data Generator, 8 Meg (Option UN4) |
| A8 | E4400-60182 | 1 | Bd Assy-Data Generator, 1 Meg (Option UN8) |
| A8 | E4400-69182 | | Exchange Bd Assy-Data Generator, 1 Meg (Option UN8) |
| A8 | E4400-60183 | 1 | Bd Assy-Data Generator, 8 Meg (Option UN8+UN9) |
| A8 | E4400-69183 | | Exchange Bd Assy-Data Generator, 8 Meg (Option UN8+UN9) |
| A8 | E4400-60154 | 1 | Bd Assy-Flex Data Generator, 1 Meg (Option UN8) |
| A8 | E4400-69154 | | Exchange Bd Assy-Flex Data Generator, 1 Meg (Option UN8) |
| A8 | E4400-60195 | 1 | Bd Assy-Flex Data Generator, 8 Meg (Option UN8+UN9) |
| A8 | E4400-69195 | | Exchange Bd Assy-Flex Data Generator, 8 Meg (Option UN8+UN9) |
| A14 | E4400-60220 | 1 | Replacement Kit-CPU/Motherboard (serial no. prefixes < US3934/GB3934) |
| A14 | E4400-60225 | 1 | Replacement Kit-CPU/Motherboard (serial no. prefixes ≥ US3934/GB3934) |
| A14BT1 | 1420-0338 | 1 | Battery-Lithium |
| AT1 | E4400-60042 | 1 | Assy-Electronic Attenuator/RPP (Option UNA) replaced by E4400-60681 |
| AT1 | E4400-60680 | 1 | Assy-Electronic Attenuator/RPP |
| AT1 | E4400-60681 | 1 | Assy-Electronic Attenuator/RPP upgrade kit (for E4400-60042 and E4400-60205) |
| AT1 | 33322-60014 | 1 | Assy-Mechanical Attenuator (Option UNB) |
| A19 | 08648-60025 | 1 | Assy-RPP (Option UNB) |

| Reference Designator | Part Number | Qty | Description |
|----------------------|-------------|-----|---|
| A25 | 08648-60010 | 1 | Pulse Modulator Assembly (Option 1E6) |
| B1 | E4400-60218 | 1 | Assy-Fan, Small |
| B2 | E4400-60062 | 1 | Kit-Fan, Large (includes 2 foam strips) |

Figure 3-1 Top View



sk71b

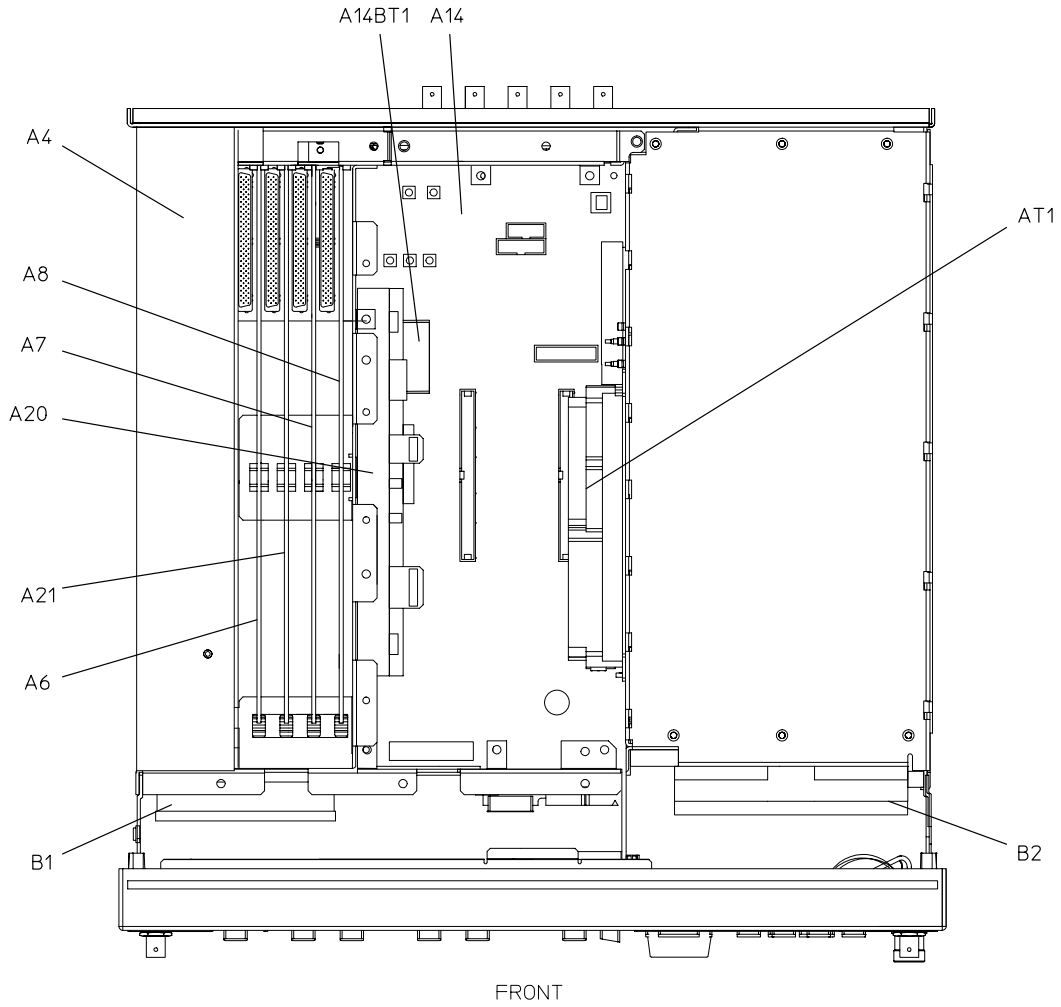
Top View (ESG-D Series - Option 300)

Refer to [Table 3-2](#) and [Figure 3-2](#).

Table 3-2 Top View (ESG-D Series - Option 300)

| Reference Designator | Part Number | Qty | Description |
|----------------------|-------------|-----|---|
| A4 | 0950-2791 | 1 | Assy-Power Supply |
| A6 | E4400-60507 | 1 | Bd Assy-Bit Error Rate Test (Option UN7) |
| A6 | E4400-69072 | | Exchange Bd Assy-Bit Error Rate Test (Option UN7) |
| A7 | E4400-60070 | 1 | Bd Assy-Real-Time I/Q Baseband Generator (Options UN8 or UN8+UN9) |
| A7 | E4400-69070 | | Exchange Bd Assy-Real-Time I/Q Baseband Generator (Options UN8 or UN8+UN9) |
| A8 | E4400-60154 | 1 | Bd Assy-Flex Data Generator, 1 Meg (Option UN8) |
| A8 | E4400-69154 | | Exchange Bd Assy-Flex Data Generator, 1 Meg (Option UN8) |
| A8 | E4400-60195 | 1 | Bd Assy-Flex Data Generator, 8 Meg (Option UN8+UN9) |
| A8 | E4400-69195 | | Exchange Bd Assy-Flex Data Generator, 8 Meg (Option UN8+UN9) |
| A14 | E4400-60220 | 1 | Replacement Kit-CPU/Motherboard (serial no. prefixes < US3934/GB3934) |
| A14 | E4400-60225 | 1 | Replacement Kit-CPU/Motherboard (serial no. prefixes ≥ US3934/GB3934) |
| A14BT1 | 1420-0338 | 1 | Battery-Lithium |
| AT1 | E4400-60042 | 1 | Assy-Electronic Attenuator/RPP (Option UNA) replaced by E4400-60681 |
| AT1 | E4400-60680 | 1 | Assy-Electronic Attenuator/RPP |
| AT1 | E4400-60681 | 1 | Assy-Electronic Attenuator/RPP upgrade kit (for E4400-60042 and E4400-6205) |
| A20 | E4400-60200 | 1 | Bd Assy-Downconverter |
| A20 | E4400-69200 | 1 | Exchange Bd Assy-Downconverter |
| A21 | E4400-60241 | 1 | Bd Assy-Demodulator |
| A21 | E4400-69199 | | Exchange Assy-Demodulator |
| B1 | E4400-60218 | 1 | Assy-Fan, Small |
| B2 | E4400-60062 | 1 | Kit-Fan, Large (includes 2 foam strips) |

Figure 3-2 Top View (ESG-D Series - Option 300)



sk796b

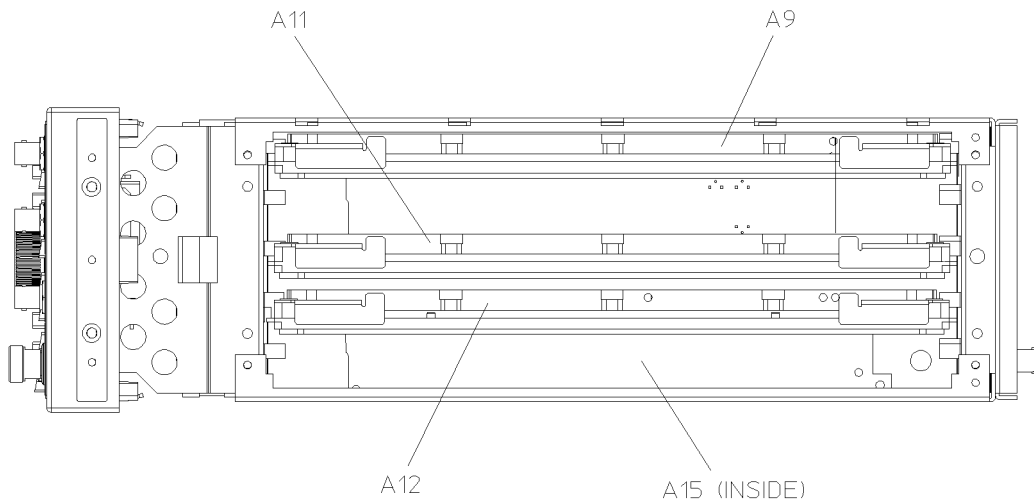
Right Side Assemblies

Refer to [Table 3-3](#) and [Figure 3-3](#).

Table 3-3 Replaceable Assemblies, Right Side

| Reference Designator | Part Number | Qty | Description |
|----------------------|-------------|-----|--|
| A9 | E4400-60038 | 1 | Bd Assy-Output (ESG-A series with serial no. prefixes \leq US3926/GB3926 or \geq US3934/GB3934) |
| A9 | E4400-69038 | 1 | Exchange Bd Assy-Output (ESG-A series with serial no. prefixes \leq US3926/GB3926 or \geq US3934/GB3934) |
| A9 | E4400-60003 | 1 | Bd Assy-Output (ESG-A series with serial no. prefix US3927/GB3927) |
| A9 | E4400-69003 | 1 | Exchange Bd Assy-Output (ESG-A series with serial no. prefix US3927/GB3927) |
| A9 | E4400-60003 | 1 | Bd Assy-Output (ESG-D Series) |
| A9 | E4400-69003 | 1 | Exchange Bd Assy-Output (ESG-D Series) |
| A9 | E4400-60141 | 1 | Bd Assy-Output (<i>All</i> models with Option UNB) |
| A9 | E4400-69141 | 1 | Exchange Bd Assy-Output (<i>All</i> models with Option UNB) |
| A11 | E4400-60243 | 1 | Bd Assy-Reference, TCXO |
| A11 | E4400-69243 | 1 | Exchange Bd Assy-Reference, TCXO |
| A11 | E4400-60242 | 1 | Bd Assy-Reference, OCXO (Option 1E5) |
| A11 | E4400-69242 | 1 | Exchange Bd Assy-Reference, OCXO (Option 1E5) |
| A12 | E4400-60180 | 1 | Bd Assy-Synthesizer/Doubler |
| A12 | E4400-69180 | 1 | Exchange Bd Assy-Synthesizer/Doubler |
| A15 | E4400-60138 | 1 | Bd Assy-Daughter |

Figure 3-3 Right Side View



sk714a

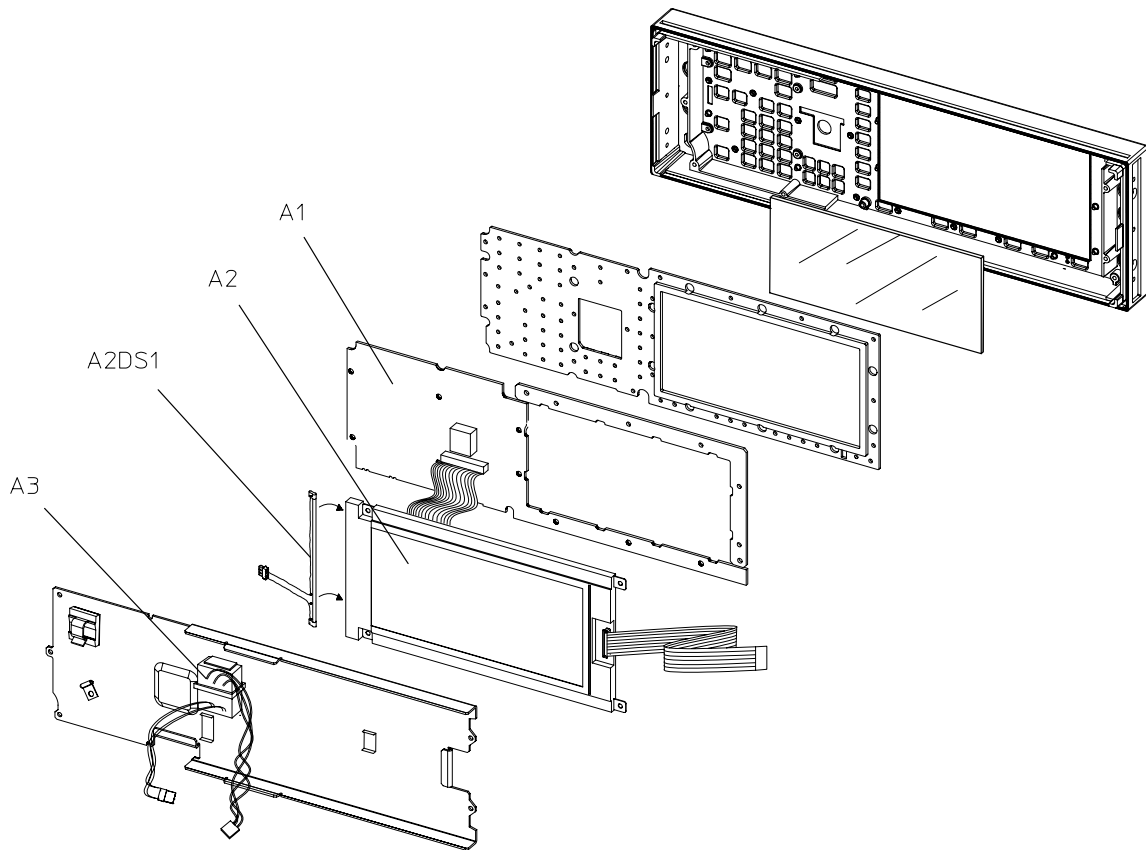
Disassembled Front Panel View

Refer to [Table 3-4](#) and [Figure 3-4](#).

Table 3-4 Disassembled Front Panel View

| Reference Designator | Part Number | Qty | Description |
|----------------------|-------------|-----|---|
| A1 | E4400-60211 | 1 | Bd Assy-Front Panel |
| A2 | 1990-1910 | 1 | Assy-Display, Wide-Angle View (serial no. prefixes < US3934/GB3934) |
| A2 | 2090-0375 | 1 | Assy-Display, Wide-Angle View (serial no. prefixes ≥ US3934/GB3934) |
| A2DS1 | 1513-5204 | 1 | Lamp-Fluorescent |
| A3 | 0950-3093 | 1 | Assy-Inverter |

Figure 3-4 Disassembled Front Panel View



sk7147b

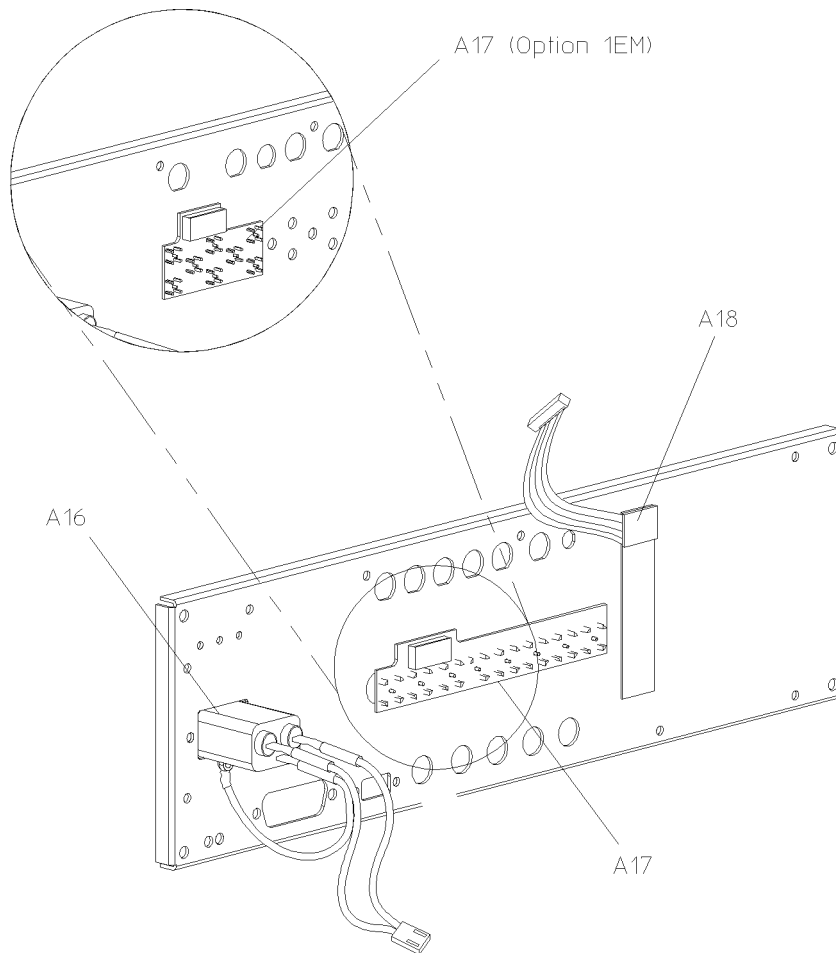
Inside Rear Panel View

Refer to [Table 3-5](#) and [Figure 3-5](#).

Table 3-5 Inside Rear Panel View

| Reference Designator | Part Number | Qty | Description |
|----------------------|-------------|-----|--|
| A16 | 5063-9711 | 1 | Assy-Line Module |
| A17 | E4400-60145 | 1 | Bd Assy-Rear Panel Interface (ESG-D Series) |
| A17 | E4400-60146 | 1 | Bd Assy-Rear Panel Interface (ESG-D Series Option 1EM) |
| A18 | E4400-60075 | 1 | Bd Assy Rear Panel Interface Subminiature Type-B (ESG-D Series Option UN7) |

Figure 3-5 Inside Rear Panel View



sk72b

Cables

This section lists part numbers for the cables in your signal generator. The following instrument views are provided to help you locate specific cables.

- “Top View (ESG-A Series)” on page 3-16
- “Top View (ESG-D Series - Options UN3/4, UN7)” on page 3-18
- “Top View (ESG-D Series - Options UN7, UN8)” on page 3-20
- “Top View (ESG-D Series - Option UND)” on page 3-22
- “Top View (ESG-D Series - Options UN3/4, UN7 with 1EM)” on page 3-24
- “Top View (ESG-D Series - Options UN7, UN8 with 1EM)” on page 3-26
- “Top View (ESG-D Series - Options UN7, UN8, UND)” on page 3-28
- “Top View (ESG-D Series - Option UND with 1EM)” on page 3-30
- “Top View (ESG-D Series - Option 300)” on page 3-32
- “Inside Front Panel View” on page 3-34
- “Electronic Attenuator/RPP View” on page 3-36
- “Electronic Attenuator/RPP View (with Option 1EM)” on page 3-38
- “Mechanical Attenuator View (Option UNB)” on page 3-40
- “Mechanical Attenuator View (Option UNB with 1EM)” on page 3-42
- “Pulse Modulator View (Option 1E6)” on page 3-44

Top View (ESG-A Series)

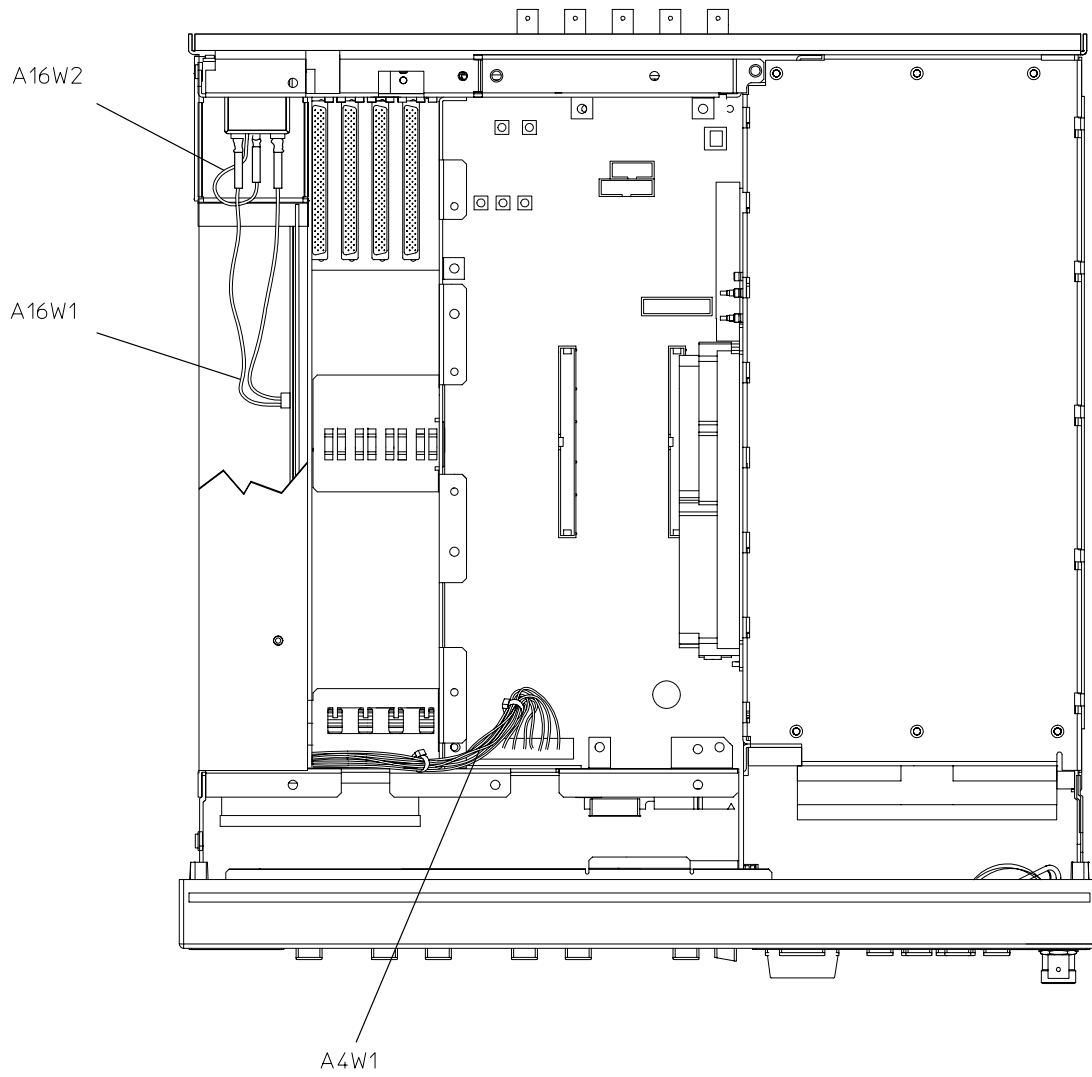
Refer to [Table 3-6](#) and [Figure 3-6](#).

Table 3-6 Top View (ESG-A Series)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|--|
| A4W1* | (part of A4) | 1 | Power Supply (A4) to CPU/Motherboard (A14J6) |
| A16W1* | (part of A16) | 1 | Line Module (A16) to Power Supply (A4J1) |
| A16W2* | (part of A16) | 1 | Line Module (A16) to Chassis Ground Post on Rear Panel |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

Figure 3-6 Top View (ESG-A Series)



sk77b

Top View (ESG-D Series - Options UN3/4, UN7)

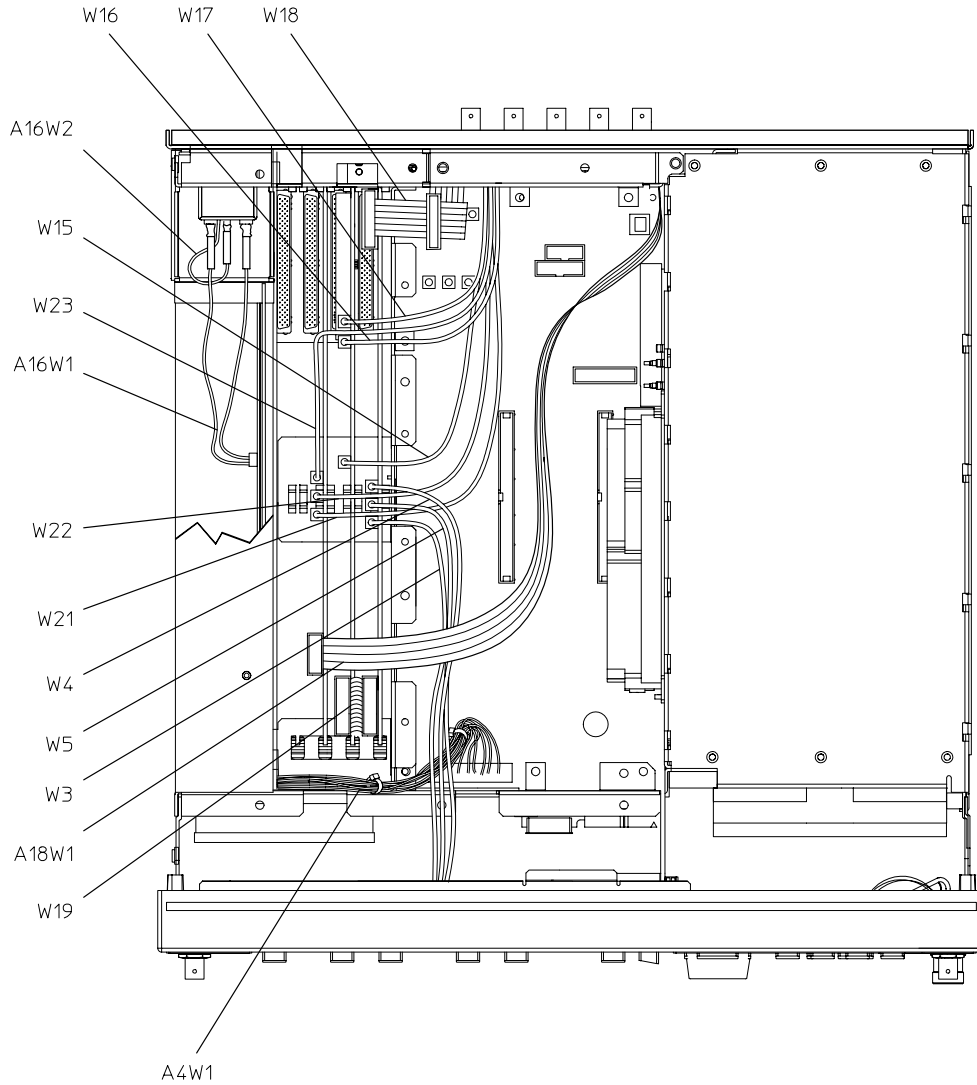
Refer to [Table 3-7](#) and [Figure 3-7](#).

Table 3-7 Top View (ESG-D Series - Options UN3/4, UN7)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|---|
| A4W1* | (part of A4) | 1 | Power Supply (A4) to CPU/Motherboard (A14J6) |
| A16W1* | (part of A16) | 1 | Line Module (A16) to Power Supply (A4J1) |
| A16W2* | (part of A16) | 1 | Line Module (A16) to Chassis Ground Post on Rear Panel |
| A18W1* | (part of A18) | 1 | BERT Rear Panel Interface Board (A18) to BERT (A6) |
| W3 | 8120-5063 | 1 | DATA to Data Generator (A8J2) |
| W4 | 8120-5063 | 1 | DATA CLOCK to Data Generator (A8J1) |
| W5 | 8120-5063 | 1 | SYMBOL SYNC to Data Generator (A8J3) |
| W15 | 8120-5055 | 1 | Baseband Generator (A7P403) to BASEBAND GENREF IN |
| W16 | 8120-5055 | 1 | Baseband Generator (A7P404) to Rear Panel (Q OUT) |
| W17 | 8120-5055 | 1 | Baseband Generator (A7P405) to Rear Panel (I OUT) |
| W18 | 8120-8458 | 1 | Rear Panel Interface Board (A17) to Data Generator (A8P2) (Options UN3/4) |
| W19 | 8120-8349 | 1 | Baseband Generator (A7P300) to Data Generator (A8P3) (Options UN3/4) |
| W21 | 8120-5055 | 1 | Bit Error Rate Test Board (A6) to BER GATE IN (Options UN3/4 and UN7) |
| W22 | 8120-5055 | 1 | Bit Error Rate Test Board (A6) to BER CLK IN (Options UN3/4 and UN7) |
| W23 | 8120-5055 | 1 | Bit Error Rate Test Board (A6) to BER DATA IN (Options UN3/4 and UN7) |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

Figure 3-7 Top View (ESG-D Series - Options UN3/4, UN7)



sk78b

Top View (ESG-D Series - Options UN7, UN8)

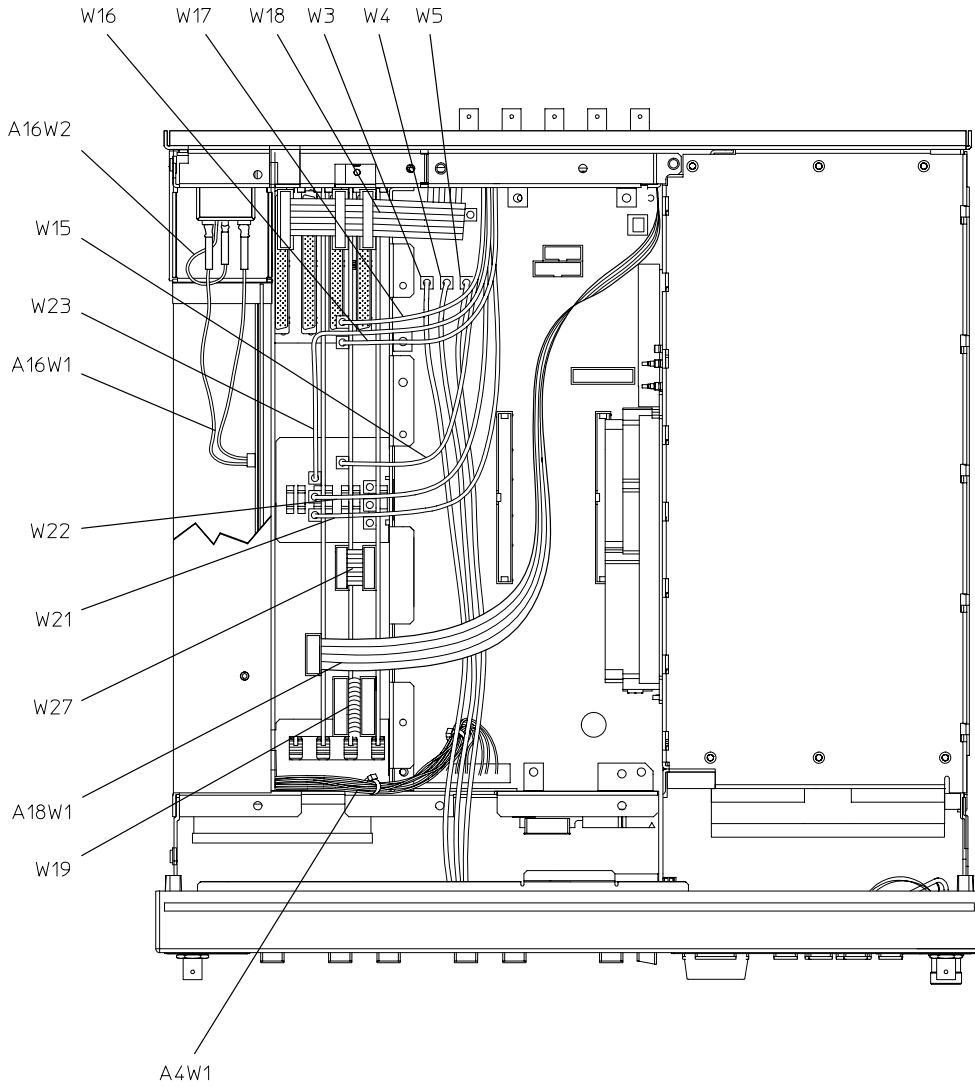
Refer to [Table 3-8](#) and [Figure 3-8](#).

Table 3-8 Top View (ESG-D Series - Options UN7, UN8)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|---|
| A4W1* | (part of A4) | 1 | Power Supply (A4) to CPU/Motherboard (A14J6) |
| A16W1* | (part of A16) | 1 | Line Module (A16) to Power Supply (A4J1) |
| A16W2* | (part of A16) | 1 | Line Module (A16) to Chassis Ground Post on Rear Panel |
| A18W1* | (part of A18) | 1 | BERT Rear Panel Interface Board (A18) to BERT (A6) |
| W3 | 8120-5063 | 1 | DATA to Motherboard (A14P5) |
| W4 | 8120-5063 | 1 | DATA CLOCK to Motherboard (A14P6) |
| W5 | 8120-5063 | 1 | SYMBOL SYNC to Motherboard (A14P7) |
| W15 | 8120-5055 | 1 | Baseband Generator (A7P403) to BASEBAND GENREF IN |
| W16 | 8120-5055 | 1 | Baseband Generator (A7P404) to Rear Panel (Q OUT) |
| W17 | 8120-5055 | 1 | Baseband Generator (A7P405) to Rear Panel (I OUT) |
| W18 | 8120-8457 | 1 | Rear Panel Interface Board (A17) to Data Generator (A8P2) and Baseband Generator (A7P2) (Option UN8 - connects in three places) |
| W19 | 8120-8349 | 1 | Baseband Generator (A7P300) to Data Generator (A8P3) (Option UN8) |
| W21 | 8120-5055 | 1 | Bit Error Rate Test Board (A6) to BER GATE IN (Options UN7, UN8) |
| W22 | 8120-5055 | 1 | Bit Error Rate Test Board (A6) to BER CLK IN (Options UN7, UN8) |
| W23 | 8120-5055 | 1 | Bit Error Rate Test Board (A6) to BER DATA IN (Options UN7, UN8) |
| W27 | 8120-8725 | 1 | 16-Pin Ribbon Cable, Parallel Data In, Data Generator (A8) to Baseband Generator (A7) |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

Figure 3-8 Top View (ESG-D Series - Options UN7, UN8)



sk762b

Top View (ESG-D Series - Option UND)

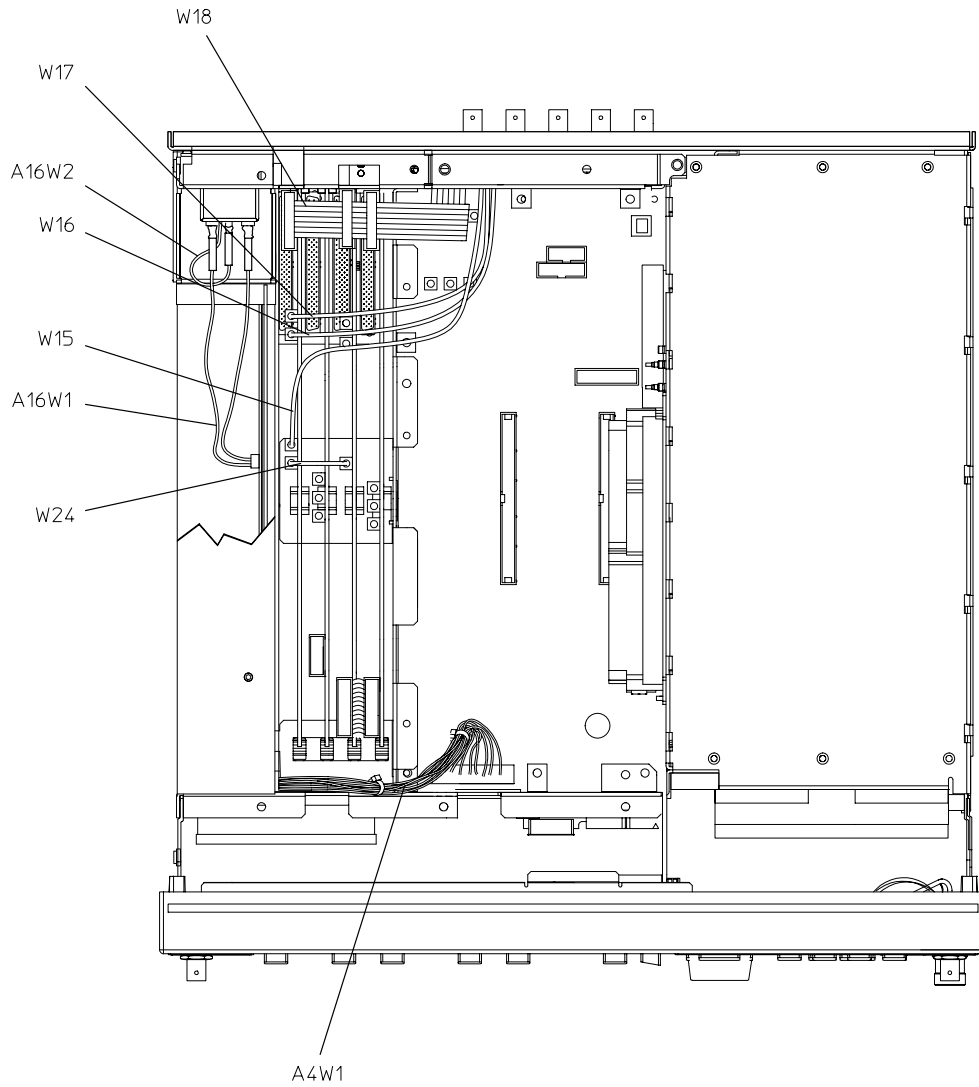
Refer to [Table 3-9](#) and [Figure 3-9](#).

Table 3-9 Top View (ESG-D Series - Option UND)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|--|
| A4W1* | (part of A4) | 1 | Power Supply (A4) to CPU/Motherboard (A14J6) |
| A16W1* | (part of A16) | 1 | Line Module (A16) to Power Supply (A4J1) |
| A16W2* | (part of A16) | 1 | Line Module (A16) to Chassis Ground Post on Rear Panel |
| W15 | 8120-5055 | 1 | Dual Arb Waveform Generator (A5) to BASEBAND GEN REF |
| W16 | 8120-5055 | 1 | Dual Arb Waveform Generator (A5) to Q OUT |
| W17 | 8120-5055 | 1 | Dual Arb Waveform Generator (A5) to I OUT |
| W18 | 8120-8458 | 1 | Rear Panel Interface Board (A17) to Dual Arb Waveform Generator (A5) |
| W18 | 8120-8457 | 1 | Rear Panel Interface Board (A17) to Data Generator (A8P2), Baseband Generator (A7P2), and Dual Arb Waveform Generator (A5) (Option UN8 - connects in three places) |
| W24 | E4400-20131 | 1 | Baseband Generator - 13 MHz (A7) to Dual Arb Waveform Generator - 13 MHz (A5) (Option UN3 or UN4) |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

Figure 3-9 Top View (ESG-D Series - Option UND)



sk79b

Top View (ESG-D Series - Options UN3/4, UN7 with 1EM)

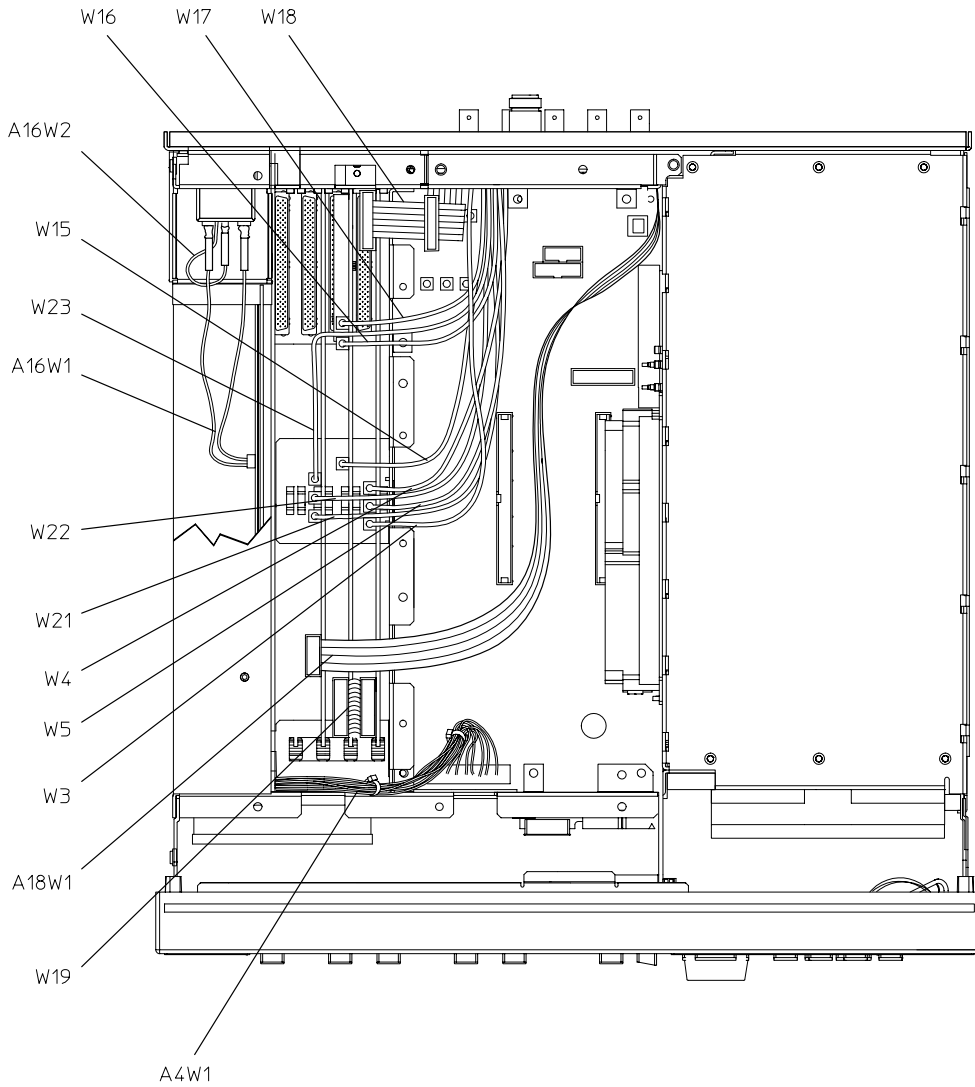
Refer to [Table 3-10](#) and [Figure 3-10](#).

Table 3-10 Top View (ESG-D Series - Options UN3/4, UN7 with 1EM)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|---|
| A4W1* | (part of A4) | 1 | Power Supply (A4) to CPU/Motherboard (A14J6) |
| A16W1* | (part of A16) | 1 | Line Module (A16) to Power Supply (A4J1) |
| A16W2* | (part of A16) | 1 | Line Module (A16) to Chassis Ground Post on Rear Panel |
| A18W1* | (part of A18) | 1 | BERT Rear Panel Interface Board (A18) to BERT (A6) (Option UN7) |
| W3 | 8120-5556 | 1 | DATA to Data Generator (A8J2) (Options UN3/4) |
| W4 | 8120-5556 | 1 | DATA CLOCK to Data Generator (A8J1) (Options UN3/4) |
| W5 | 8120-5556 | 1 | SYMBOL SYNC to Data Generator (A8J3) (Options UN3/4) |
| W15 | 8120-5556 | 1 | Baseband Generator (A7P403) to BASEBAND GENREF IN (Options UN3/4) |
| W16 | 8120-5556 | 1 | Baseband Generator (A7P404) to Q OUT (Options UN3/4) |
| W17 | 8120-5556 | 1 | Baseband Generator (A7P405) to I OUT (Options UN3/4) |
| W18 | 8120-8458 | 1 | Rear Panel Interface Board (A17) to Data Generator (A8P2) (Options UN3/4) |
| W19 | 8120-8349 | 1 | Baseband Generator (A7P300) to Data Generator (A8P3) (Options UN3/4) |
| W21 | 8120-5556 | 1 | Bit Error Rate Test Board (A6) to BER GATE IN (Option UN7) |
| W22 | 8120-5556 | 1 | Bit Error Rate Test Board (A6) to BER CLK IN (Option UN7) |
| W23 | 8120-5556 | 1 | Bit Error Rate Test Board (A6) to BER DATA IN (Option UN7) |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

Figure 3-10 Top View (ESG-D Series - Options UN3/4, UN7 with 1EM)



sk710b

Top View (ESG-D Series - Options UN7, UN8 with 1EM)

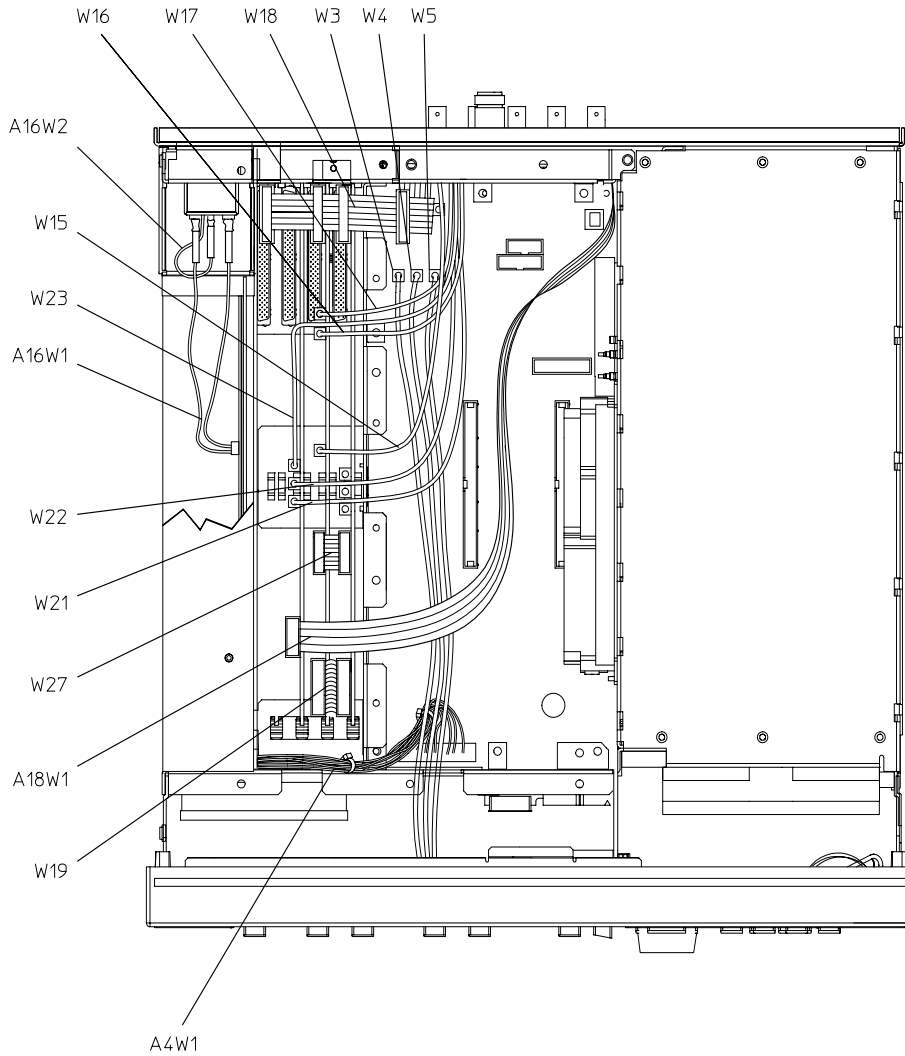
Refer to [Table 3-11](#) and [Figure 3-11](#).

Table 3-11 Top View (ESG-D Series - Options UN7, UN8 with 1EM)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|---|
| A4W1* | (part of A4) | 1 | Power Supply (A4) to CPU/Motherboard (A14J6) |
| A16W1* | (part of A16) | 1 | Line Module (A16) to Power Supply (A4J1) |
| A16W2* | (part of A16) | 1 | Line Module (A16) to Chassis Ground Post on Rear Panel |
| A18W1* | (part of A18) | 1 | BERT Rear Panel Interface Board (A18) to BERT (A6) (Option UN7) |
| W3 | 8120-5556 | 1 | DATA to Data Generator (A8J2) (Option UN8) |
| W4 | 8120-5556 | 1 | DATA CLOCK to Data Generator (A8J1) (Option UN8) |
| W5 | 8120-5556 | 1 | SYMBOL SYNC to Data Generator (A8J3) (Option UN8) |
| W15 | 8120-5556 | 1 | Baseband Generator (A7P403) to BASEBAND GENREF IN (Option UN8) |
| W16 | 8120-5556 | 1 | Baseband Generator (A7P404) to Q OUT (Option UN8) |
| W17 | 8120-5556 | 1 | Baseband Generator (A7P405) to I OUT (Option UN8) |
| W18 | 8120-8457 | 1 | Rear Panel Interface Board (A17) to Data Generator (A8P2) and Baseband Generator (A7P2) (Option UN8 - connects in three places) |
| W19 | 8120-8349 | 1 | Baseband Generator (A7P300) to Data Generator (A8P3) (Option UN8) |
| W21 | 8120-5556 | 1 | Bit Error Rate Test Board (A6) to BER GATE IN (Option UN7) |
| W22 | 8120-5556 | 1 | Bit Error Rate Test Board (A6) to BER CLK IN (Option UN7) |
| W23 | 8120-5556 | 1 | Bit Error Rate Test Board (A6) to BER DATA IN (Option UN7) |
| W27 | 8120-8725 | 1 | 16-Pin Ribbon Cable, Parallel Data In, Data Generator (A8) to Baseband Generator (A7) |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

Figure 3-11 Top View (ESG-D Series - Options UN7, UN8 with 1EM)



sk7116b

Top View (ESG-D Series - Options UN7, UN8, UND)

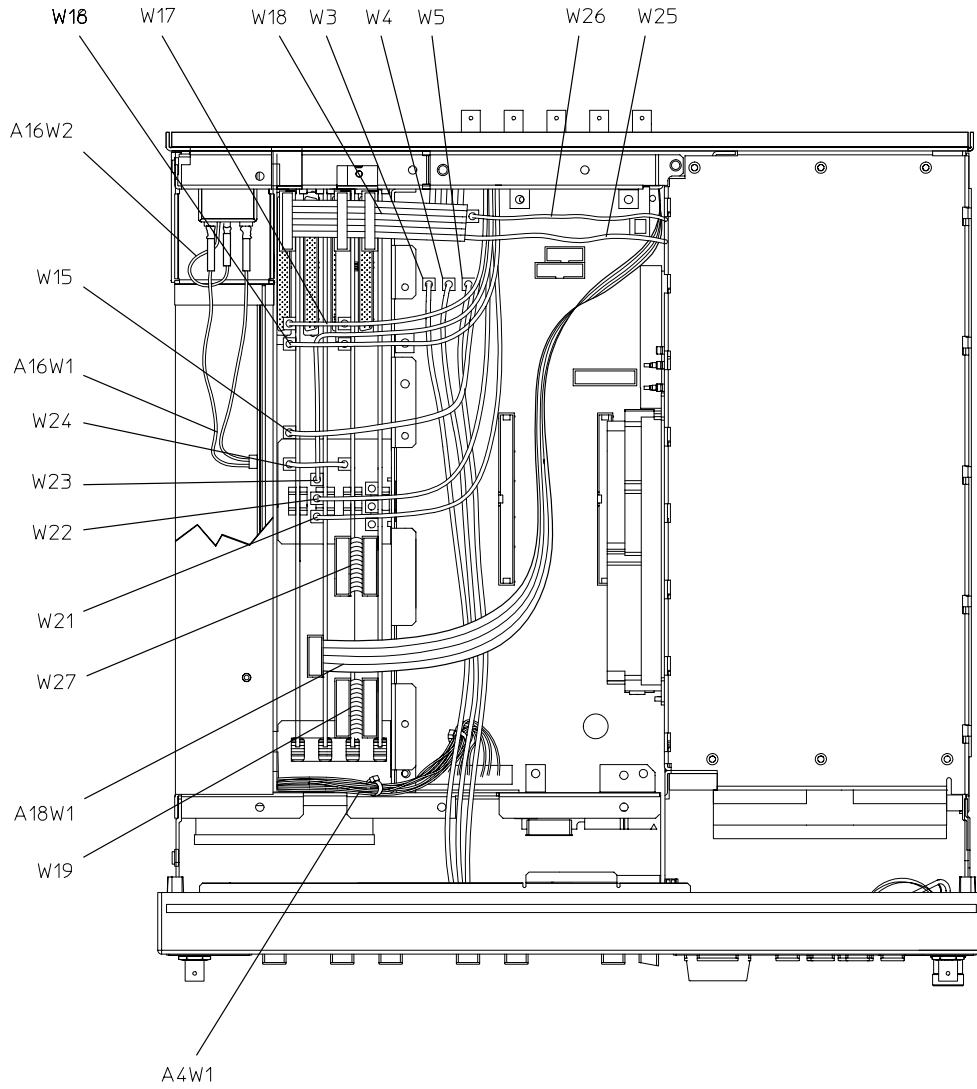
Refer to [Table 3-12](#) and [Figure 3-12](#).

Table 3-12 Top View (ESG-D Series - Options UN7, UN8, UND)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|---|
| A4W1* | (part of A4) | 1 | Power Supply (A4) to CPU/Motherboard (A14J6) |
| A16W1* | (part of A16) | 1 | Line Module (A16) to Power Supply (A4J1) |
| A16W2* | (part of A16) | 1 | Line Module (A16) to Chassis Ground Post on Rear Panel |
| A18W1* | (part of A18) | 1 | BERT Rear Panel Interface Board (A18) to BERT (A6) (Option UN7) |
| W3 | 8120-5556 | 1 | DATA to Data Generator (A8J2) (Option UN8) |
| W4 | 8120-5556 | 1 | DATA CLOCK to Data Generator (A8J1) (Option UN8) |
| W5 | 8120-5556 | 1 | SYMBOL SYNC to Data Generator (A8J3) (Option UN8) |
| W15 | 8120-5556 | 1 | Baseband Generator (A7P403) to BASEBAND GENREF IN (Option UN8) |
| W16 | 8120-5556 | 1 | Baseband Generator (A7P404) to Q OUT (Option UN8) |
| W17 | 8120-5556 | 1 | Baseband Generator (A7P405) to I OUT (Option UN8) |
| W18 | 8120-8457 | 1 | Rear Panel Interface Board (A17) to Data Generator (A8P2) and Baseband Generator (A7P2) (Option UN8 - connects in three places) |
| W19 | 8120-8349 | 1 | Baseband Generator (A7P300) to Data Generator (A8P3) (Option UN8) |
| W21 | 8120-5556 | 1 | Bit Error Rate Test Board (A6) to BER GATE IN (Option UN7) |
| W22 | 8120-5556 | 1 | Bit Error Rate Test Board (A6) to BER CLK IN (Option UN7) |
| W23 | 8120-5556 | 1 | Bit Error Rate Test Board (A6) to BER DATA IN (Option UN7) |
| W24 | E4400-20131 | 1 | Baseband Generator-13 MHz (A7) to Dual Arb Waveform Generator - 13 MHz (A5) (Option UN3 or UN4) |
| W25 | 8120-8748 | 1 | Motherboard (A14P103) to Daughterboard - Q INT (A15J8) |
| W26 | 8120-8748 | 1 | Motherboard (A14P102) to Daughterboard - I INT (A15J9) |
| W27 | 8120-8725 | 1 | 16-Pin Ribbon Cable, Parallel Data In, Data Generator (A8) to Baseband Generator (A7) |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

Figure 3-12 Top View (ESG-D Series - Options UN7, UN8, UND)



sk7160b

Top View (ESG-D Series - Option UND with 1EM)

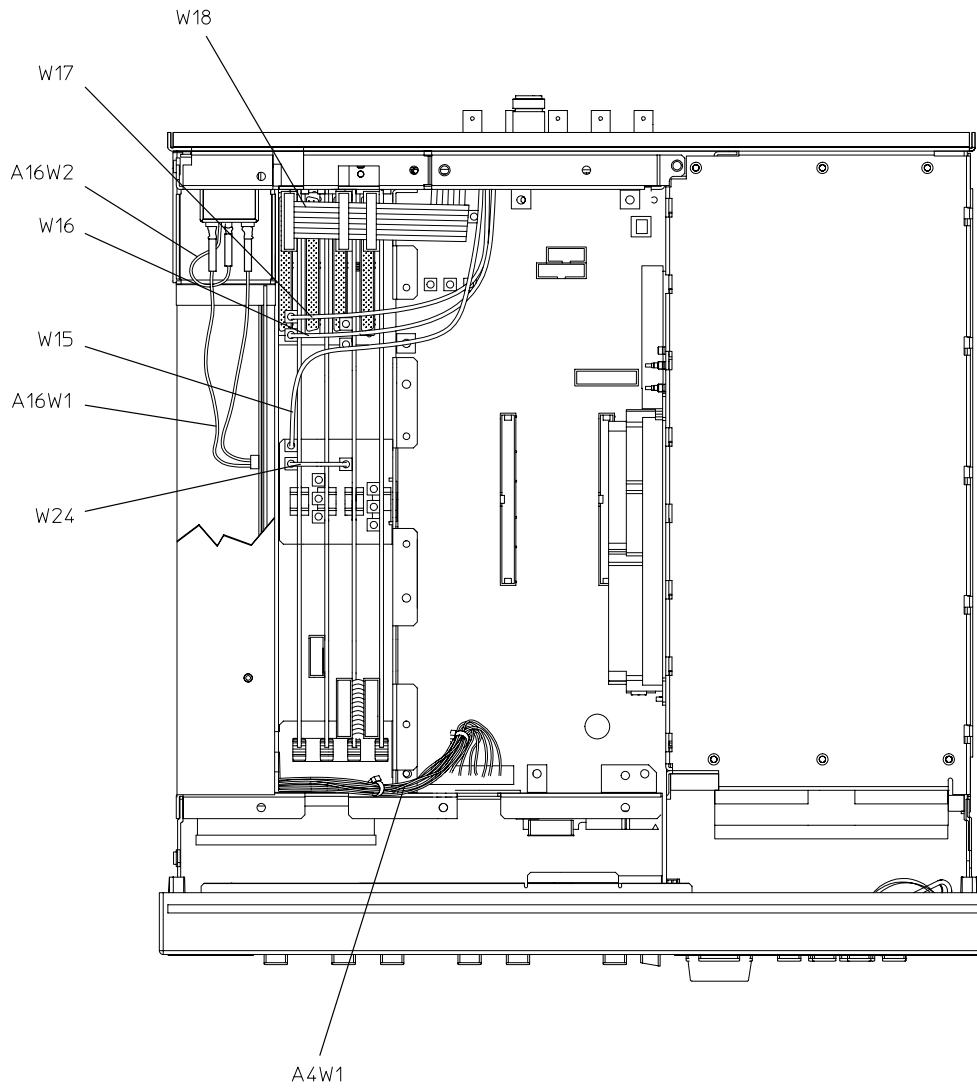
Refer to [Table 3-13](#) and [Figure 3-13](#).

Table 3-13 Top View (ESG-D Series - Option UND with 1EM)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|---|
| A4W1* | (part of A4) | 1 | Power Supply (A4) to CPU/Motherboard (A14J6) |
| A16W1* | (part of A16) | 1 | Line Module (A16) to Power Supply (A4J1) |
| A16W2* | (part of A16) | 1 | Line Module (A16) to Chassis Ground Post on Rear Panel |
| W15 | 8120-5556 | 1 | Dual Arb Waveform Generator (A5) to BASEBAND GENREF IN |
| W16 | 8120-5556 | 1 | Dual Arb Waveform Generator (A5) to Q OUT |
| W17 | 8120-5556 | 1 | Dual Arb Waveform Generator (A5) to I OUT |
| W18 | 8120-8458 | 1 | Rear Panel Interface Board (A7) to Dual Arb Waveform Generator (A5) |
| | 8120-8457 | 1 | Rear Panel Interface Board (A17) to Data Generator (A8P2), Baseband Generator (A7P2), and Dual Arb Waveform Generator (A5) (Option UN8 - connects in four places) |
| W24 | E4400-20131 | 1 | Baseband Generator - 13 MHz (A7) to Dual Arb Waveform Generator - 13 MHz (A5) (Option UN3 or UN4) |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

Figure 3-13 Top View (ESG-D Series - Option UND with 1EM)



sk711b

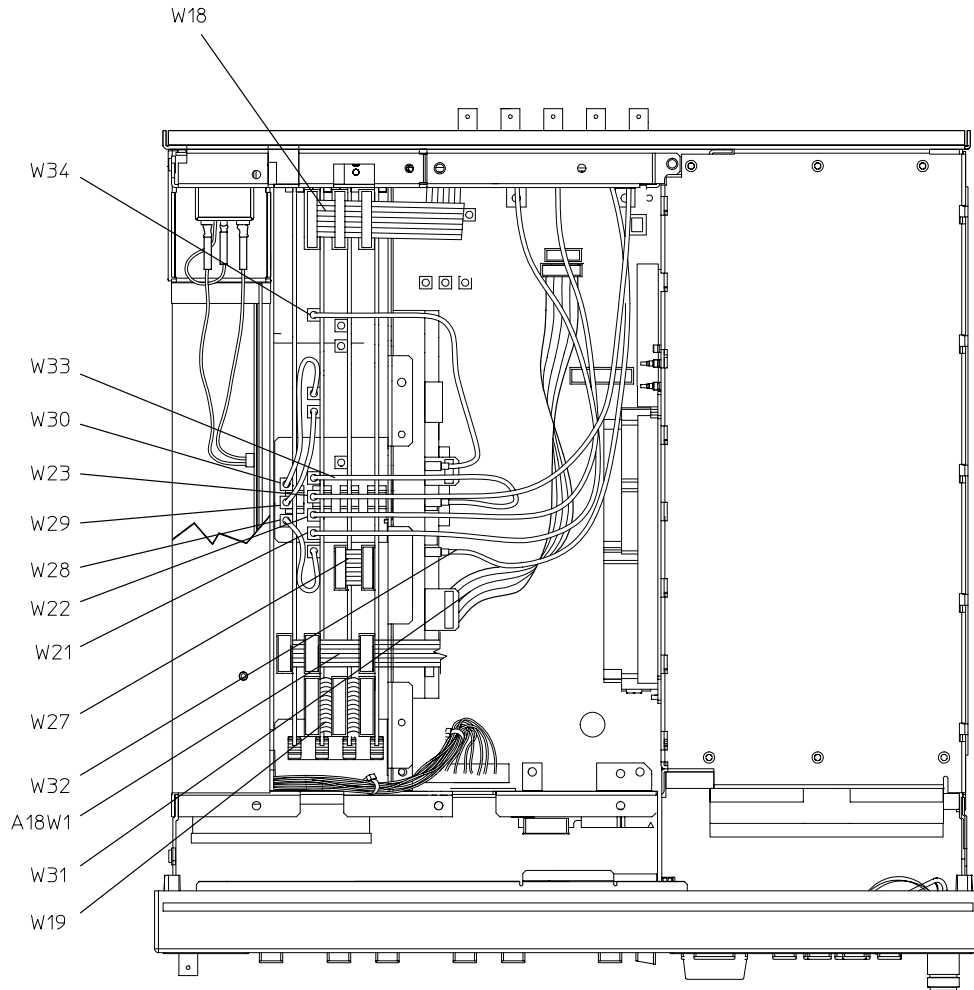
Top View (ESG-D Series - Option 300)

Refer to [Table 3-14](#) and [Figure 3-14](#).

Table 3-14 Top View (ESG-D Series - Option 300)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|--|
| W18 | 8121-0042 | 1 | 16-Pin Ribbon Cable, Rear Panel I/O, Rear Panel Interface Board (A17) to Data Generator (A8), Baseband Generator (A7), and Demodulator (A21) (connects in four places) |
| W19 | 8121-0040 | 1 | 24-Pin Ribbon Cable, BBG I/O, Data Generator (A8) to Demodulator (A21) |
| W21 | 8120-5055 | 1 | Flexible Cable, BER GATE IN (RP) to Demodulator (A21) |
| W22 | 8120-5055 | 1 | Flexible Cable, BER CLK IN (RP) to Demodulator (A21) |
| W23 | 8120-5055 | 1 | Flexible Cable, BER DATA IN (RP) to Demodulator (A21) |
| W27 | 8120-8725 | 1 | 16-Pin Ribbon Cable, Parallel Data In, Data Generator (A8) to Baseband Generator (A7) |
| W28 | 8120-5206 | 1 | Flexible Cable, BERT (A6, BER Gate In) to Demodulator (A21) |
| W29 | 8121-0045 | 1 | Flexible Cable, BERT (A6, BER Clk In) to Demodulator (A21) |
| W30 | 8120-5014 | 1 | Flexible Cable, BERT (A6, BER Data In) to Demodulator (A21) |
| W31 | 8120-8789 | 1 | Ribbon Cable, Motherboard (A14J26) to A20 Down Convertor |
| W32 | 8121-0044 | 1 | Flexible Cable, 321.4 MHZ IN (RP) to A20 Down Convertor |
| W33 | 8121-0043 | 1 | Flexible Cable, Down Convertor (A20, 26 MHz) to Demodulator (A21, Freq Ref 26 MHz) |
| W34 | 8121-0043 | 1 | Flexible Cable, Down Convertor (A20, IF In) to Demodulator (A21, IF In) |
| A18W1 | (part of A18) | 1 | 10-Pin Ribbon Cable, BER Status, BERT Rear Panel Interface (A18) to Data Generator (A8), Baseband Generator (A7), and BERT (A6) |

Figure 3-14 Top View (ESG-D Series - Option 300)



sk797b

Inside Front Panel View

Refer to [Table 3-15](#) and [Figure 3-15](#).

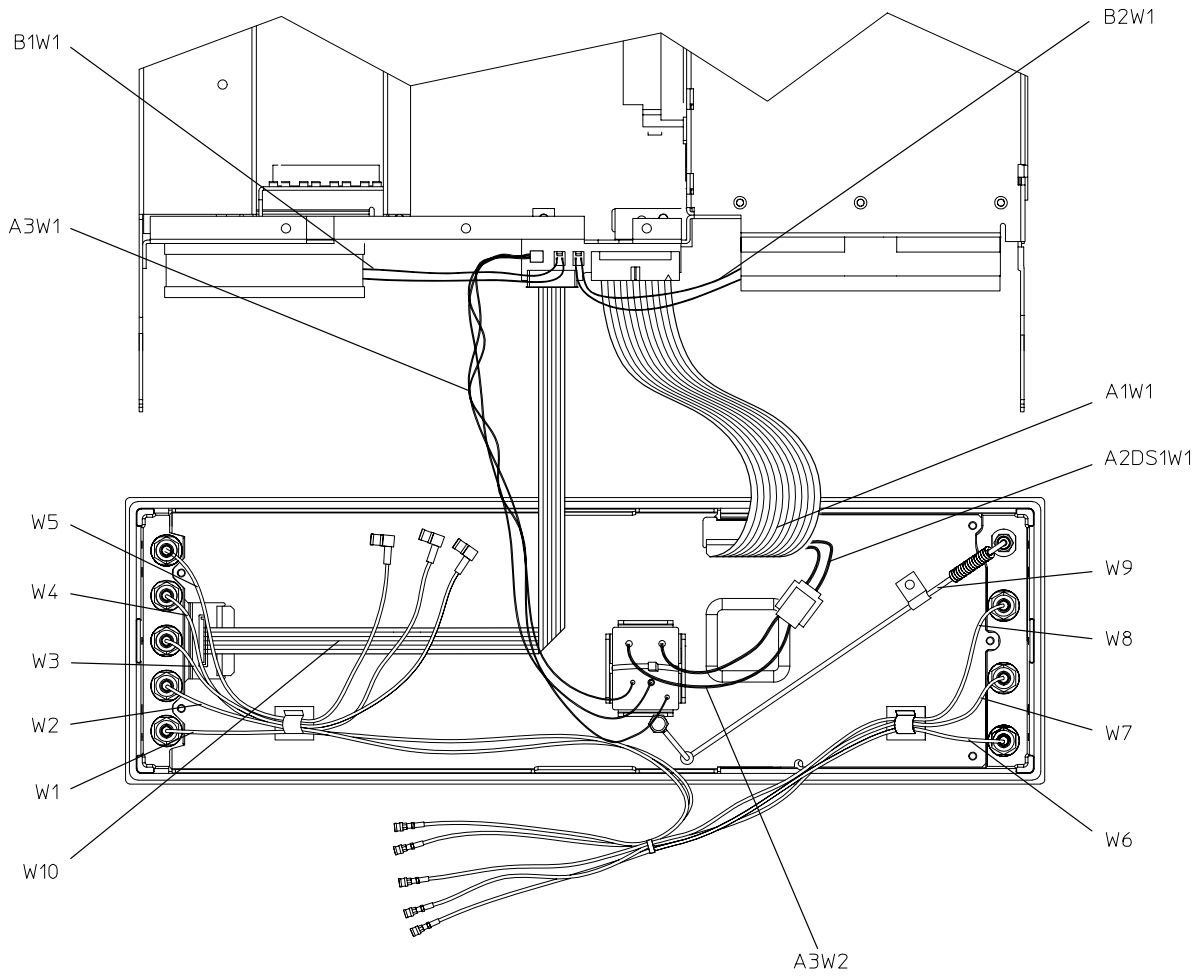
Table 3-15 Inside Front Panel View

| Reference Designator | Part Number | Qty | Description |
|----------------------|-----------------|-----|---|
| A1W1* | (part of A1) | 1 | Front Panel Board (A1) to CPU/Motherboard (A14J20) |
| A2DS1W1* | (part of A2DS1) | 1 | Florescent Lamp (A2DS1) to A3W2 |
| A3W1* | (part of A3) | 1 | Inverter (A3) to CPU/Motherboard (A14J19) |
| A3W2* | (part of A3) | 1 | Inverter (A3) to A2DS1W1 |
| B1W1* | (part of B1) | 1 | Small Fan (B1) to CPU/Motherboard (A14J16) |
| B2W1* | (part of B2) | 1 | Large Fan (B2) to CPU/Motherboard (A14J17) |
| W1 | 8120-6758 | 1 | I IN to Daughterboard (A15J2) |
| W2 | 8120-6758 | 1 | Q IN to Daughterboard (A15J3) |
| W3 | 8120-5063 | 1 | DATA to Baseband Generator (A7P100) (Options UN3/4) |
| W4 | 8120-5063 | 1 | DATA CLOCK to Baseband Generator (A7P103) (Options UN3/4) |
| W5 | 8120-5063 | 1 | SYMBOL SYNC to Baseband Generator (A7P101) (Options UN3/4) |
| W6 | 8120-6758 | 1 | EXT 1 to Daughterboard (A15J4) |
| W7 | 8120-6758 | 1 | EXT 2 to Daughterboard (A15J5) |
| W8 | 8120-6758 | 1 | LF OUTPUT to Daughterboard (A15J6) |
| W9 | E4400-20018 | 1 | RF OUTPUT to Electronic Attenuator/RPP (AT1) |
| | E4400-20125 | 1 | RF OUTPUT to RPP (AT1) (Option 1EM, UNB) |
| W10 | 8120-6759 | 1 | Display (A2) to CPU/Motherboard (A14J21) |
| W47 | 8120-8783 | 1 | Flexible Cable, PULSE IN (FP) to Pulse Modulator (A25) (Option 1E6 - not shown) |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

NOTE Figure 3-15 shows an ESG-D series front panel having options UN3/4 or UN8. On a standard ESG-D series front panel, W3, W4, and W5 do not exist and the front panel connectors for W1 and W2 will be in a slightly different location. An ESG-A series front panel does not include W1 through W5, but will include W47 with Option 1E6 (not shown). All models having Option 1EM do not have W1 through W9 on the front panel.

Figure 3-15 Inside Front Panel View



sk7146b

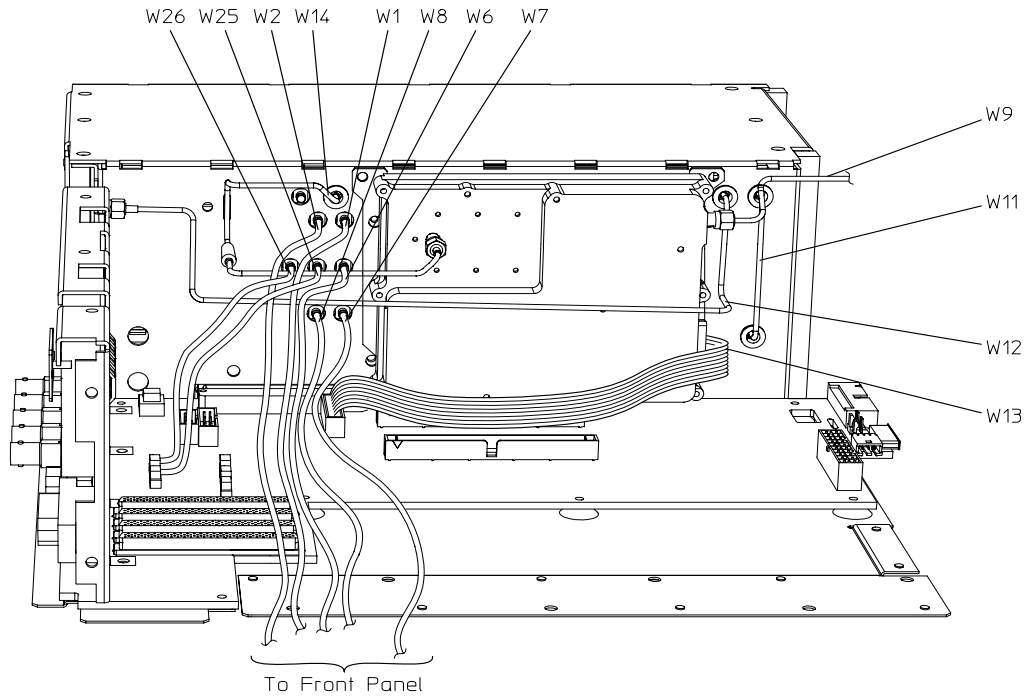
Electronic Attenuator/RPP View

Refer to [Table 3-16](#) and [Figure 3-16](#).

Table 3-16 Electronic Attenuator/RPP View

| Reference Designator | Part Number | Qty | Description |
|----------------------|-------------|-----|--|
| W1 | 8120-6758 | 1 | I IN to Daughterboard (A15J2) |
| W2 | 8120-6758 | 1 | Q IN to Daughterboard (A15J3) |
| W6 | 8120-6758 | 1 | EXT 1 to Daughterboard (A15J4) |
| W7 | 8120-6758 | 1 | EXT 2 to Daughterboard (A15J5) |
| W8 | 8120-6758 | 1 | LF OUTPUT to Daughterboard (A15J6) |
| W9 | E4400-20018 | 1 | RF OUTPUT to Electronic Attenuator/RPP (AT1) |
| W11 | E4400-60059 | 1 | Output Board (A9) to Synthesizer/Doubler Board (A12) (includes cable retainer and ring) |
| W12 | E4400-60060 | 1 | Output Board (A9) to COHERENT CARRIER (includes cable retainer and ring) |
| W13 | 8120-6837 | 1 | Electronic Attenuator/RPP (AT1) to CPU/Motherboard (A14J14) |
| W14 | E4400-60061 | 1 | Electronic Attenuator/RPP (AT1) to Output Board (A9) (includes cable retainer and ring) used with the E4400-60007, E4400-60042, and E4400-60205 attenuators. |
| | E4400-60726 | 1 | Electronic Attenuator/RPP (AT1) to Output Board (A9) (includes cable retainer and ring) usedj with the E4400-60680 attenuator. |
| W25 | 8120-8748 | 1 | Motherboard (A14P103) to Daughterboard - Q INT (A15J8) |
| W26 | 8120-8748 | 1 | Motherboard (A14P102) to Daughterboard - I INT (A15J9) |

Figure 3-16 Electronic Attenuator/RPP View



sk712b

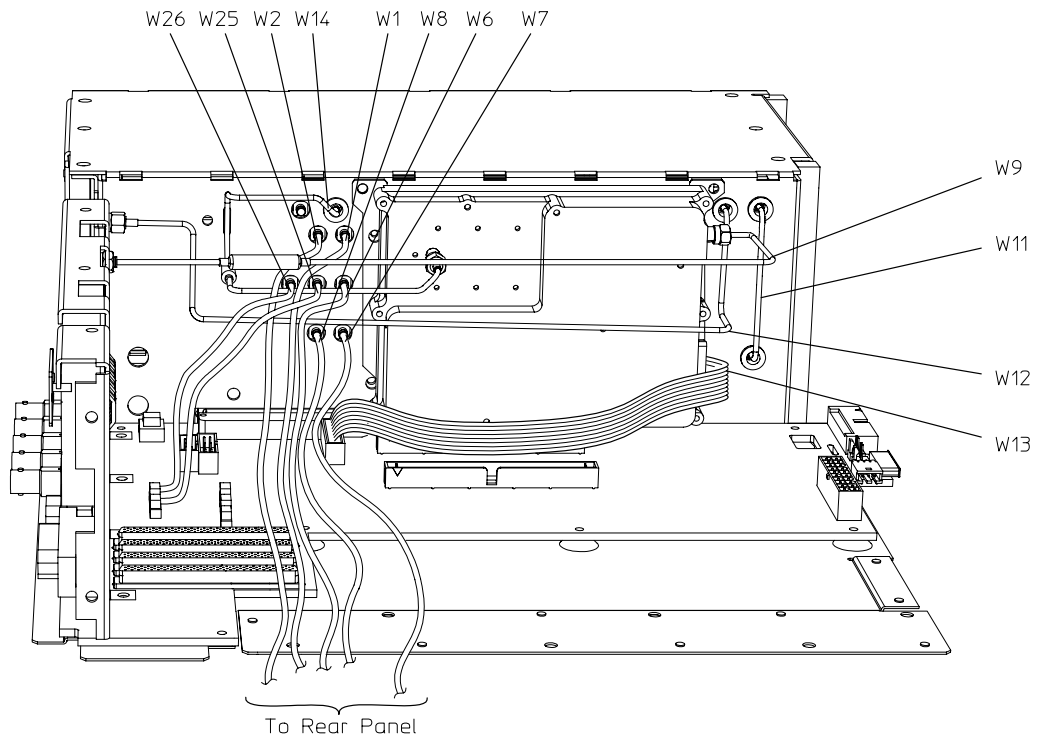
Electronic Attenuator/RPP View (with Option 1EM)

Refer to [Table 3-17](#) and [Figure 3-17](#).

Table 3-17 Electronic Attenuator/RPP View (with Option 1EM)

| Reference Designator | Part Number | Qty | Description |
|----------------------|-------------|-----|--|
| W1 | 8120-6839 | 1 | I IN to Daughterboard (A15J2) |
| W2 | 8120-6839 | 1 | Q IN to Daughterboard (A15J3) |
| W6 | 8120-6839 | 1 | EXT 1 to Daughterboard (A15J4) |
| W7 | 8120-6839 | 1 | EXT 2 to Daughterboard (A15J5) |
| W8 | 8120-6839 | 1 | LF OUTPUT to Daughterboard (A15J6) |
| W9 | E4400-20025 | 1 | RF OUTPUT to Electronic Attenuator/RPP (AT1) |
| W11 | E4400-60059 | 1 | Output Board (A9) to Synthesizer/Doubler Board (A12) (includes cable retainer and ring) |
| W12 | E4400-60060 | 1 | Output Board (A9) to COHERENT CARRIER (includes cable retainer and ring) |
| W13 | 8120-6837 | 1 | Electronic Attenuator/RPP (AT1) to CPU/Motherboard (A14J14) |
| W14 | E4400-60061 | 1 | Electronic Attenuator/RPP (AT1) to Output Board (A9) (includes cable retainer and ring) used with the E4400-60007, E4400-60042, and E4400-60205 attenuators. |
| W14 | E4400-60726 | 1 | Electronic Attenuator/RPP (AT1) to Output Board (A9) (includes cable retainer and ring) used with the E4400-60680 attenuator. |
| W25 | 8120-8748 | 1 | Motherboard (A14P103) to Daughterboard - Q INT (A15J8) |
| W26 | 8120-8748 | 1 | Motherboard (A14P102) to Daughterboard - I INT (A15J9) |

Figure 3-17 Electronic Attenuator/RPP View (with Option 1EM)



sk713b

Mechanical Attenuator View (Option UNB)

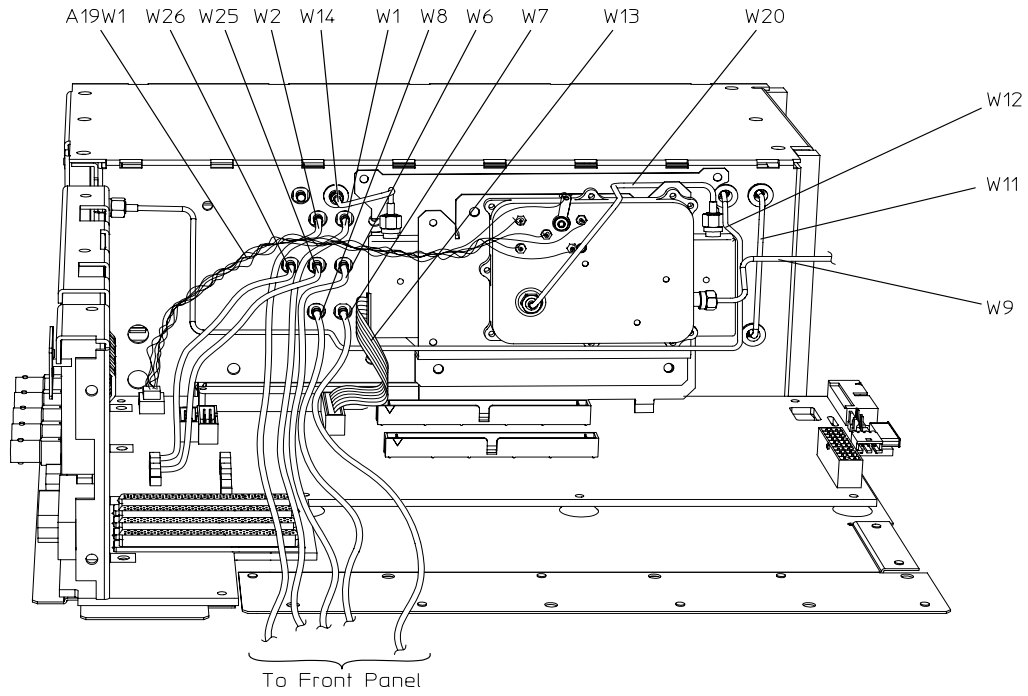
Refer to [Table 3-18](#) and [Figure 3-18](#).

Table 3-18 Mechanical Attenuator View (Option UNB)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|---|
| A19W1* | (part of A19) | 1 | RPP (A19) to Motherboard (A14J15) |
| W1 | 8120-6839 | 1 | I IN to Daughterboard (A15J2) |
| W2 | 8120-6839 | 1 | Q IN to Daughterboard (A15J3) |
| W6 | 8120-6758 | 1 | EXT 1 to Daughterboard (A15J4) |
| W7 | 8120-6758 | 1 | EXT 2 to Daughterboard (A15J5) |
| W8 | 8120-6758 | 1 | LF OUTPUT to Daughterboard (A15J6) |
| W9 | E4400-20125 | 1 | RF OUTPUT to RPP (A19) |
| W11 | E4400-60059 | 1 | Output Board (A9) to Synthesizer/Doubler Board (A12) (includes cable retainer and ring) |
| W12 | E4400-60176 | 1 | Output Board (A9) to COHERENT CARRIER (includes cable retainer and ring) |
| W13 | E4400-20132 | 1 | Mechanical Attenuator (AT1) to CPU/Motherboard (A14J14) |
| W14 | E4400-60177 | 1 | Mechanical Attenuator (AT1) to Output Board (A9) (includes cable retainer and ring) |
| W20 | E4400-20126 | 1 | Mechanical Attenuator (AT1) to RPP (A19) |
| W25 | 8120-8748 | 1 | Motherboard (A14P103) to Daughterboard - Q INT (A15J8) |
| W26 | 8120-8748 | 1 | Motherboard (A14P102) to Daughterboard - I INT (A15J9) |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

Figure 3-18 Mechanical Attenuator View (Option UNB)



sk715b

Mechanical Attenuator View (Option UNB with 1EM)

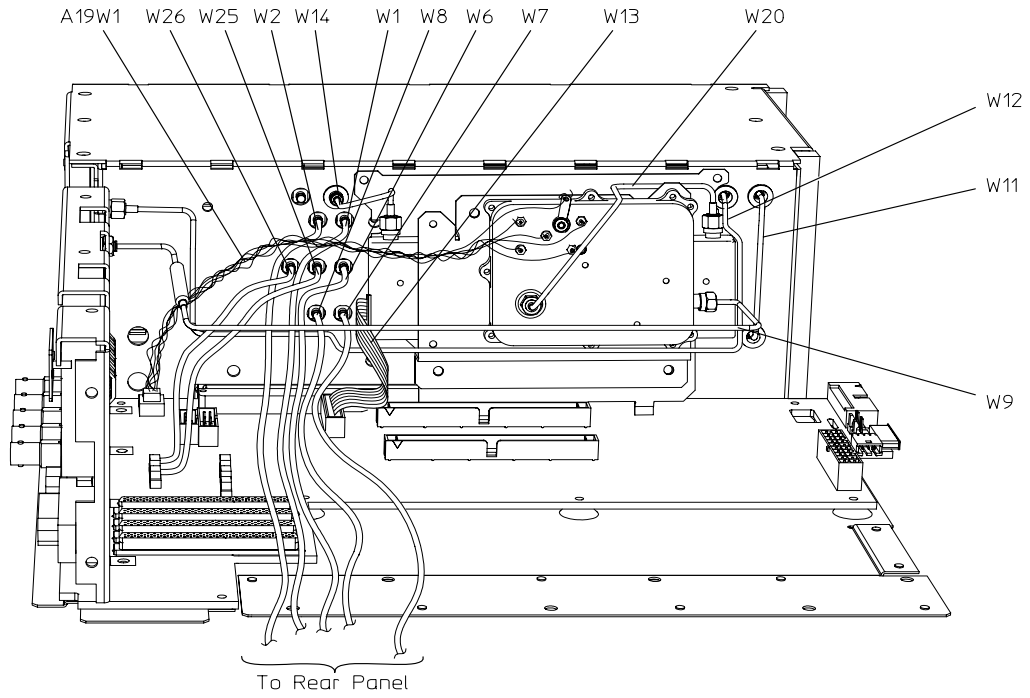
Refer to [Table 3-19](#) and [Figure 3-19](#).

Table 3-19 Mechanical Attenuator View (Option UNB with 1EM)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|---|
| A19W1* | (part of A19) | 1 | RPP (A19) to Motherboard (A14J15) |
| W1 | 8120-6839 | 1 | I IN to Daughterboard (A15J2) |
| W2 | 8120-6839 | 1 | Q IN to Daughterboard (A15J3) |
| W6 | 8120-6839 | 1 | EXT 1 to Daughterboard (A15J4) |
| W7 | 8120-6839 | 1 | EXT 2 to Daughterboard (A15J5) |
| W8 | 8120-6839 | 1 | LF OUTPUT to Daughterboard (A15J6) |
| W9 | E4400-20143 | 1 | RF OUTPUT to RPP (A19) |
| W11 | E4400-60059 | 1 | Output Board (A9) to Synthesizer/Doubler Board (A12) (includes cable retainer and ring) |
| W12 | E4400-60176 | 1 | Output Board (A9) to COHERENT CARRIER (includes cable retainer and ring) |
| W13 | E4400-20132 | 1 | Mechanical Attenuator (AT1) to CPU/Motherboard (A14J14) |
| W14 | E4400-60177 | 1 | Mechanical Attenuator (AT1) to Output Board (A9) (includes cable retainer and ring) |
| W20 | E4400-20126 | 1 | Mechanical Attenuator (AT1) to RPP (A19) |
| W25 | 8120-8748 | 1 | Motherboard (A14P103) to Daughterboard - Q INT (A15) |
| W26 | 8120-8748 | 1 | Motherboard (A14P102) to Daughterboard - I INT (A15) |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

Figure 3-19 Mechanical Attenuator View (Option UNB with 1EM)



sk714b

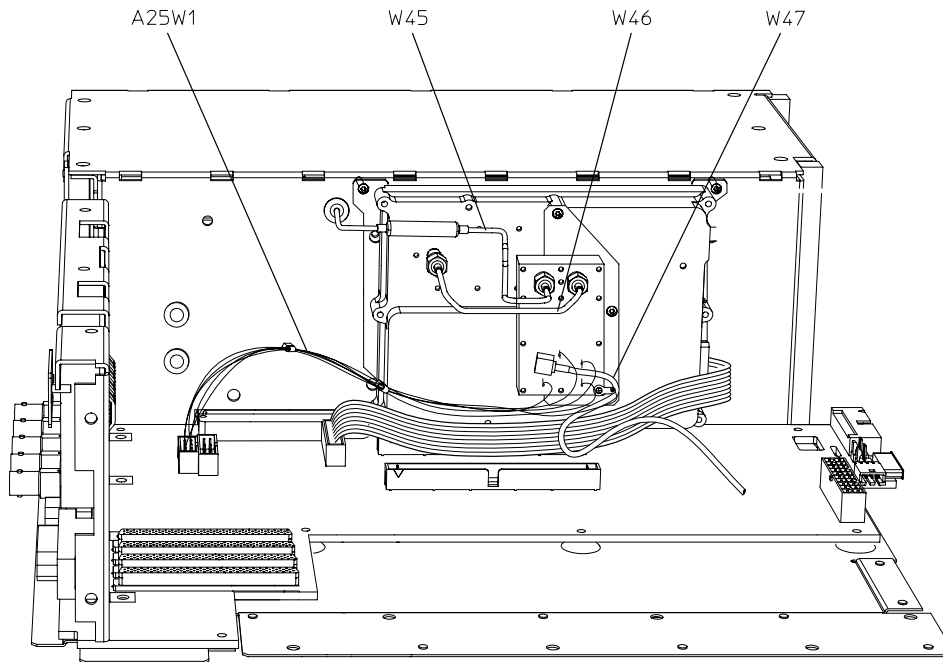
Pulse Modulator View (Option 1E6)

Refer to [Table 3-20](#) and [Figure 3-20](#).

Table 3-20 Pulse Modulator View (Option 1E6)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|---|
| A25W1 | (part of A25) | 1 | Wire Harness, Pulse Modulator (A25) to Motherboard (A14) |
| W45 | E4423-20017 | 1 | Semi-Rigid Cable, Output (A9) to Pulse Modulator (A25) |
| | E4423-20012 | 1 | Semi-Rigid Cable, Output (A9) to Pulse Modulator (A25) (Option UNB - not shown) |
| W46 | E4423-20014 | 1 | Semi-Rigid Cable, Electronic Attenuator (AT1) to Pulse Modulator (A25) used with the E4400-60007, E4400-60042, and E4400-60205 attenuators. |
| | E4423-20726 | 1 | Semi-Rigid Cable, Electronic Attenuator (AT1) to Pulse Modulator (A25) used with the E4400-60680 attenuator. |
| | E4423-20011 | 1 | Semi-Rigid Cable, Mechanical Attenuator (AT1) to Pulse Modulator (A25) (Option UNB - not shown) |
| W47 | 8120-8783 | 1 | Flexible Cable, PULSE IN (FP) to Pulse Modulator (A25) |
| | 8120-8787 | 1 | Flexible Cable, PULSE IN (RP) to Pulse Modulator (A25) (Option 1EM) |

Figure 3-20 Pulse Modulator View (Option 1E6)



sk7139b

Hardware and Other Instrument Parts

This section lists part numbers for hardware and other parts in your signal generator. The following instrument views are provided to help you locate specific parts.

- “Top View” on page 3-46
- “Downconverter View (Option 300)” on page 3-48
- “Disassembled Mechanical Attenuator View (Option UNB)” on page 3-49
- “Disassembled Pulse Modulator View (Option 1E6)” on page 3-50
- “Disassembled Pulse Modulator View (Option 1E6/UNB)” on page 3-51
- “Front Panel View (ESG-A Series)” on page 3-52
- “Front Panel View (ESG-D Series)” on page 3-54
- “Disassembled Front-Panel View” on page 3-56
- “Daughterboard Card Cage View” on page 3-58
- “Inside Rear-Panel View” on page 3-59
- “Rear-Panel View (ESG-A Series)” on page 3-60
- “Rear-Panel View (ESG-A Series - Option 1EM)” on page 3-62
- “Rear-Panel View (ESG-D Series)” on page 3-64
- “Rear Panel View (ESG-D Series - Option 1EM)” on page 3-66
- “Instrument Chassis with Top and Right-Side Hardware” on page 3-68
- “Power Supply Shield and Left-Side Hardware” on page 3-70
- “Motherboard and Bottom-Side Hardware” on page 3-71
- “Instrument Cover and Associated Parts” on page 3-72

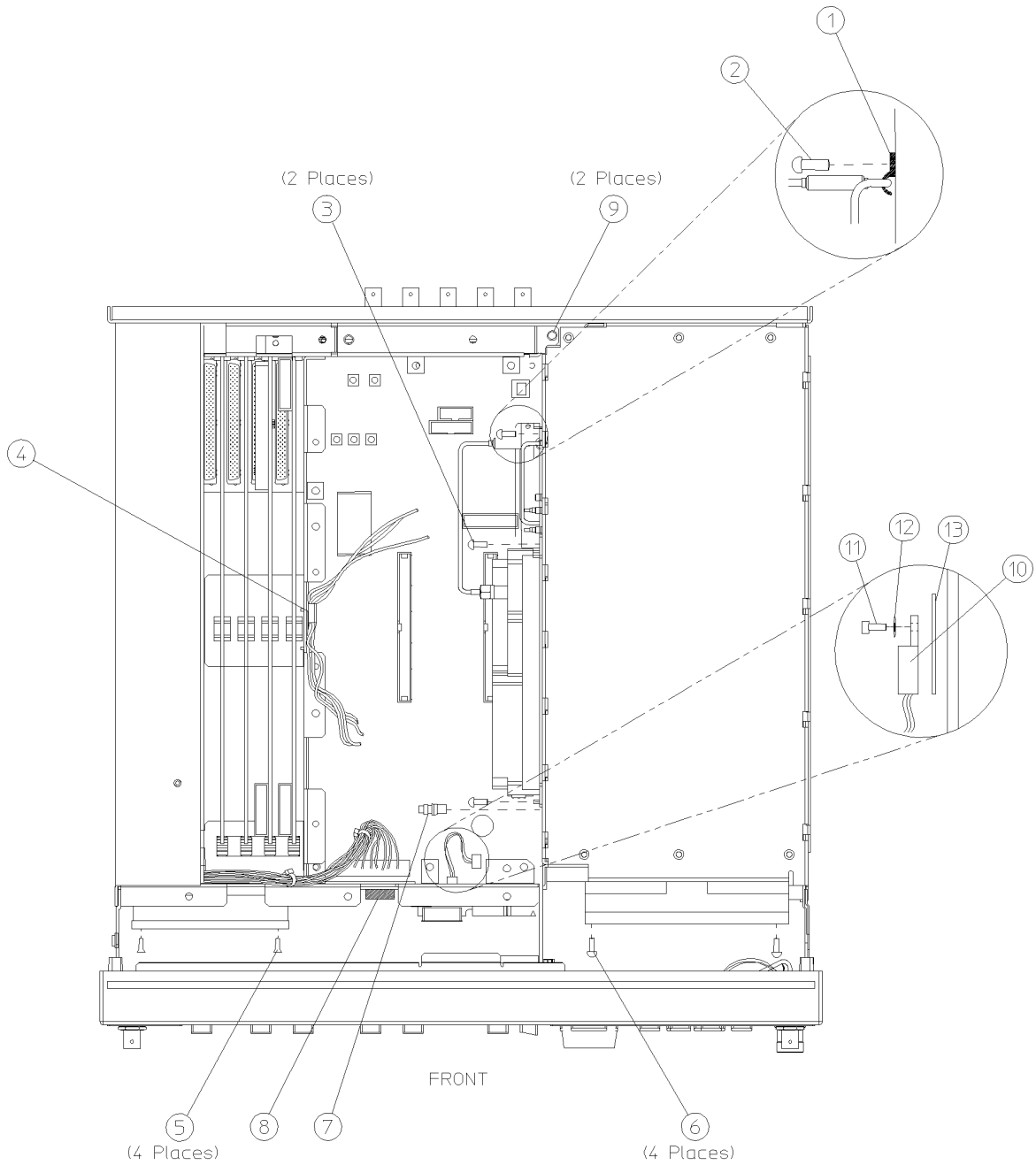
Top View

Refer to [Table 3-21](#) and [Figure 3-21](#).

Table 3-21 Top View

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|--|
| 1 | 1400-0054 | 1 | Clamp-Semi-Rigid Cable (W14) |
| 2 | 0515-0372 | 1 | Screw-Machine M3x8 CW-PN-TX |
| 3 | 0515-0430 | 2 | Screw-Machine M3x6 CW-PN-TX |
| 4 | 1400-1594 | 1 | Clamp-Flexible Cables (not used on Option 1EM) |
| 5 | 0361-1341 | 4 | Rivet-Plastic |
| 6 | 0515-0374 | 4 | Screw-Machine M3x10 CW-PN-TX |
| 7 | E4400-20041 | 1 | Shield Cap |
| 8 | 0400-0001 | 1 | Grommet Round .562ID |
| 9 | 0515-1521 | 2 | Screw-Machine M3x5 FL-TX |
| 10 | E4400-60221 | 1 | A14Q501 Transistor Assembly |
| 11 | 0515-0374 | 1 | Screw-Machine M3x10 CW-PN-TX |
| 12 | 0340-1162 | 1 | Bushing, Insulator 0.119 ID |
| 13 | 0340-0614 | 1 | Insulator Pad, Transistor TO-220 |

Figure 3-21 Top View



sk7103b

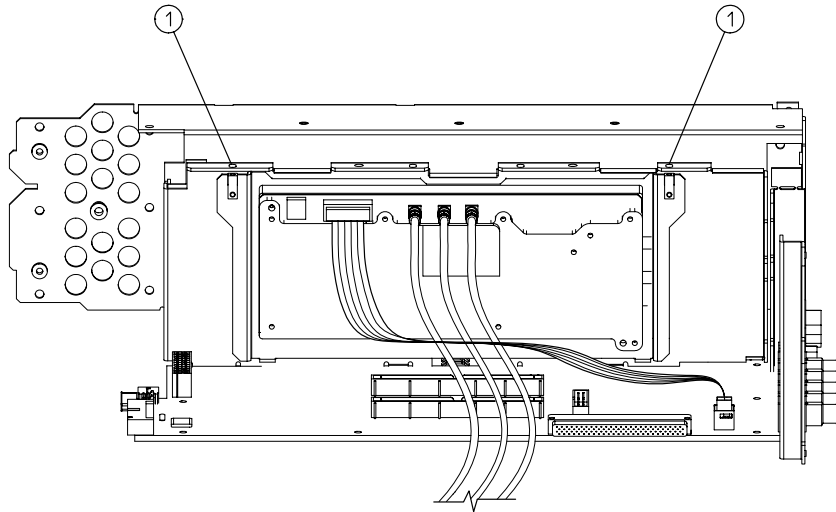
Downconverter View (Option 300)

Refer to [Table 3-22](#) and [Figure 3-22](#).

Table 3-22 Downconverter View

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|-----------------------------|
| 1 | 0515-0372 | 2 | Screw-Machine M3x8 CW-PN-TX |

Figure 3-22 Downconverter View



sk7150b

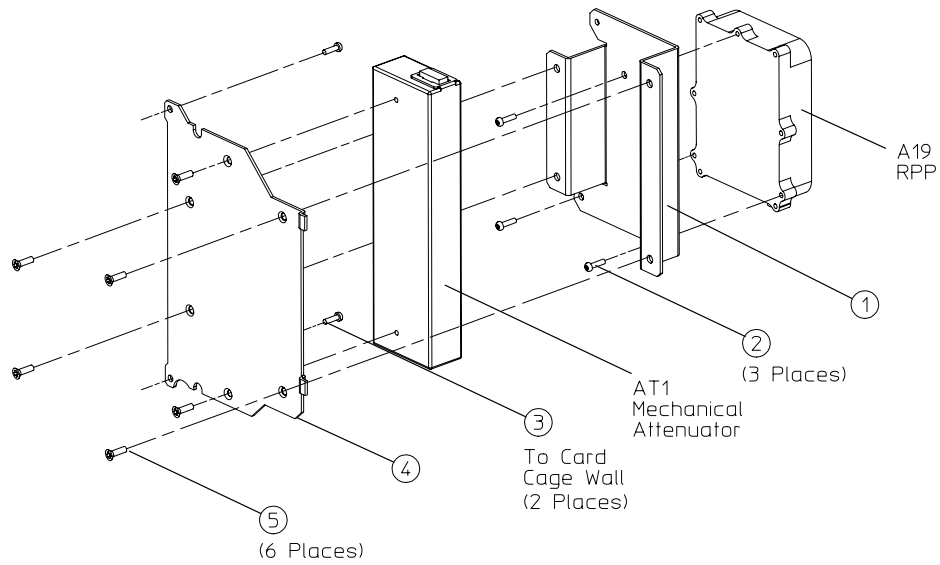
Disassembled Mechanical Attenuator View (Option UNB)

Refer to [Table 3-23](#) and [Figure 3-23](#).

Table 3-23 Disassembled Mechanical Attenuator View

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|------------------------------|
| 1 | E4400-00027 | 1 | Bracket-RPP |
| 2 | 0515-0664 | 3 | Screw-Machine M3x12 CW-PN-TX |
| 3 | 0515-0430 | 2 | Screw-Machine M3x6 CW-PN-TX |
| 4 | E4400-00028 | 1 | Bracket-Attenuator |
| 5 | 0515-1102 | 6 | Screw-Machine M3x8 FL-TX |

Figure 3-23 Disassembled Mechanical Attenuator View



sk718b

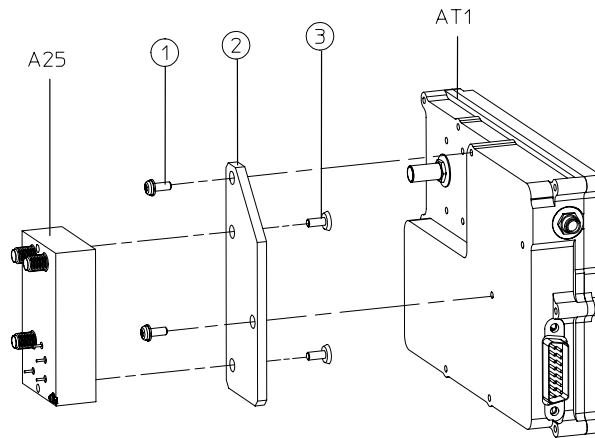
Disassembled Pulse Modulator View (Option 1E6)

Refer to [Table 3-24](#) and [Figure 3-24](#).

Table 3-24 Disassembled Pulse Modulator View (Option 1E6)

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|-----------------------------|
| 1 | 0515-0372 | 2 | Screw-Machine M3x8 CW-PN-TX |
| 2 | E4423-00003 | 1 | Bracket-Pulse Modulator |
| 3 | 0515-2001 | 2 | Screw-Machine M2.5x10 FL-TX |

Figure 3-24 Disassembled Pulse Modulator View (Option 1E6)



sk7152b

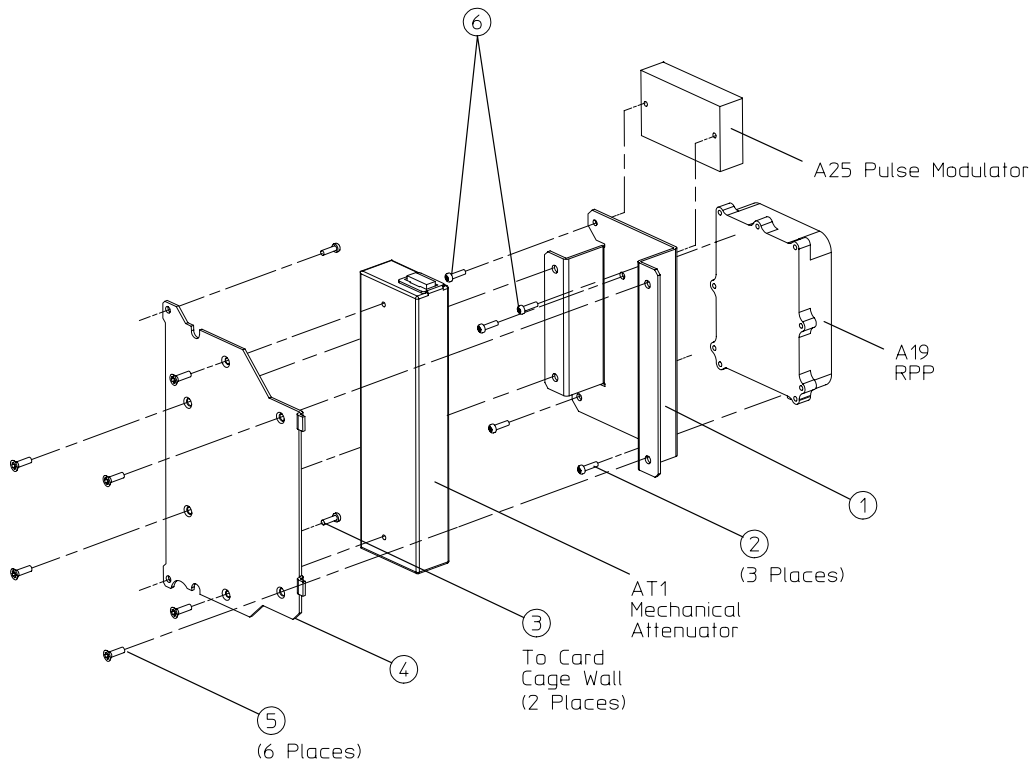
Disassembled Pulse Modulator View (Option 1E6/UNB)

Refer to [Table 3-25](#) and [Figure 3-25](#).

Table 3-25 Disassembled Pulse Modulator View (Option 1E6/UNB)

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|-------------------------------|
| 1 | E4400-00027 | 1 | Bracket-RPP |
| 2 | 0515-0664 | 3 | Screw-Machine M3x12 CW-PN-TX |
| 3 | 0515-0430 | 2 | Screw-Machine M3x6 CW-PN-TX |
| 4 | E4400-00028 | 1 | Bracket-Attenuator |
| 5 | 0515-1102 | 6 | Screw-Machine M3x8 FL-TX |
| 6 | 0515-0367 | 2 | Screw-Machine M2.5x8 CW-PN-TX |

Figure 3-25 Disassembled Pulse Modulator View (Option 1E6/UNB)



sk7149b

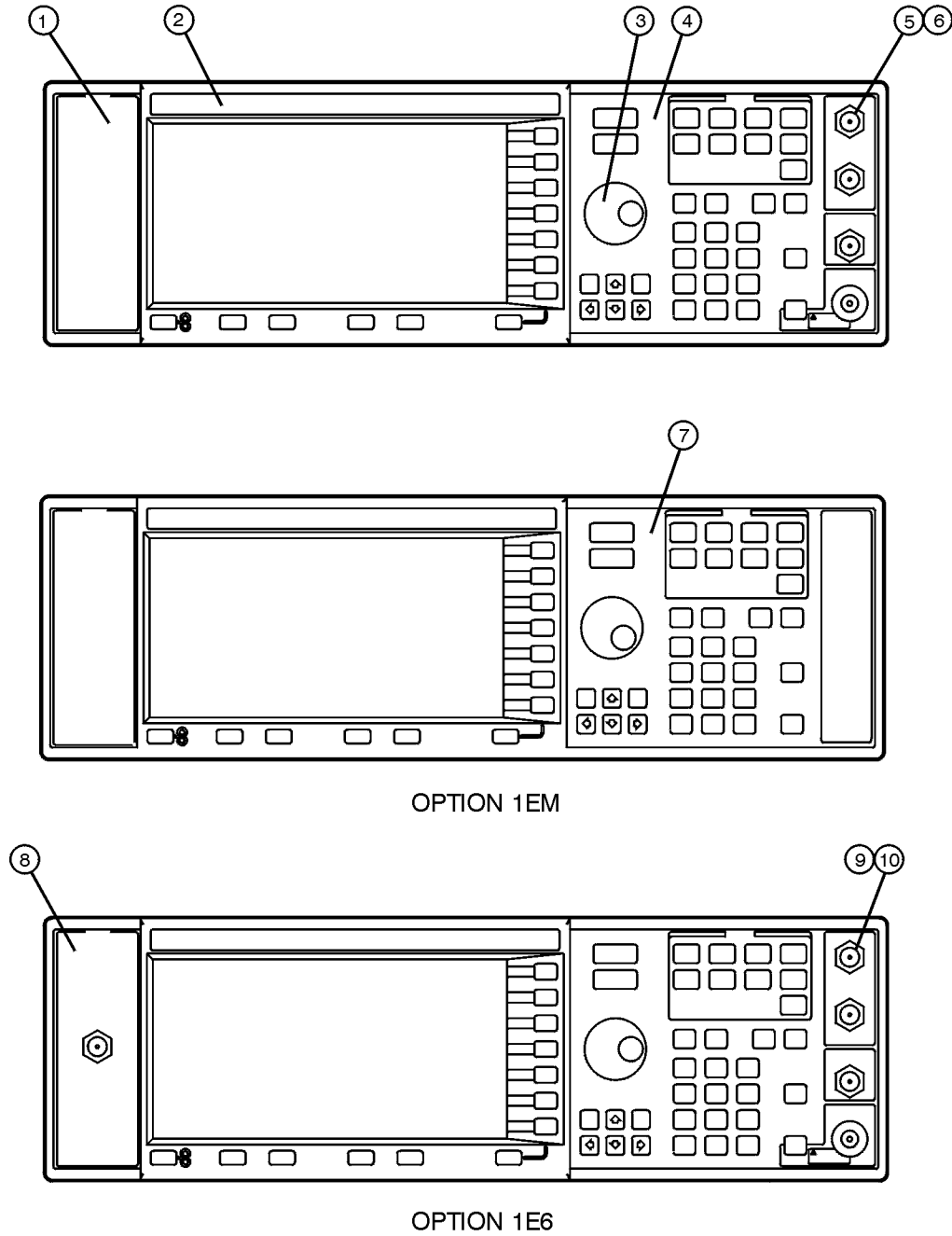
Front Panel View (ESG-A Series)

Refer to [Table 3-26](#) and [Figure 3-26](#).

Table 3-26 Front Panel View (ESG-A Series)

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|--------------------------------|
| 1 | E4400-80011 | 1 | Label-Connectors |
| 2 | E4400-80072 | 1 | Nameplate - E4400B 250k - 1GHz |
| 2 | E4400-80073 | 1 | Nameplate - E4420B 250k - 2GHz |
| 2 | E4400-80074 | 1 | Nameplate - E4421B 250k - 3GHz |
| 2 | E4400-80075 | 1 | Nameplate - E4422B 250k - 4GHz |
| 3 | E4400-40003 | 1 | Knob-RPG |
| 4 | E4400-80016 | 1 | Label-Keypad |
| 5 | 2950-0035 | 3 | Nut-Hex 15/32-32 |
| 6 | 3050-1919 | 3 | Washer-Wavy.490ID |
| 7 | E4400-80017 | 1 | Label-Keypad (Option 1EM) |
| 8 | E4423-80001 | 1 | Label-Connectors (Option 1E6) |
| 9 | 2950-0035 | 4 | Nut-Hex 15/32-32 |
| 10 | 3050-1919 | 4 | Washer-Wavy .490ID |

Figure 3-26 Front Panel View (ESG-A Series)



sk799b

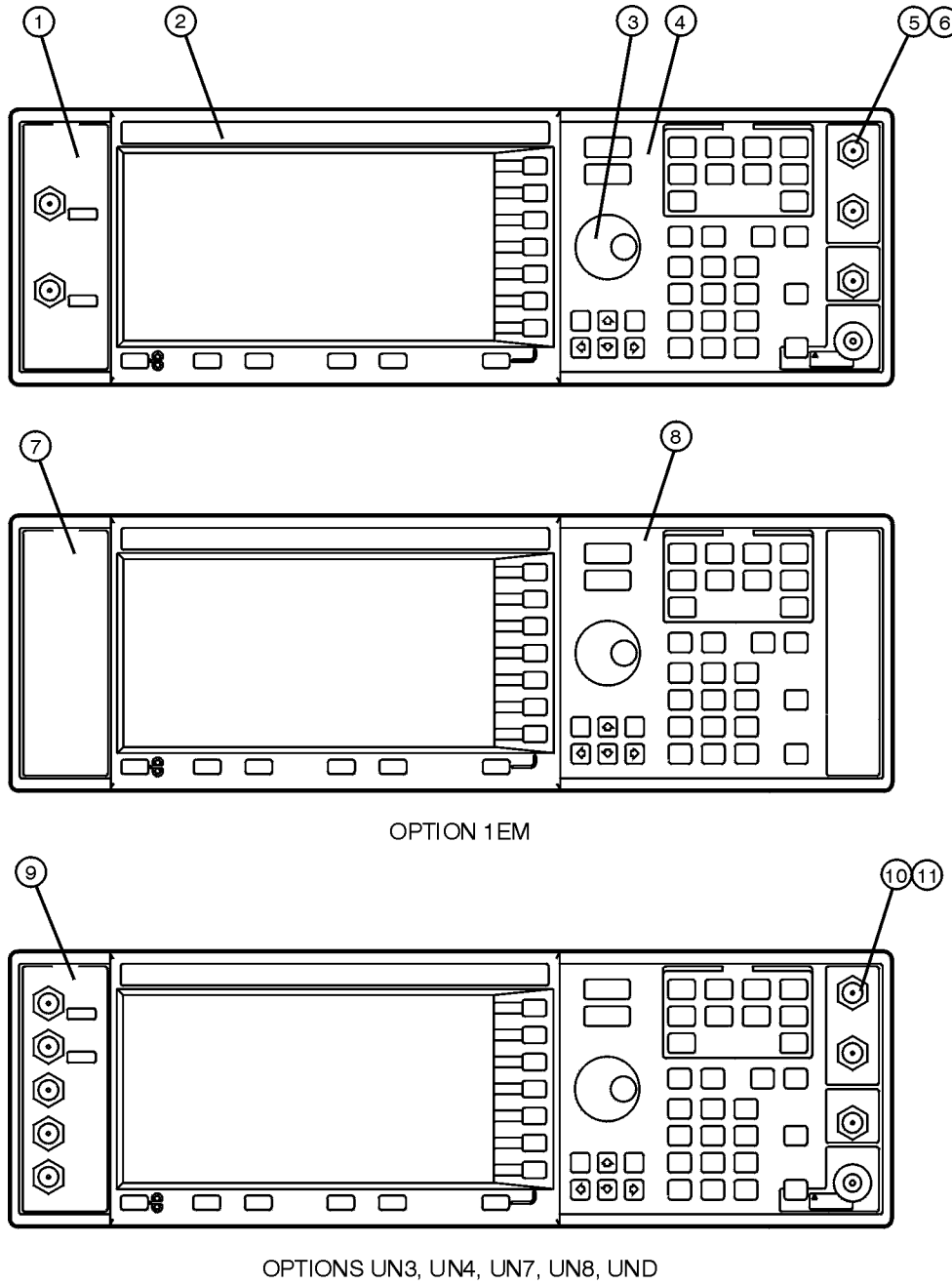
Front Panel View (ESG-D Series)

Refer to [Table 3-27](#) and [Figure 3-27](#).

Table 3-27 Front Panel View (ESG-D Series)

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|--|
| 1 | E4400-80010 | 1 | Label-Connectors |
| 2 | E4400-80076 | 1 | Nameplate - E4430B 250k - 1GHz |
| 2 | E4400-80077 | 1 | Nameplate - E4431B 250k - 2GHz |
| 2 | E4400-80078 | 1 | Nameplate - E4432B 250k - 3GHz |
| 2 | E4400-80079 | 1 | Nameplate - E4433B 250k - 4GHz |
| 3 | E4400-40003 | 1 | Knob-RPG |
| 4 | E4400-80005 | 1 | Label-Keypad |
| 5 | 2950-0035 | 5 | Nut-Hex 15/32-32 |
| 6 | 3050-1919 | 5 | Washer-Wavy .490ID |
| 7 | E4400-80011 | 1 | Label-Connectors (Option 1EM) |
| 8 | E4400-80015 | 1 | Label-Keypad (Option 1EM) |
| 9 | E4400-80006 | 1 | Label-Connectors (Options UN3, UN4, UN7, UN8, UND) |
| 10 | 2950-0035 | 8 | Nut-Hex 15/32-32 (Options UN3, UN4, UN7, UN8, UND) |
| 11 | 3050-1919 | 8 | Washer-Wavy .490ID (Options UN3, UN4, UN7, UN8, UND) |

Figure 3-27 Front-Panel View (ESG-D Series)



sk763b

Disassembled Front-Panel View

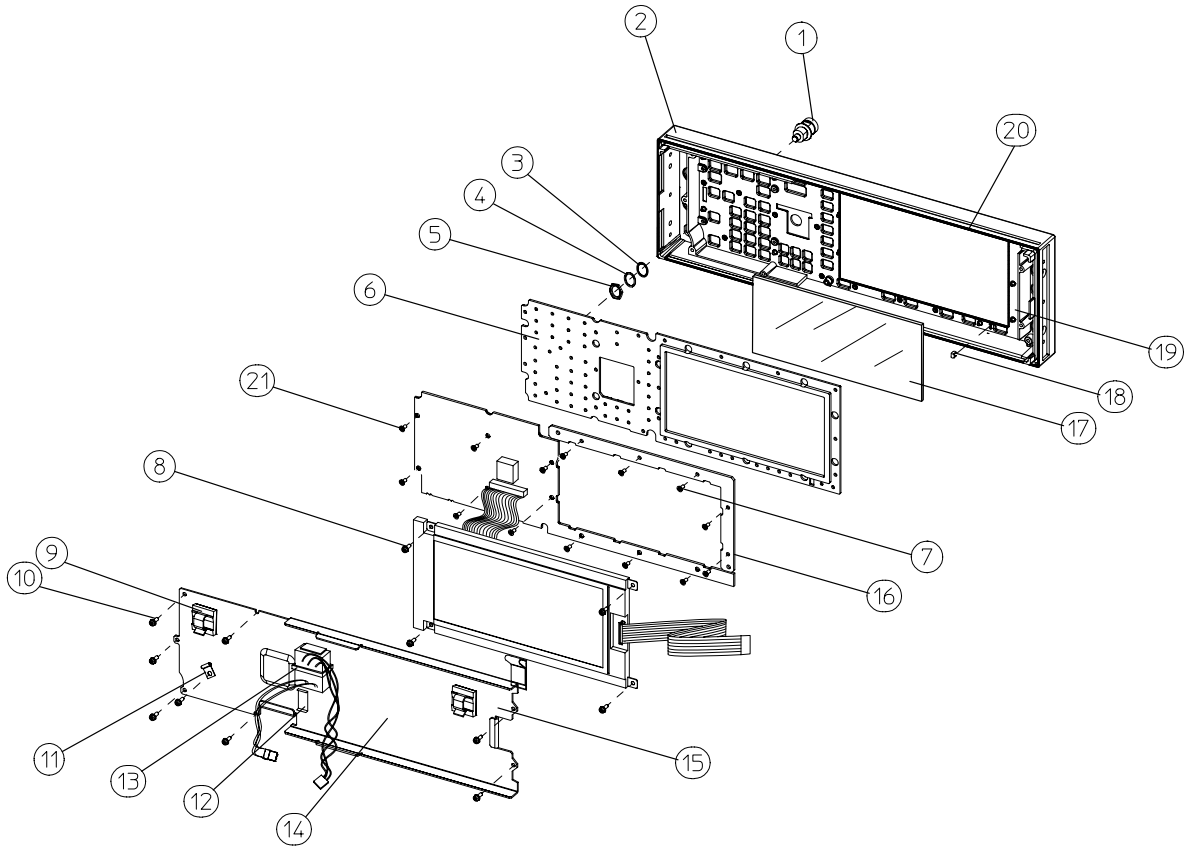
Refer to [Table 3-28](#) and [Figure 3-28](#).

Table 3-28 Disassembled Front-Panel View

| Item No. | Part Number | Qty | Description |
|----------|-------------|------|-------------------------------------|
| 1 | 1250-1811 | 1 | Adapter-Female SMA to Female Type-N |
| 2 | E4400-20012 | 1 | Frame-Front |
| 3 | 3050-1935 | 1 | Washer-Flat |
| 4 | 2190-0383 | 1 | Washer-Lock |
| 5 | 2950-0054 | 1 | Nut-Hex 1/2-28 |
| 6 | E4400-40001 | 1 | Rubber Keypad |
| 7 | 0515-1521 | 5 | Screw-Machine M3x5 FL-TX |
| 8 | 0515-0372 | 4 | Screw-Machine M3x8 CW-PN-TX |
| 9 | 1400-1594 | 2* | Clamp-Flexible Cables |
| 10 | 0515-0372 | 8 | Screw-Machine M3x8 CW-PN-TX |
| 11 | 1400-0054 | 1 | Clamp-Semi-Rigid Cable (W9) |
| 12 | 1400-1533 | 1 | Clamp-Ribbon Cable (A1W1) |
| 13 | 1400-0493 | 1 | Cable Tie Wrap |
| 14 | 1400-0611 | 1 | Clamp-Ribbon Cable (W10) |
| 15 | E4400-00008 | 1 | Front Frame RFI Shield |
| 16 | E4400-00009 | 1 | Filter Bracket |
| 17 | 4330-1711 | 1 | Glass Filter 70% XMT |
| 18 | E4400-40008 | 1 | Light Pipe |
| 19 | 8160-0723 | 2 Ft | Spiral Gasket-BC CY .094 |
| 20 | 8160-0660 | 4 Ft | RFI Round Mesh.125 |
| 21 | 0515-1227 | 9 | Screw-Machine M3x6 FL-TX |

*. ESG-A Series uses a quantity of one.

Figure 3-28 Disassembled Front-Panel View



sk7148b

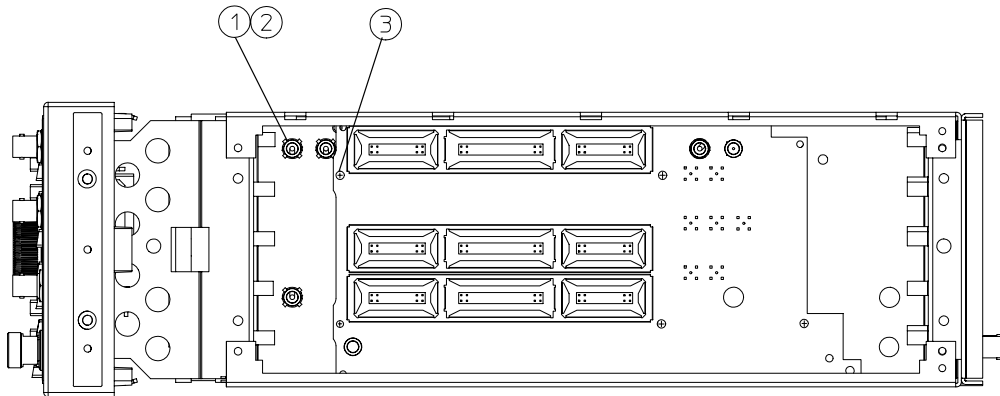
Daughterboard Card Cage View

Refer to [Table 3-29](#) and [Figure 3-29](#).

Table 3-29 Daughterboard Card Cage View

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|-----------------------------|
| 1 | E4400-40002 | 4 | Retainer-Cable |
| 2 | 0510-1643 | 4 | Retainer Ring .309ID |
| 3 | 0515-0430 | 5 | Screw-Machine M3x6 CW-PN-TX |

Figure 3-29 Daughterboard Card Cage View



sk719b

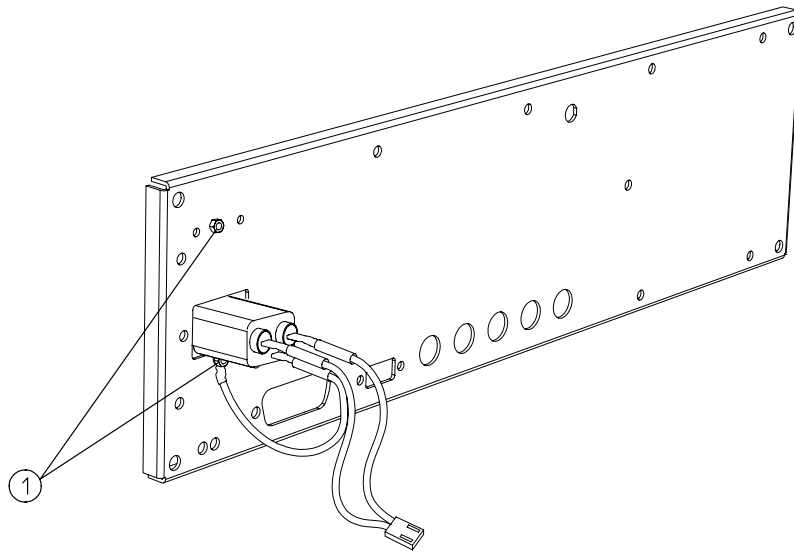
Inside Rear-Panel View

Refer to [Table 3-30](#) and [Figure 3-30](#).

Table 3-30 Inside Rear-Panel View

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|--------------|
| 1 | 0535-0031 | 2 | Nut-Hex M3.0 |

Figure 3-30 Inside Rear-Panel View



sk720b

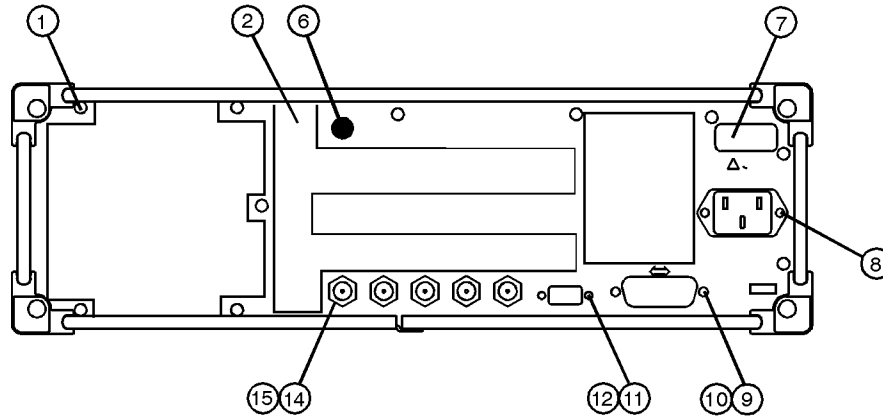
Rear-Panel View (ESG-A Series)

Refer to [Table 3-31](#) and [Figure 3-31](#).

Table 3-31 Rear-Panel View (ESG-A Series)

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|-----------------------------|
| 1 | 0515-0372 | 10 | Screw-Machine M3x8 CW-PN-TX |
| 2 | E4400-00032 | 1 | Panel-Rear |
| 6 | 6960-0023 | 1 | Plug-Hole .312D |
| 7 | E4400-00017 | 1 | Serial Number Plate |
| 8 | 0515-1102 | 2 | Screw-Machine M3x8 FL-TX |
| 9 | 0380-0644 | 2 | Standoff-Hex .327L 6-32 |
| 10 | 2190-0577 | 2 | Washer-Lock |
| 11 | 0380-2079 | 2 | Standoff-Hex .312L 4-40 |
| 12 | 2190-0003 | 2 | Washer-Lock |
| 14 | 2950-0054 | 5 | Nut-Hex 1/2-28 |
| 15 | 2190-0068 | 5 | Washer-Lock .505ID |

Figure 3-31 Rear-Panel View (ESG-A Series)



sk773a

Rear-Panel View (ESG-A Series - Option 1EM)

Refer to [Table 3-32](#) and [Figure 3-32](#).

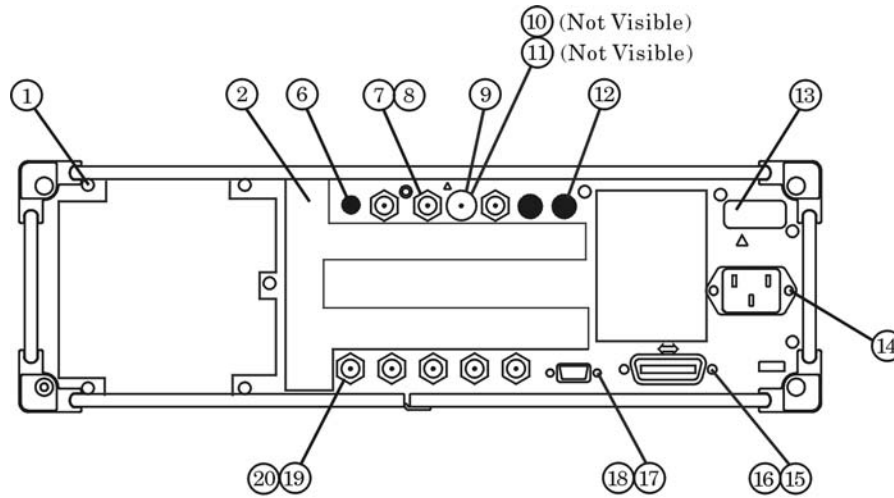
Table 3-32 Rear-Panel View (ESG-A Series - Option 1EM)

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|-----------------------------|
| 1 | 0515-0372 | 10 | Screw-Machine M3x8 CW-PN-TX |
| 2 | E4400-00033 | 1 | Panel-Rear |
| 6 | 6960-0023 | 1 | Plug-Hole .312D |
| 7 | 2950-0035 | 3* | Nut-Hex 15/32-32 |
| 8 | 2190-0102 | 3* | Washer-Lock .472ID |
| 9 | 08559-60002 | 1 | RF Output Assy |
| 10 | 2950-0132 | 1 | Nut-Hex 7/16-28 |
| 11 | 2190-0102 | 1 | Washer-Lock |
| 12 | 6960-0002 | 2† | Plug-Hole .500D |
| 13 | E4400-00017 | 1 | Serial Number Plate |
| 14 | 0515-1102 | 2 | Screw-Machine M3x8 FL-TX |
| 15 | 0380-0644 | 2 | Standoff-Hex .327L 6-32 |
| 16 | 2190-0577 | 2 | Washer-Lock |
| 17 | 0380-2079 | 2 | Standoff-Hex .312L 4-40 |
| 18 | 2190-0003 | 2 | Washer-Lock |
| 19 | 2950-0054 | 5 | Nut-Hex 1/2-28 |
| 20 | 2190-0068 | 5 | Washer-Lock .505ID |

*. For Option 1E6 quantity is 4.

†. For Option 1E6 quantity is 1.

Figure 3-32 Rear-Panel View (ESG-A Series - Option 1EM)



sk7100b

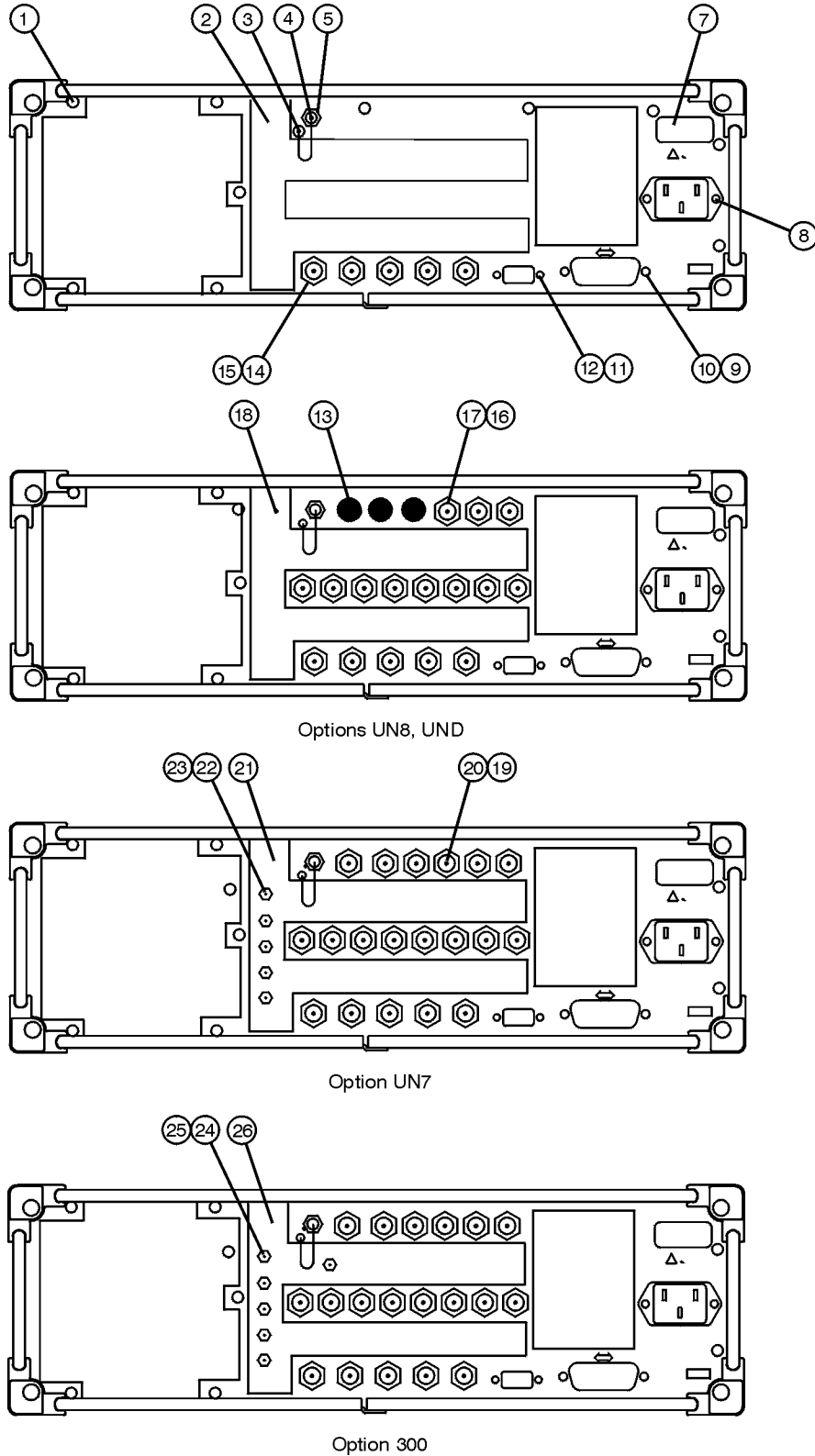
Rear-Panel View (ESG-D Series)

Refer to [Table 3-33](#) and [Figure 3-33](#).

Table 3-33 Rear-Panel View (ESG-D Series)

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|--|
| 1 | 0515-0372 | 10 | Screw-Machine M3x8 CW-PN-TX |
| 2 | E4400-00032 | 1 | Panel-Rear |
| 3 | 0515-0372 | 1 | Screw-Machine M3x8 CW-PN-TX (used to attach item 4)) |
| 4 | 1250-2759 | 1 | Dust Cap Female SMA |
| 5 | 1250-1753 | 1 | Adapter-Female SMA to Female SMA |
| 7 | E4400-00017 | 1 | Serial Number Plate |
| 8 | 0515-1102 | 2 | Screw-Machine M3x8 FL-TX |
| 9 | 0380-0644 | 2 | Standoff-Hex .327L 6-32 |
| 10 | 2190-0577 | 2 | Washer-Lock |
| 11 | 0380-2079 | 2 | Standoff-Hex .312L 4-40 |
| 12 | 2190-0003 | 2 | Washer-Lock |
| 13 | 6960-0002 | 3 | Plug-Hole .500D (Options UN3, UN4, UN8, UND) |
| 14 | 2950-0054 | 5 | Nut-Hex 1/2-28 |
| 15 | 2190-0068 | 5 | Washer-Lock .505ID |
| 16 | 2950-0035 | 11 | Nut-Hex 15/32-32 (Options UN3, UN4, UN8, UND) |
| 17 | 2190-0102 | 11 | Washer-Lock .472ID (Options UN3, UN4, UN8, UND) |
| 18 | E4400-00031 | 1 | Panel-Rear (Options UN3, UN4, UN8, UND) |
| 19 | 2950-0035 | 14 | Nut-Hex 15/32-32 (Option UN7) |
| 20 | 2190-0102 | 14 | Washer-Lock .472ID (Option UN7) |
| 21 | E4400-00025 | 1 | Panel-Rear (Option UN7) |
| 22 | 2950-0078 | 5 | Nut-Hex 10-32 (for the SMBs) (Option UN7) |
| 23 | 2190-0124 | 5 | Washer-Lock .195ID (for the SMBs) (Option UN7) |
| 24 | 2950-0078 | 6 | Nut-Hex 10-32 (for the SMBs) (Option 300) |
| 25 | 2190-0124 | 6 | Washer-Lock .195ID (for the SMBs) (Option 300) |
| 26 | E4400-00025 | 1 | Panel-Rear (Option 300) |

Figure 3-33 Rear-Panel View (ESG-D Series)



sk7101b

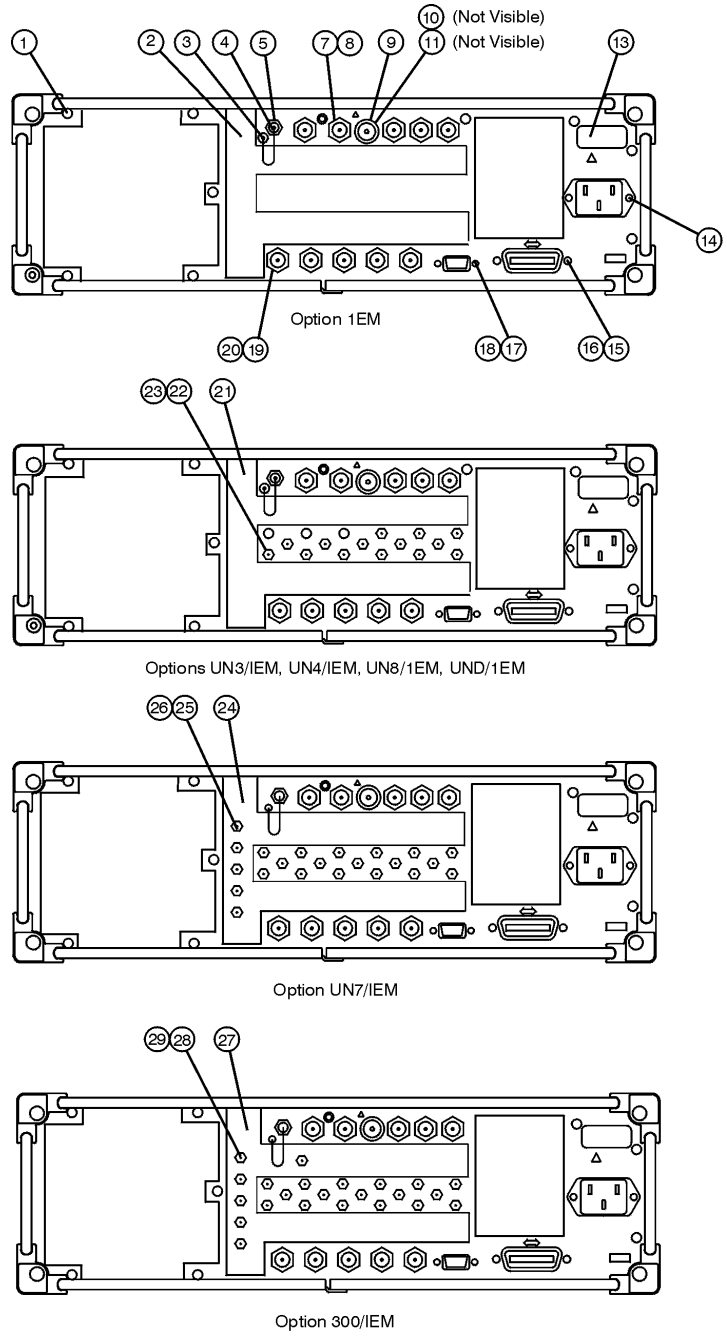
Rear Panel View (ESG-D Series - Option 1EM)

Refer to [Table 3-34](#) and [Figure 3-34](#).

Table 3-34 Rear Panel View (ESG-D Series - Option 1EM)

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|--|
| 1 | 0515-0372 | 10 | Screw-Machine M3x8 CW-PN-TX |
| 2 | E4400-00033 | 1 | Panel-Rear |
| 3 | 0515-0372 | 1 | Screw-Machine M3x8 CW-PN-TX (used to attach item 4) |
| 4 | 1250-2759 | 1 | Dust Cap Female SMA |
| 5 | 1250-1753 | 1 | Adapter-Female SMA to Female SMA |
| 7 | 2950-0035 | 5 | Nut-Hex 15/32-32 |
| 8 | 2190-0102 | 5 | Washer-Lock .472ID |
| 9 | 08559-60002 | 1 | RF Output Assy |
| 10 | 2950-0132 | 1 | Nut-Hex 7/16-28 |
| 11 | 2190-0102 | 1 | Washer-Lock |
| 13 | E4400-00017 | 1 | Serial Number Plate |
| 14 | 0515-1102 | 2 | Screw-Machine M3x8 FL-TX |
| 15 | 0380-0644 | 2 | Standoff-Hex .327L 6-32 |
| 16 | 2190-0577 | 2 | Washer-Lock |
| 17 | 0380-2079 | 2 | Standoff-Hex .312L 4-40 |
| 18 | 2190-0003 | 2 | Washer-Lock |
| 19 | 2950-0054 | 5 | Nut-Hex 1/2-28 |
| 20 | 2190-0068 | 5 | Washer-Lock .505ID |
| 21 | E4400-00034 | 1 | Panel-Rear (Options UN3, UN4, UN8) |
| 22 | 2950-0078 | 14 | Nut-Hex 10-32 (for the SMBs) (Options UN3, UN4, UN8, UND) |
| 23 | 2190-0124 | 14 | Washer-Lock .195ID (for the SMBs) (Options UN3, UN4, UN8, UND) |
| 24 | E4400-00026 | 1 | Panel-Rear (Option UN7) |
| 25 | 2950-0078 | 22 | Nut-Hex 10-32 (for the SMBs) (Option UN7) |
| 26 | 2190-0124 | 22 | Washer-Lock .195ID (for the SMBs) (Option UN7) |
| 27 | E4400-00026 | 1 | Panel-Rear (Option 300) |
| 28 | 2950-0078 | 22 | Nut-Hex 10-32 (for the SMBs) (Option UN7) |
| 29 | 2190-0124 | 14 | Washer-Lock .195ID (for the SMBs) (Options UN3, UN4, UN8, UND) |

Figure 3-34 Rear-Panel View (ESG-D Series - Option 1EM)



sk7102b

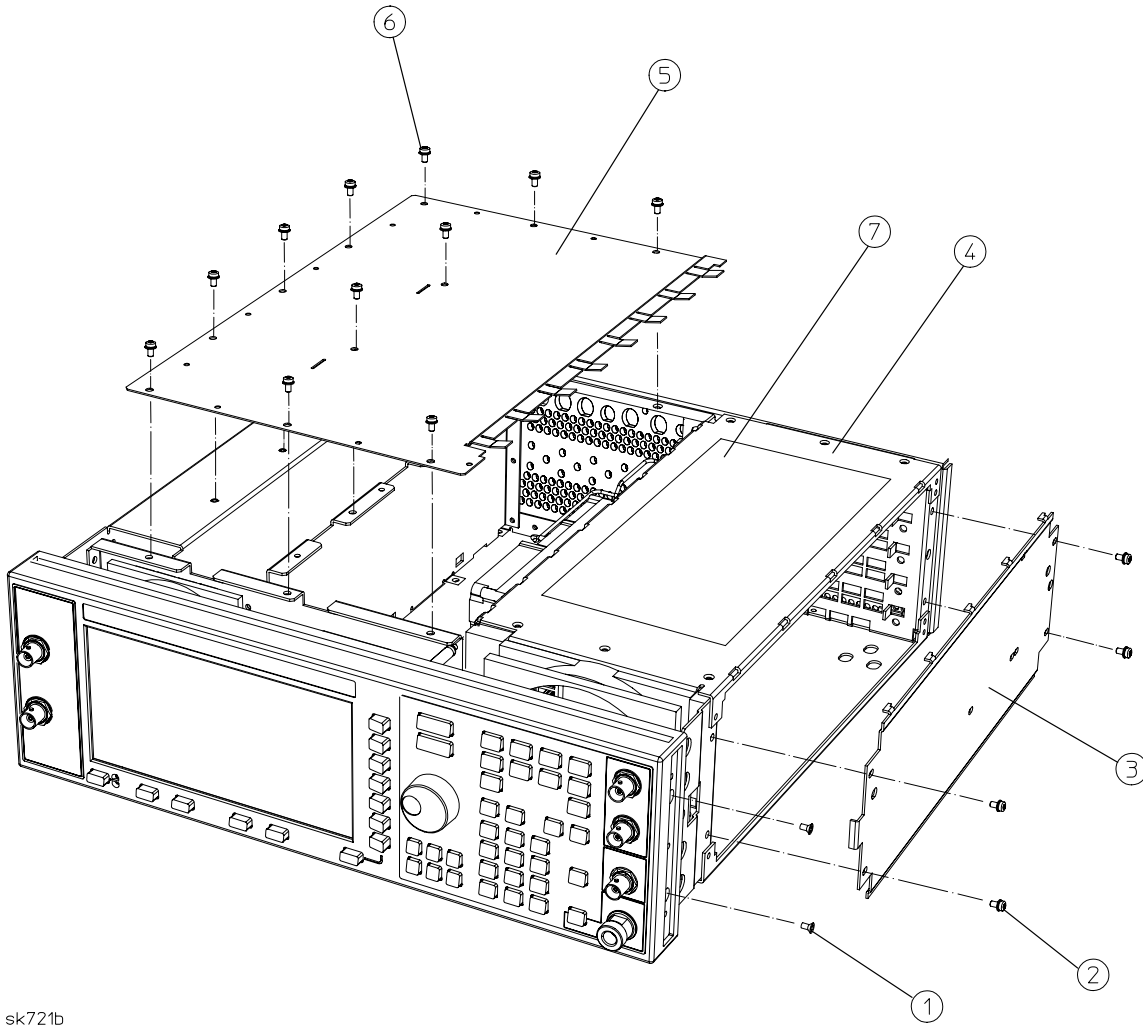
Instrument Chassis with Top and Right-Side Hardware

Refer to [Table 3-35](#) and [Figure 3-35](#).

Table 3-35 Instrument Chassis with Top and Right-Side Hardware

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|---|
| 1 | 0515-1269 | 2 | Screw-Machine M4X10 FL-TX |
| 2 | 0515-2087 | 4 | Screw-Machine M3x6 CW-BN-TX |
| 3 | E4400-00003 | 1 | Cover-Side (Serial Prefix US3833, or GB3832, and below) |
| 3 | E4400-00037 | 1 | Cover-Side (Serial Prefix US3844, or GB3845, and above) |
| 4 | E4400-00035 | 1 | Chassis |
| 5 | E4400-00036 | 1 | Cover-Top Chassis |
| 6 | 0515-0430 | 11 | Screw-Machine M3x6 CW-PN-TX |
| 7 | E4400-80066 | 1 | Label-Connection Diagram |

Figure 3-35 Instrument Chassis with Top and Right-Side Hardware



sk721b

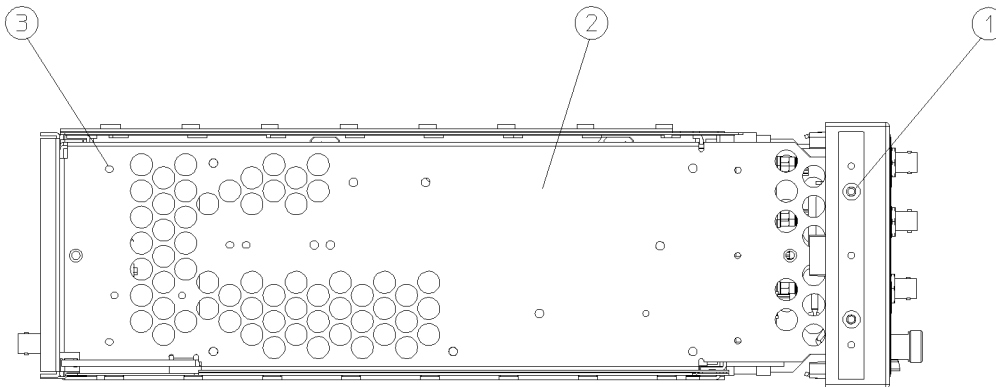
Power Supply Shield and Left-Side Hardware

Refer to [Table 3-36](#) and [Figure 3-36](#).

Table 3-36 Power Supply Shield and Left-Side Hardware

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|-----------------------------|
| 1 | 0515-1269 | 2 | Screw-Machine M4X10 FL-TX |
| 2 | E4400-00011 | 1 | Shield-Power Supply |
| 3 | 0515-0372 | 17 | Screw-Machine M3x8 CW-PN-TX |

Figure 3-36 Power Supply Shield and Left-Side Hardware



sk706a

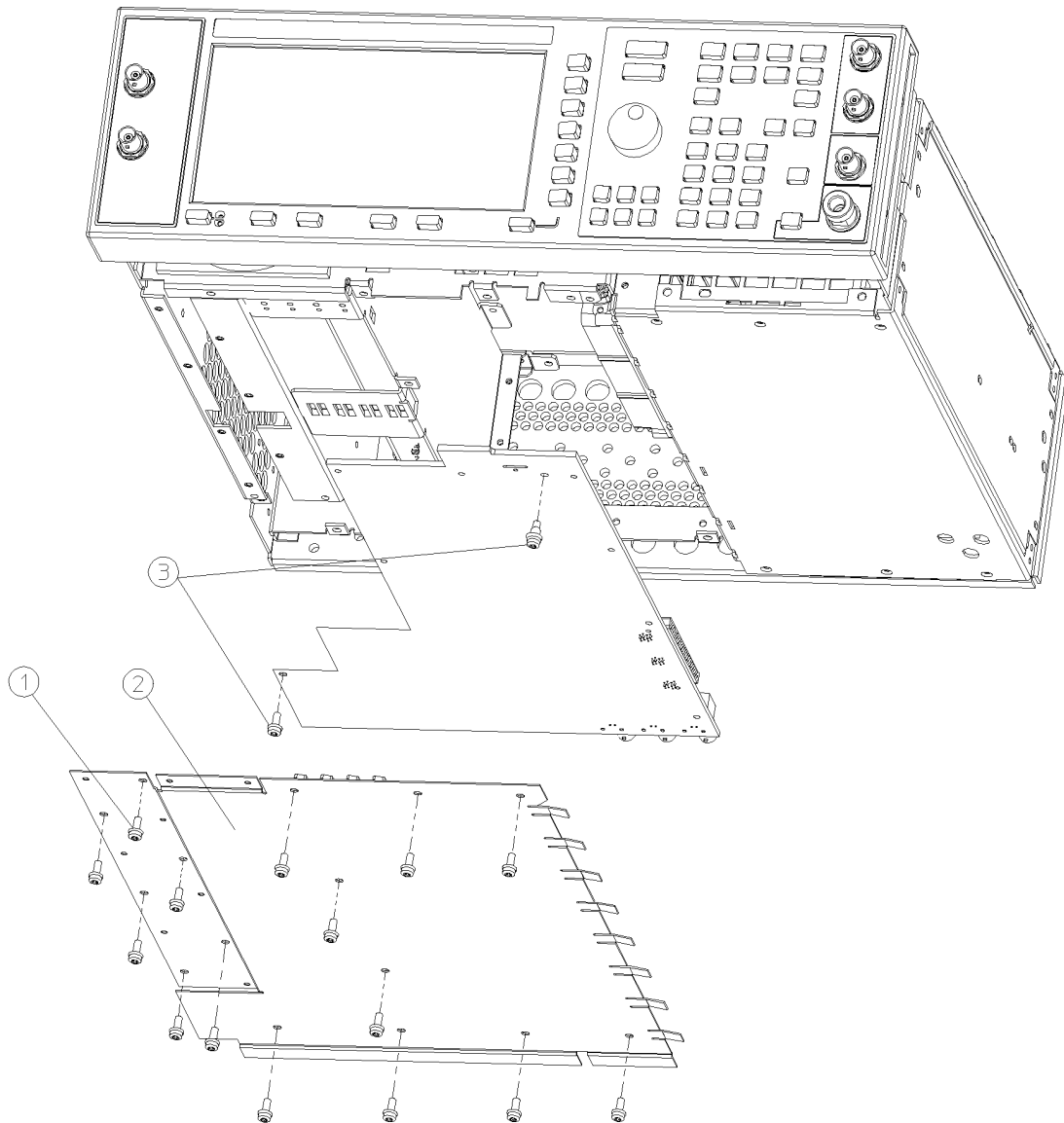
Motherboard and Bottom-Side Hardware

Refer to [Table 3-37](#) and [Figure 3-37](#).

Table 3-37 Motherboard and Bottom-Side Hardware

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|-----------------------------|
| 1 | 0515-0372 | 15 | Screw-Machine M3x8 CW-PN-TX |
| 2 | E4400-00007 | 1 | Cover-Bottom Chassis |
| 3 | 0515-0372 | 2 | Screw-Machine M3x8 CW-PN-TX |

Figure 3-37 Motherboard and Bottom-Side Hardware



sk7104b

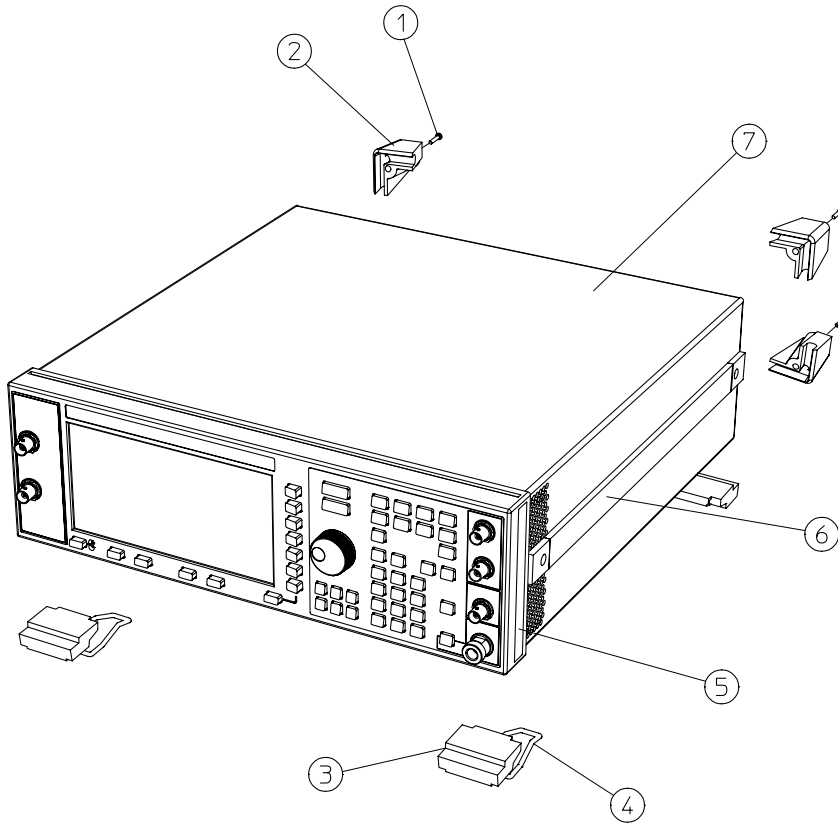
Instrument Cover and Associated Parts

Refer to [Table 3-38](#) and [Figure 3-38](#).

Table 3-38 Instrument Cover and Associated Parts

| Item No. | Part Number | Qty | Description |
|------------------------------------|-------------|-----|---|
| 1 | 0515-1619 | 4 | Screw-Machine M4x25 PN-TX |
| 2 | 5041-9611 | 4 | Foot-Rear Long |
| 3 | 5041-9167 | 4 | Feet-Bottom |
| 4 | 1460-1345 | 2 | Spring-Wire Frame 3.000 Long |
| 5 | 5041-9171 | 2 | Side Trim |
| 6 | E4400-60026 | 2 | Assy-Strap Handle - includes the following parts: |
| Item 6 includes these parts: | 5063-9209 | 1 | Strap Assembly |
| | E4400-00015 | 2 | Ground Spring |
| | E4400-20023 | 2 | Handle Retainer |
| | E4400-40007 | 2 | End Cap |
| | 0515-0710 | 2 | Screw-Machine M5x18 FL-TX |
| 7 | E4400-00004 | 1 | Cover-Instrument |

Figure 3-38 Instrument Cover and Associated Parts



sk755b

Miscellaneous

This section lists part numbers for miscellaneous items that can be used with your signal generator. These items are categorized as follows:

- “[Accessories](#)” on page 3-74
- “[Documentation](#)” on page 3-75
- “[Electrostatic Discharge \(ESD\) Protective Supplies](#)” on page 3-78
- “[Upgrade and Retrofit Kits](#)” on page 3-78

Accessories

Refer to [Table 3-39](#).

Table 3-39 Accessories

| Description | Part Number |
|--|-------------|
| Connector End Cap-RF Output | 1401-0247 |
| Connector End Cap-GPIB | 1401-5007 |
| Connector End Cap Coherent Carrier Out | 1252-4696 |
| Remote Interface | 83300A |
| Transit Case | 9211-1296 |

Documentation

Refer to [Table 3-40](#) and [Table 3-41](#).

Table 3-40 ESG Family Signal Generators Documentation

| Description | Part Number |
|--|-------------|
| ESG-A and ESG-AP Series Manual Set (includes items listed below) | E4400-90334 |
| User's Guide | E4400-90323 |
| Programming Guide | E4400-90324 |
| Calibration Guide | E4400-90325 |
| Quick Start Guide | E4400-90326 |
| Error Messages | E4400-90333 |
| Technical Specifications | 5965-3096E |
| Feature Releases Document | E4400-90363 |
| ESG-D and ESG-DP Series Manual Set (includes items listed below) | E4400-90322 |
| User's Guide | E4400-90323 |
| Programming Guide | E4400-90324 |
| Calibration Guide | E4400-90325 |
| Quick Start Guide | E4400-90326 |
| Error Messages | E4400-90333 |
| Technical Specifications | 5965-3096E |
| Feature Releases Document | E4400-90363 |
| Option 200 Fully Coded 3GPP W-CDMA Personality User's and Programming Guide | E4400-90390 |
| Option 201 Real-Time cdma2000 Personality User's and Programming Guide | E4400-90386 |
| Option UN8 Real-Time I/Q Baseband Generator with TDMA Standards User's and Programming Guide (includes Option 202, EDGE) | E4400-90327 |
| Option UND Dual Arbitrary Waveform Generator and Option UN5 Multichannel, Multicarrier CDMA Personality User's and Programming Guide | E4400-90328 |
| Option 100 W-CDMA Personality User's and Programming Guide | E4400-90329 |
| Option 101 CDMA2000 Personality User's and Programming Guide | E4400-90330 |
| Option UN7 Bit Error Rate Test User's and Programming Guide | E4400-90331 |
| Option 300 Base Station BERT Extension for Option UN7 User's and Programming Guide | E4400-90305 |
| Service Guide | E4400-90335 |
| Component-Level Information | E4400-90336 |

Table 3-41 Localized Documentation for ESG Family Signal Generators

| Description | Part Number |
|--|-------------|
| Chinese | |
| User's Guide - Chinese | E4400-90172 |
| Option UN8 DECT User's and Programming Guide - Chinese | E4400-90194 |
| Option UN8 GSM User's and Programming Guide - Chinese | E4400-90201 |
| Option UN8 Custom Digital Modulation User's and Programming Guide - Chinese | E4400-90180 |
| Option UND Dual Arbitrary Waveform Generator and Option UN5 Multichannel, Multicarrier CDMA Personality User's and Programming Guide - Chinese | E4400-90187 |
| Taiwanese | |
| User's Guide - Taiwanese | E4400-90173 |
| Option UN8 DECT User's and Programming Guide - Taiwanese | E4400-90195 |
| Option UN8 GSM User's and Programming Guide - Taiwanese | E4400-90202 |
| Option UN8 Custom Digital Modulation User's and Programming Guide - Taiwanese | E4400-90181 |
| Option UND Dual Arbitrary Waveform Generator and Option UN5 Multichannel, Multicarrier CDMA Personality User's and Programming Guide - Taiwanese | E4400-90188 |
| French | |
| User's Guide - French | E4400-90174 |
| Option UN8 DECT User's and Programming Guide - French | E4400-90196 |
| Option UN8 GSM User's and Programming Guide - French | E4400-90203 |
| Option UN8 TETRA User's and Programming Guide - French | E4400-90212 |
| Option UN8 Custom Digital Modulation User's and Programming Guide - French | E4400-90182 |
| Option UND Dual Arbitrary Waveform Generator and Option UN5 Multichannel, Multicarrier CDMA Personality User's and Programming Guide - French | E4400-90189 |
| German | |
| User's Guide - German | E4400-90175 |
| Option UN8 DECT User's and Programming Guide - German | E4400-90197 |
| Option UN8 GSM User's and Programming Guide - German | E4400-90204 |
| Option UN8 TETRA User's and Programming Guide - German | E4400-90210 |
| Option UN8 Custom Digital Modulation User's and Programming Guide - German | E4400-90183 |
| Option UND Dual Arbitrary Waveform Generator and Option UN5 Multichannel, Multicarrier CDMA Personality User's and Programming Guide - German | E4400-90190 |

| Description | Part Number |
|---|-------------|
| Japanese | |
| User's Guide - Japanese | E4400-90176 |
| Option UN8 DECT User's and Programming Guide - Japanese | E4400-90198 |
| Option UN8 GSM User's and Programming Guide - Japanese | E4400-90205 |
| Option UN8 PDC User's and Programming Guide - Japanese | E4400-90208 |
| Option UN8 PHS User's and Programming Guide - Japanese | E4400-90209 |
| Option UN8 Custom Digital Modulation User's and Programming Guide - Japanese | E4400-90184 |
| Option UND Dual Arbitrary Waveform Generator and Option UN5 Multichannel, Multicarrier CDMA Personality User's and Programming Guide - Japanese | E4400-90191 |
| Option UN7 Bit Error Rate Test User's and Programming Guide - Japanese | E4400-90179 |
| Korean | |
| User's Guide - Korean | E4400-90177 |
| Option UND Dual Arbitrary Waveform Generator and Option UN5 Multichannel, Multicarrier CDMA Personality User's and Programming Guide - Korean | E4400-90192 |
| Spanish | |
| User's Guide - Spanish | E4400-90178 |
| Option UN8 DECT User's and Programming Guide - Spanish | E4400-90200 |
| Option UN8 GSM User's and Programming Guide - Spanish | E4400-90207 |
| Option UN8 TETRA User's and Programming Guide - Spanish | E4400-90211 |
| Option UN8 Custom Digital Modulation User's and Programming Guide - Spanish | E4400-90186 |
| Option UND Dual Arbitrary Waveform Generator and Option UN5 Multichannel, Multicarrier CDMA Personality User's and Programming Guide - Spanish | E4400-90193 |

Electrostatic Discharge (ESD) Protective Supplies

Refer to [Table 3-42](#).

Table 3-42 Electrostatic Discharge (ESD) Protective Supplies

| Description | Part Number |
|--|-------------|
| 2 X 4 Ft Antistatic Table Mat with 15 Ft Ground Wire | 9300-0797 |
| 5 Ft Grounding Cord (for wrist strap) | 9300-0980 |
| Adjustable Antistatic Wrist Strap | 9300-1367 |
| Antistatic Heel Strap (for use on conductive floors) | 9300-1126 |

Upgrade and Retrofit Kits

Refer to [Table 3-43](#).

Table 3-43 Upgrade and Retrofit Kits

| Description | Part Number |
|---|-------------|
| Kit-Firmware Upgrade | E4400-60174 |
| Kit-Firmware Upgrade with ESG-A Series Manual Set | E4400-60171 |
| Kit-Firmware Upgrade with ESG-D Series Manual Set | E4400-60172 |
| Kit-RS-232 Cable | E4400-60049 |
| Kit-Rack Mount Flanges without Handles (Option 1CM) | 5063-9214 |
| Kit-Rack Mount Flanges with Handles (Option 1CP) | 5063-9221 |
| Retrofit Kit-Rack Slide for Rack Mount | 5182-1272 |
| Retrofit Kit-Modified Rack Rail for Rack Mount | 5182-1273 |
| Retrofit Kit-High Stability Timebase (conversion to Option 1E5) | E4400-60032 |
| Retrofit Kit-Add Option UND to ESG-D Series | E4400-60166 |
| Retrofit Kit-Retrofit Option UN3 or UN4 to include Option UN7 | E4400-60143 |
| Retrofit Kit-Upgrade Option UN3 to UN8 | E4400-60160 |
| Retrofit Kit-Upgrade Option UN4 to UN8 to include Option UN9 | E4400-60184 |
| Retrofit Kit-Upgrade Add Option UN8 to ESG-D Series | E4400-60170 |
| Retrofit Kit-Upgrade Add Option UN9 (Options UN8 and UN9) to ESG-D Series | E4400-60185 |

4 Replaceable Parts (ESG-AP and ESG-DP Series)

This chapter provides important ordering information and lists the part numbers for the various replaceable parts, kits, and accessories available for your signal generator. This chapter is also useful for locating and identifying assemblies and cables.

Ordering Information

To order a part listed in the replaceable parts lists, do the following:

1. Determine the part number.
2. Determine the quantity required.
3. Mail this information to the nearest Agilent Technologies office or, in the U.S., call the hotline number listed in the following section.

To order a part not listed in the replaceable parts lists, mail the following information to the nearest Agilent Technologies office or, in the U.S., call the hotline number listed in the following section.

1. the instrument model number
2. the serial number and options, if any (see rear panel)
3. a description of the part
4. a description of the part's function
5. the quantity required

Call (800) 227-8164 to Order Parts Fast (U.S. Only)

When you have gathered the information required to place an order, contact Agilent Technologies' direct ordering team by calling the toll-free hotline number shown above. Orders may be placed Monday through Friday, 6 AM to 5 PM (Pacific Standard Time).

The parts specialists have direct on-line access to replacement parts inventory corresponding to the replaceable parts lists in this manual. Four day delivery time is standard; there is a charge for hotline one-day delivery.

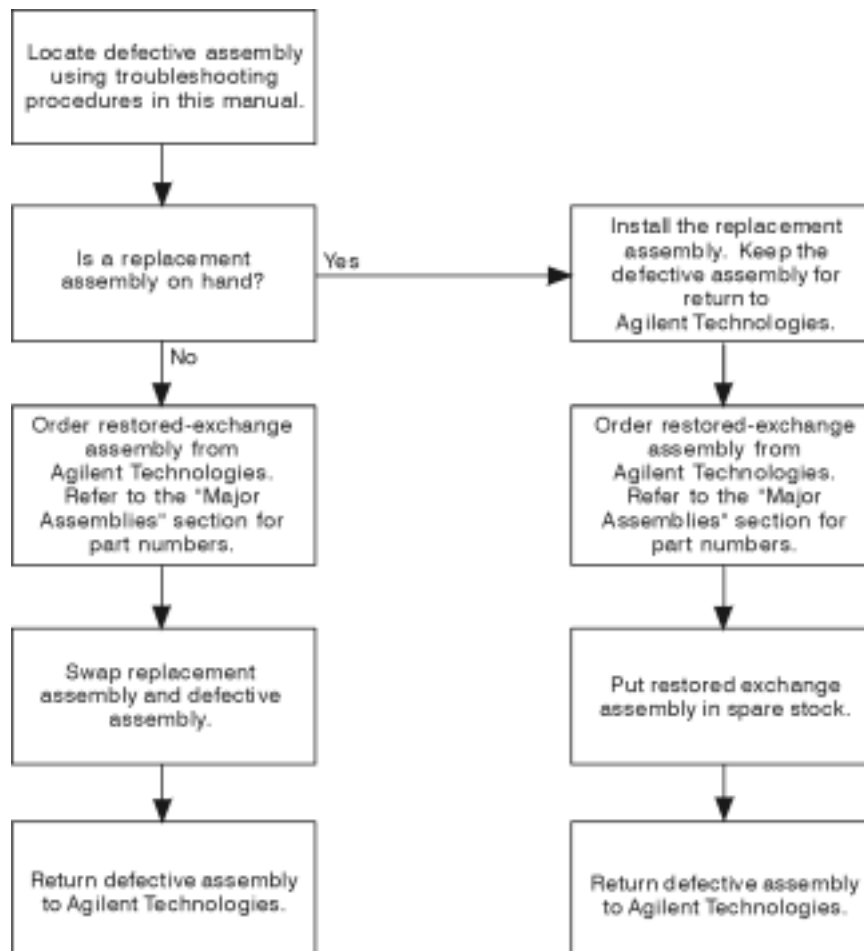
This information applies to the United States only. Outside the United States, you must contact the nearest Agilent Technologies sales and service office. (Refer to [Table 1-1](#) on page 1-9.)

Save Money with Rebuilt-Exchange Assemblies

Under the rebuilt-exchange assembly program, certain factory-repaired and tested assemblies are available on a trade-in basis. These assemblies cost less than a new assembly, and meet all factory specifications required of a new assembly.

The defective assembly must be returned for credit under the terms of the rebuilt-exchange assembly program. The figure below illustrates the assembly exchange procedure in flowchart format.

Assembly Exchange Procedure



Shipping the Defective Assembly Back to Agilent Technologies

1. When you receive the rebuilt assembly, be careful not to damage the box in which it was shipped. You will use that box to return the defective assembly. The box you receive should contain the following:
 - the rebuilt assembly
 - an exchange assembly failure report
 - a return address label
2. Complete the failure report.
3. Place the failure report and the defective assembly in the box. Be sure to remove the enclosed return address label.
4. Seal the box with tape.

If you are inside the United States, stick the preprinted return address label over the label that is already on the box and return the box to Agilent Technologies. (Agilent Technologies pays postage on boxes mailed within the United States.)

If you are outside the USA, do not use the return address label; instead, address the box to the nearest Agilent Technologies sales and service office. (Refer to [Table 1-1](#) on page 1-9.)

Abbreviations Used in Part Descriptions

This section defines the reference designators, abbreviations, and option numbers that are used in the part descriptions throughout this chapter.

Reference Designations

| Reference Designator | Definition |
|----------------------|--------------------------------|
| A | assembly |
| AT | attenuator |
| B | fan |
| DS | lamp |
| J | electrical connector; jack |
| P | electrical connector; plug |
| W | cable; transmission path; wire |

Abbreviations

| Abbreviation | Definition |
|--------------|-------------------------------|
| Assy | assembly |
| Bd | board |
| BC | beryllium |
| BN | buttonhead (screws) |
| CPU | central processing unit |
| CW | conical washer (screws) |
| CY | copper |
| D | diameter |
| ESD | electrostatic discharge |
| EXT | external |
| FL | flathead (screws) |
| Ft | feet |
| Hex | hexagonal |
| GPIB | general purpose interface bus |
| HX | hexagonal recess (screws) |
| I | in-phase |
| ID | inside diameter |
| L | length |

| Abbreviation | Definition |
|---------------------|--|
| LF | low frequency |
| M | meters or metric hardware |
| OD | outside diameter |
| PC | patch lock (screws) or printed circuit |
| PN | panhead (screws) |
| Q | quadrature |
| Qty | quantity |
| REF | reference |
| RF | radio frequency |
| RFI | radio frequency interference |
| RPP | reverse power protection |
| SH | socket head cap (screws) |
| SMA | subminiature type-A |
| SMB | subminiature type-B |
| TX | TORX recess (screws) |
| V | volt |

Hardware Options

| Options | Definition |
|----------------|--|
| 1E6 | High Performance Pulse Input |
| 1EM | Rear Panel Connections |
| UN7 | Bit Error Rate Test |
| UN8 | Real-Time I/Q Baseband Generator - 1 Meg |
| UN9 | Adds 7 Meg RAM to UN8 |
| UNA | Alternate Timeslot Power |
| UNB | High Power with Mechanical Attenuator |
| UND | Dual Arbitrary Waveform Generator |

Major Assemblies

This section lists part numbers for the major assemblies in your signal generator. The following instrument views are provided to help you locate specific assemblies.

- “[Top View](#)” on page 4-8
- “[Right Side Assemblies](#)” on page 4-10
- “[Disassembled Front Panel View](#)” on page 4-11
- “[Inside Rear Panel View](#)” on page 4-12

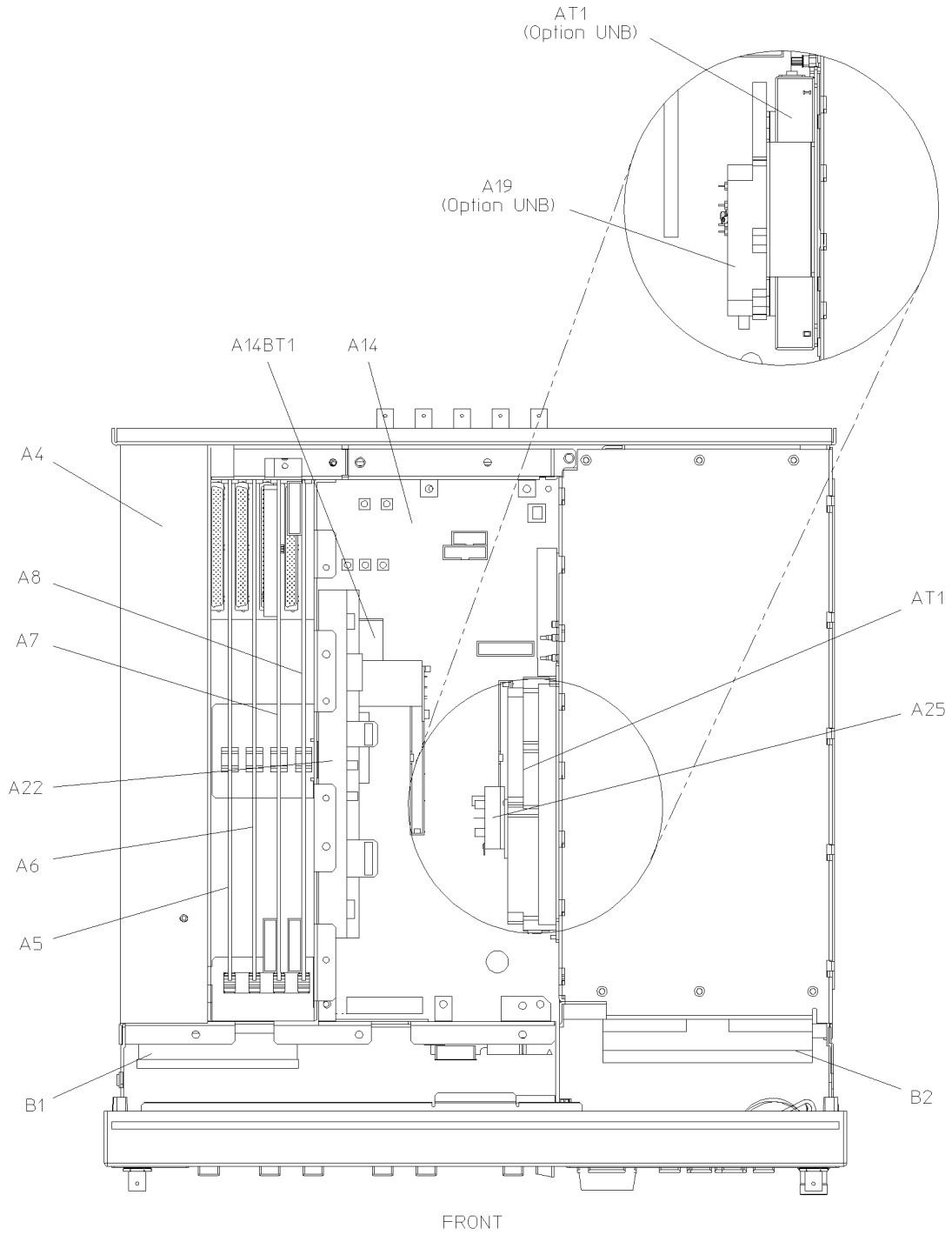
Top View

Refer to [Table 4-1](#) and [Figure 4-1](#).

Table 4-1 Top View

| Reference Designator | Part Number | Qty | Description |
|----------------------|-------------|-----|--|
| A4 | 0950-2791 | 1 | Assy-Power Supply |
| A5 | E4400-60187 | 1 | Bd Assy-Dual Arbitrary Waveform Generator (Option UND) |
| A5 | E4400-69187 | | Exchange Bd Assy-Dual Arbitrary Waveform Generator (Option UND) |
| A6 | E4400-60072 | 1 | Bd Assy-Bit Error Rate Test (Option UN7) |
| A6 | E4400-69072 | | Exchange Bd Assy-Bit Error Rate Test (Option UN7) |
| A7 | E4400-60070 | 1 | Bd Assy-Real-Time I/Q Baseband Generator (Options UN8, UN8+UN9) |
| A7 | E4400-69070 | | Exchange Bd Assy-Real-Time I/Q Baseband Generator (Options UN8, UN8+UN9) |
| A8 | E4400-60154 | 1 | Bd Assy-Flex Data Generator, 1 Meg (Option UN8) |
| A8 | E4400-69154 | | Exchange Bd Assy-Flex Data Generator, 1 Meg (Option UN8) |
| A8 | E4400-60195 | 1 | Bd Assy-Flex Data Generator (Option UN8+UN9) |
| A8 | E4400-69195 | | Exchange Bd Assy-Flex Data Generator (Option UN8+UN9) |
| A14 | E4400-60225 | 1 | Replacement Kit -CPU/Motherboard |
| A14BT1 | 1420-0338 | 1 | Battery-Lithium |
| AT1 | E4400-60042 | 1 | Assy-Electronic Attenuator/RPP (Option UNA) replaced by E4400-60681 |
| AT1 | E4400-60680 | 1 | Assy-Electronic Attenuator/RPP |
| AT1 | E4400-60681 | 1 | Assy-Electronic Attenuator/RPP upgrade kit (for E4400-60042 and E4400-60205) |
| AT1 | 33322-60014 | 1 | Assy-Mechanical Attenuator (Option UNB) |
| A19 | 08648-60025 | 1 | Assy-RPP (Option UNB) |
| A22 | E4423-60024 | 1 | YIG Driver Assembly |
| A25 | 08648-60010 | 1 | Pulse Modulator Assembly (Option 1E6) |
| B1 | E4400-60218 | 1 | Assy-Fan, Small |
| B2 | E4400-60062 | 1 | Kit-Fan, Large (includes 2 foam strips) |

Figure 4-1 Top View



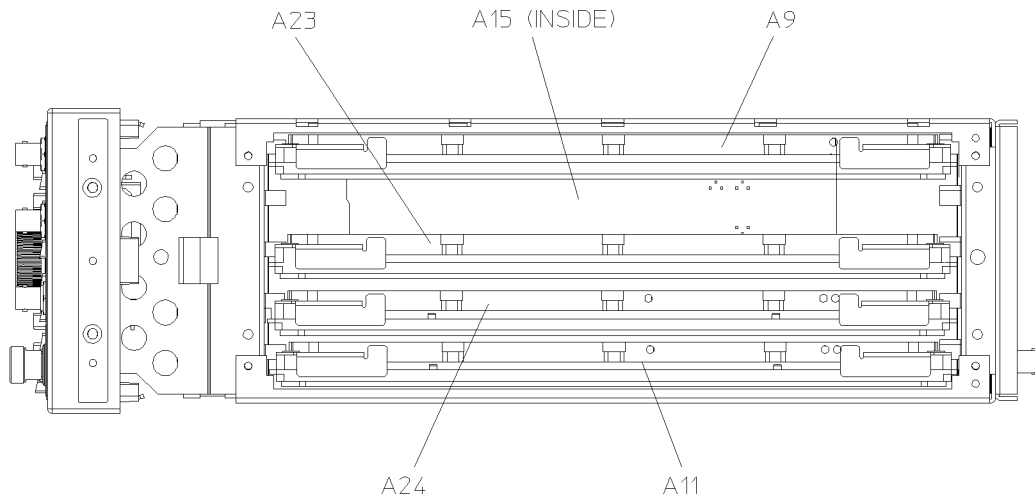
Right Side Assemblies

Refer to [Table 4-2](#) and [Figure 4-2](#).

Table 4-2 Replaceable Assemblies, Right Side

| Reference Designator | Part Number | Qty | Description |
|----------------------|-------------|-----|--|
| A9 | E4423-60022 | 1 | Bd Assy-Output |
| A9 | E4423-69022 | 1 | Exchange Bd Assy-Output |
| A9 | E4423-60030 | 1 | Bd Assy-Output (All models with Option UNB) |
| A9 | E4400-69030 | 1 | Exchange Bd Assy-Output (All models with Option UNB) |
| A11 | E4423-60018 | 1 | Bd Assy-Reference |
| A11 | E4423-69018 | 1 | Exchange Bd Assy-Reference |
| A15 | E4423-60021 | 1 | Bd Assy-Daughter |
| A15 | E4423-69021 | 1 | Exchange Bd Assy-Daughter |
| A23 | E4423-60020 | 1 | Bd Assy-Sampler |
| A23 | E4423-69020 | 1 | Exchange Bd Assy-Sampler |
| A24 | E4423-60019 | 1 | Bd Assy-Frac-N/Divider |
| A24 | E4423-69019 | 1 | Exchange Bd Assy-Frac-N/Divider |

Figure 4-2 Right Side View



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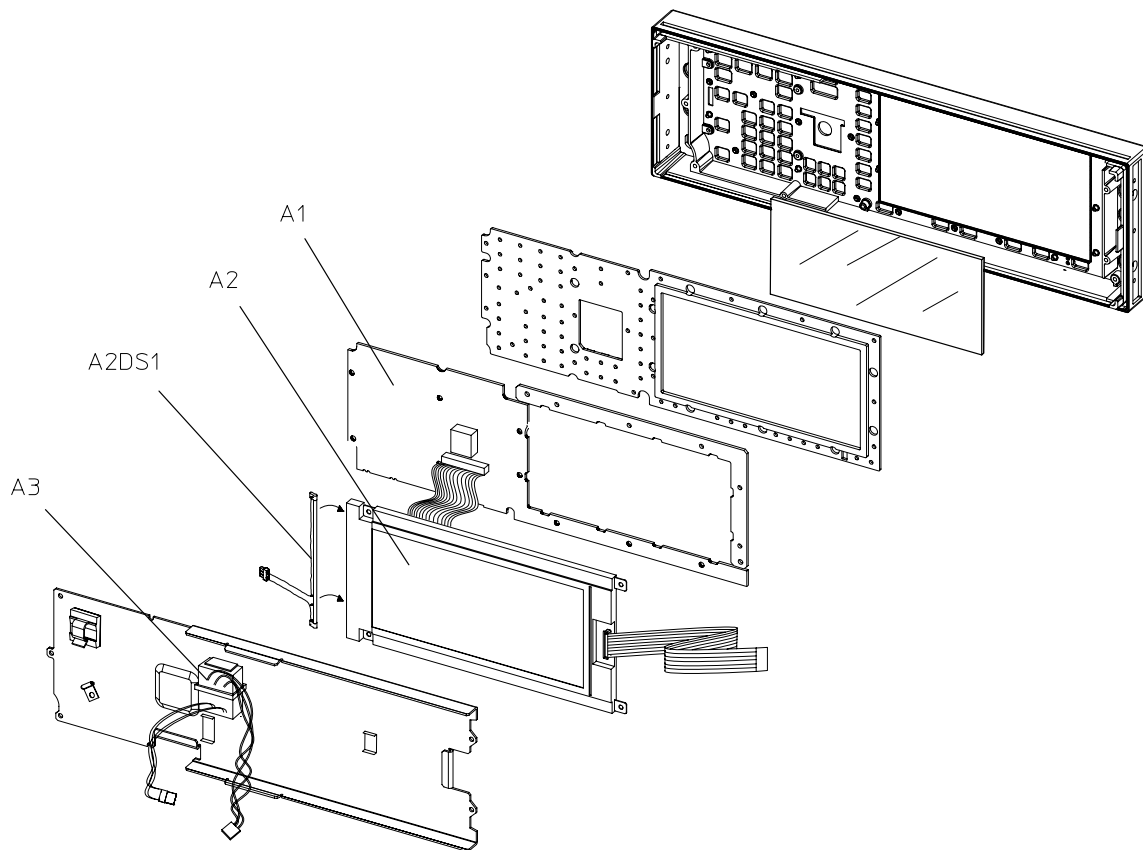
Disassembled Front Panel View

Refer to [Table 4-3](#) and [Figure 4-3](#).

Table 4-3 Disassembled Front Panel View

| Reference Designator | Part Number | Qty | Description |
|----------------------|-------------|-----|-------------------------------|
| A1 | E4400-60211 | 1 | Bd Assy-Front Panel |
| A2 | 2090-0375 | 1 | Assy-Display, Wide-Angle View |
| A2DS1 | 1513-5204 | 1 | Lamp-Fluorescent |
| A3 | 0950-3093 | 1 | Assy-Inverter |

Figure 4-3 Disassembled Front Panel View



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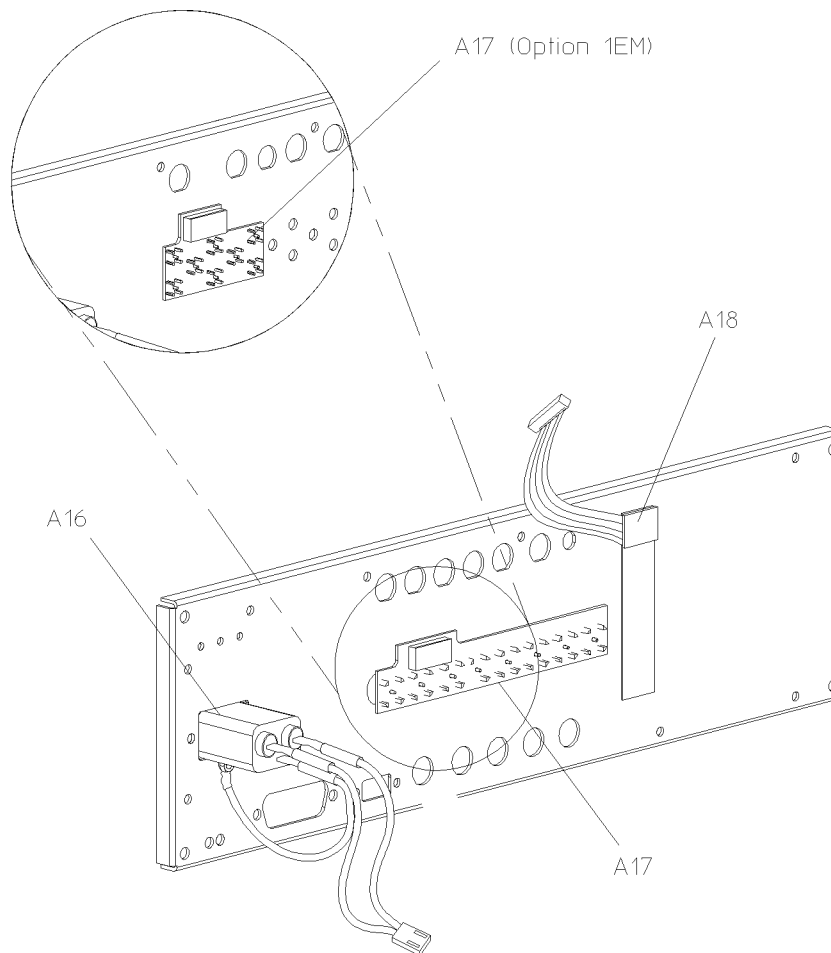
Inside Rear Panel View

Refer to [Table 4-4](#) and [Figure 4-4](#).

Table 4-4 Inside Rear Panel View

| Reference Designator | Part Number | Qty | Description |
|----------------------|-------------|-----|---|
| A16 | 5063-9711 | 1 | Assy-Line Module |
| A17 | E4400-60145 | 1 | Bd Assy-Rear Panel Interface (ESG-DP Series) |
| A17 | E4400-60146 | 1 | Bd Assy-Rear Panel Interface (ESG-DP Series Option 1EM) |
| A18 | E4400-60075 | 1 | Bd Assy Rear Panel Interface Subminiature Type-B (ESG-DP Series Option UN7) |

Figure 4-4 Inside Rear Panel View



sk72b

Cables

This section lists part numbers for the cables in your signal generator. The following instrument views are provided to help you locate specific cables.

- “Top View” on page 4-14
- “Top View (ESG-DP Series - Options UN7, UN8)” on page 4-16
- “Top View (ESG-DP Series - Option UND)” on page 4-18
- “Top View (ESG-DP Series - Options UN7, UN8 with 1EM)” on page 4-20
- “Top View (ESG-DP Series - Options UN7, UN8, UND)” on page 4-22
- “Top View (ESG-DP Series - Option UND with 1EM)” on page 4-24
- “Side View — YIG Driver Assembly” on page 4-26
- “Inside Front Panel View” on page 4-28
- “Electronic Attenuator/RPP View” on page 4-30
- “Electronic Attenuator/RPP View (with Option 1EM)” on page 4-32
- “Mechanical Attenuator View (Option UNB)” on page 4-34
- “Mechanical Attenuator View (Option UNB with 1EM)” on page 4-36
- “Pulse Modulator View (Option 1E6)” on page 4-38

Top View

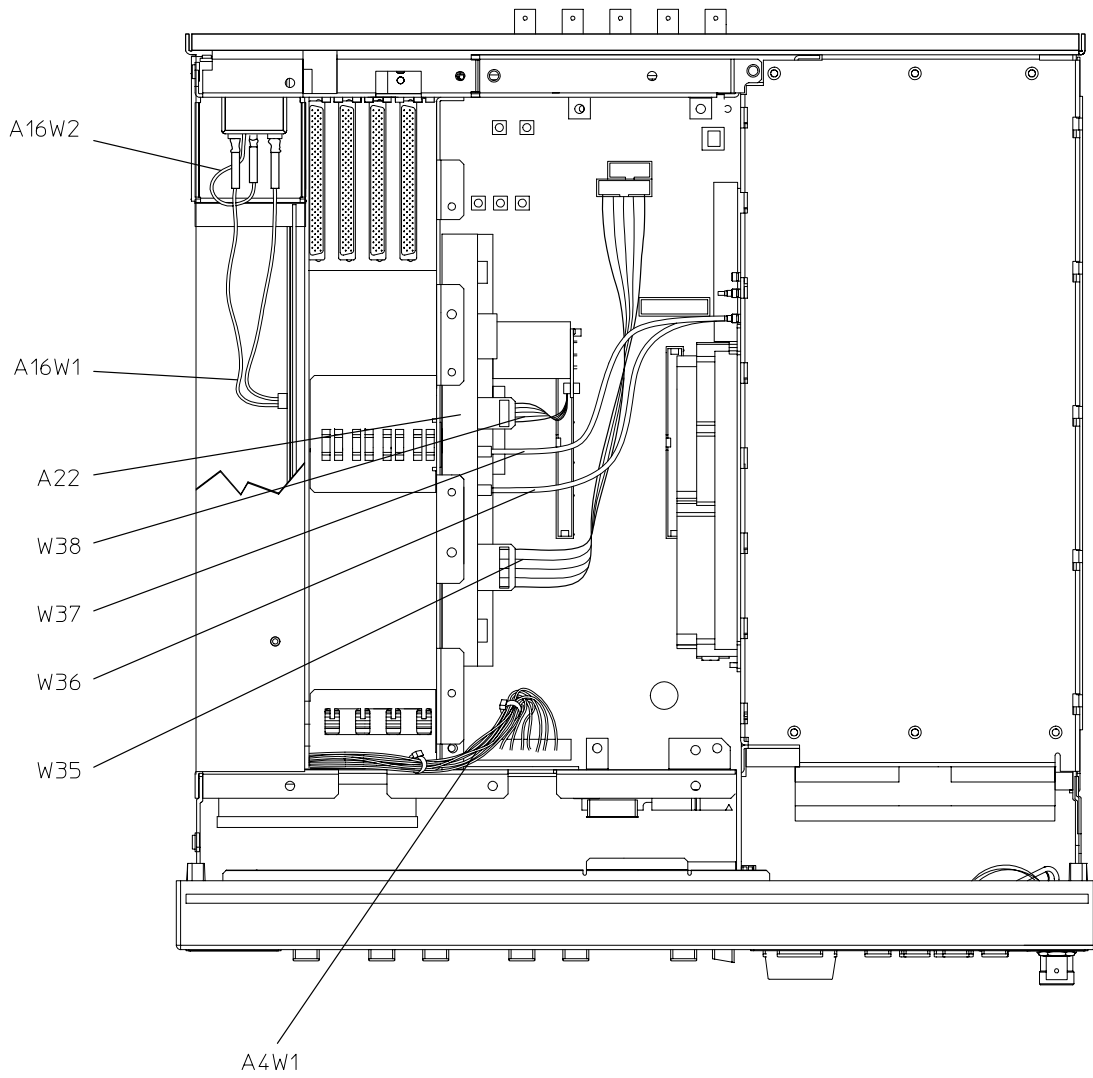
Refer to [Table 4-5](#) and [Figure 4-5](#).

Table 4-5 Top View (ESG-AP Series)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|--|
| A4W1* | (part of A4) | 1 | Power Supply (A4) to CPU/Motherboard (A14J6) |
| A16W1* | (part of A16) | 1 | Line Module (A16) to Power Supply (A4J1) |
| A16W2* | (part of A16) | 1 | Line Module (A16) to Chassis Ground Post on Rear Panel |
| A22 | E4423-60024 | 1 | YIG Output Loop Assembly |
| W35 | 8120-8789 | 1 | Ribbon Cable, YIG Driver (A22) to Motherboard (A14, J26) |
| W36 | 8120-8784 | 1 | Flexible Cable, Daughterboard (A15, YTO FM) to YIG Driver (A22) |
| W37 | 8120-8784 | 1 | Flexible Cable, Daughterboard (A15, PH Lock) to YIG Driver (A22) |
| W38 | 8120-8788 | 1 | Ribbon Cable, YIG Driver (A22) to YIG Driver Oscillator Assembly (part of A22) |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

Figure 4-5 Top View



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Top View (ESG-DP Series - Options UN7, UN8)

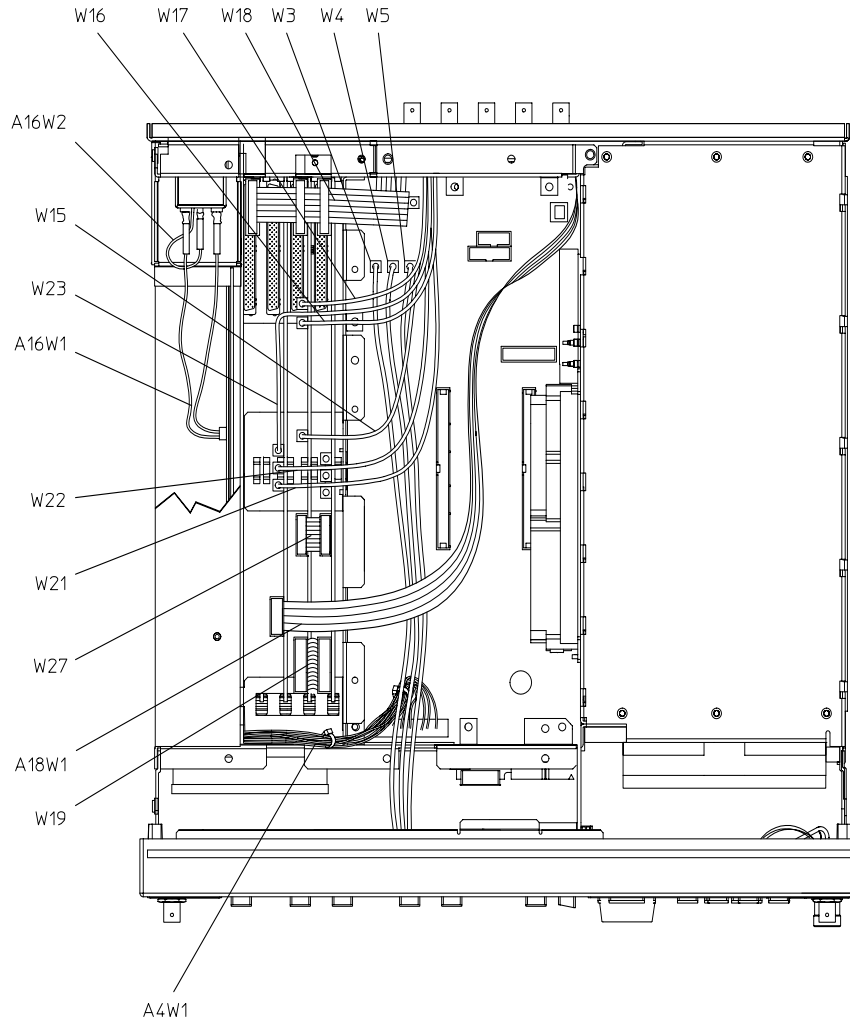
Refer to [Table 4-6](#) and [Figure 4-6](#).

Table 4-6 Top View (ESG-DP Series - Options UN7, UN8)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|---|
| A4W1* | (part of A4) | 1 | Power Supply (A4) to CPU/Motherboard (A14J6) |
| A16W1* | (part of A16) | 1 | Line Module (A16) to Power Supply (A4J1) |
| A16W2* | (part of A16) | 1 | Line Module (A16) to Chassis Ground Post on Rear Panel |
| A18W1* | (part of A18) | 1 | BERT Rear Panel Interface Board (A18) to BERT (A6) |
| W3 | 8120-5063 | 1 | DATA to Data Generator (A8J2) |
| W4 | 8120-5063 | 1 | DATA CLOCK to Data Generator (A8J1) |
| W5 | 8120-5063 | 1 | SYMBOL SYNC to Data Generator (A8J3) |
| W15 | 8120-5055 | 1 | Baseband Generator (A7P403) to BASEBAND GENREF IN |
| W16 | 8120-5055 | 1 | Baseband Generator (A7P404) to Rear Panel (Q OUT) |
| W17 | 8120-5055 | 1 | Baseband Generator (A7P405) to Rear Panel (I OUT) |
| W18 | 8120-8457 | 1 | Rear Panel Interface Board (A17) to Data Generator (A8P2) and Baseband Generator (A7P2) (Option UN8 - connects in three places) |
| W19 | 8120-8349 | 1 | Baseband Generator (A7P300) to Data Generator (A8P3) (Option UN8) |
| W21 | 8120-5055 | 1 | Bit Error Rate Test Board (A6) to BER GATE IN (Options UN8, UN7) |
| W22 | 8120-5055 | 1 | Bit Error Rate Test Board (A6) to BER CLK IN (Options UN8, UN7) |
| W23 | 8120-5055 | 1 | Bit Error Rate Test Board (A6) to BER DATA IN (Options UN8, UN7) |
| W27 | 8120-8725 | 1 | 16-Pin Ribbon Cable, Parallel Data In, Data Generator (A8) to Baseband Generator (A7) |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

Figure 4-6 Top View (ESG-DP Series - Options UN7, UN8)



sk762b

Top View (ESG-DP Series - Option UND)

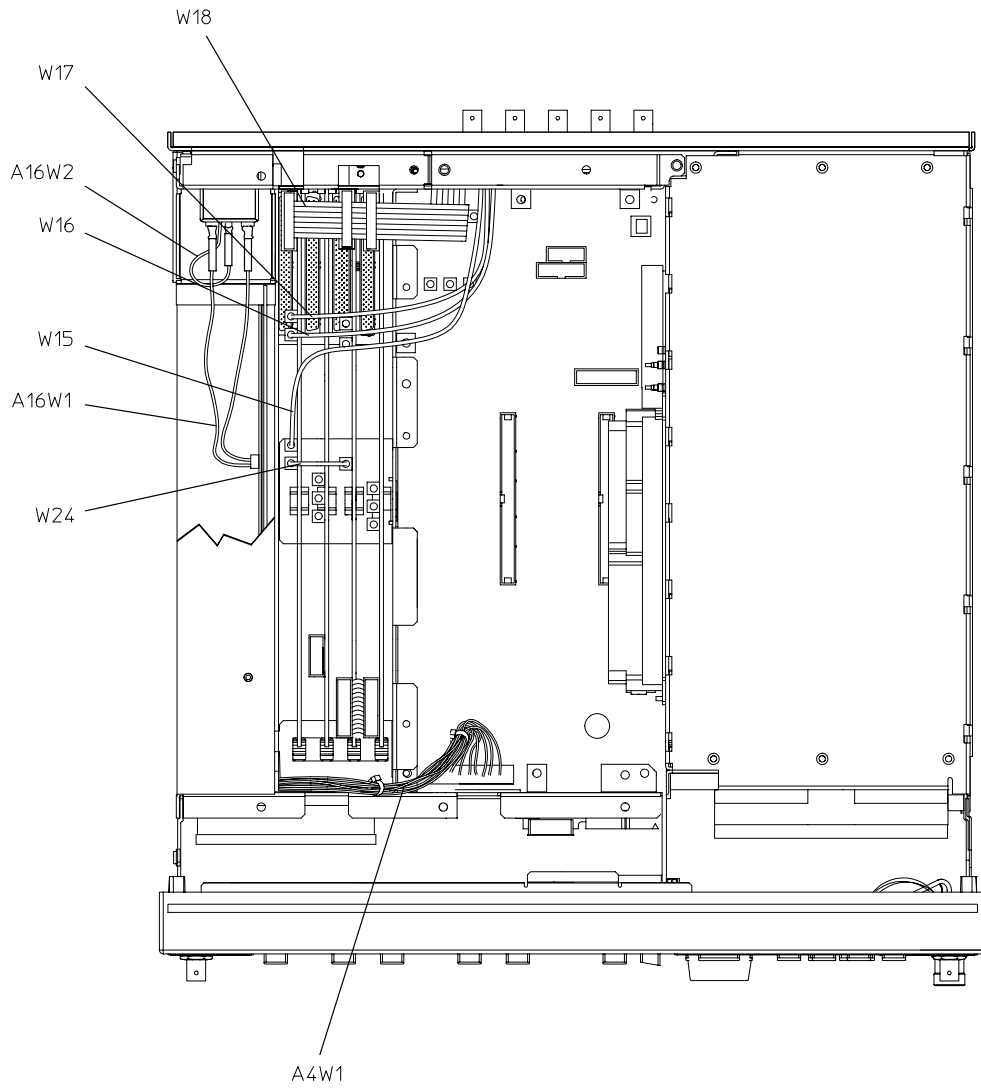
Refer to [Table 4-7](#) and [Figure 4-7](#).

Table 4-7 Top View (ESG-DP Series - Option UND)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|--|
| A4W1* | (part of A4) | 1 | Power Supply (A4) to CPU/Motherboard (A14J6) |
| A16W1* | (part of A16) | 1 | Line Module (A16) to Power Supply (A4J1) |
| A16W2* | (part of A16) | 1 | Line Module (A16) to Chassis Ground Post on Rear Panel |
| W15 | 8120-5055 | 1 | Dual Arb Waveform Generator (A5) to BASEBAND GEN REF |
| W16 | 8120-5055 | 1 | Dual Arb Waveform Generator (A5) to Q OUT |
| W17 | 8120-5055 | 1 | Dual Arb Waveform Generator (A5) to I OUT |
| W18 | 8120-8457 | 1 | Rear Panel Interface Board (A17) to Data Generator (A8P2), Baseband Generator (A7P2), and Dual Arb Waveform Generator (A5) (Option UN8 - connects in three places) |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

Figure 4-7 Top View (ESG-DP Series - Option UND)



sk79b

Top View (ESG-DP Series - Options UN7, UN8 with 1EM)

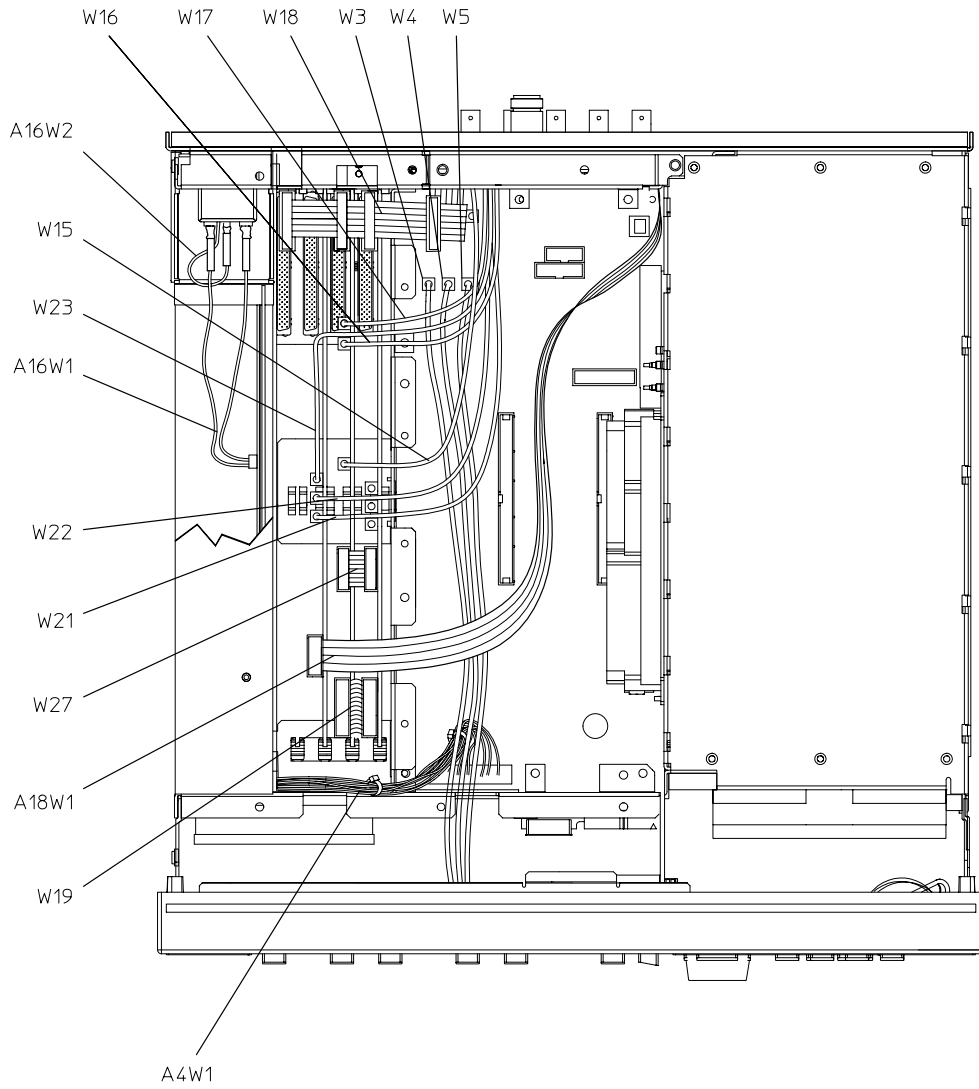
Refer to [Table 4-8](#) and [Figure 4-8](#).

Table 4-8 Top View (ESG-DP Series - Options UN7, UN8 with 1EM)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|---|
| A4W1* | (part of A4) | 1 | Power Supply (A4) to CPU/Motherboard (A14J6) |
| A16W1* | (part of A16) | 1 | Line Module (A16) to Power Supply (A4J1) |
| A16W2* | (part of A16) | 1 | Line Module (A16) to Chassis Ground Post on Rear Panel |
| A18W1* | (part of A18) | 1 | BERT Rear Panel Interface Board (A18) to BERT (A6) (Option UN7) |
| W3 | 8120-5556 | 1 | DATA to Data Generator (A8J2) (Option UN8) |
| W4 | 8120-5556 | 1 | DATA CLOCK to Data Generator (A8J1) (Option UN8) |
| W5 | 8120-5556 | 1 | SYMBOL SYNC to Data Generator (A8J3) (Option UN8) |
| W15 | 8120-5556 | 1 | Baseband Generator (A7P403) to BASEBAND GENREF IN (Option UN8) |
| W16 | 8120-5556 | 1 | Baseband Generator (A7P404) to Q OUT (Option UN8) |
| W17 | 8120-5556 | 1 | Baseband Generator (A7P405) to I OUT (Option UN8) |
| W18 | 8120-8457 | 1 | Rear Panel Interface Board (A17) to Data Generator (A8P2) and Baseband Generator (A7P2) (Option UN8 - connects in three places) |
| W19 | 8120-8349 | 1 | Baseband Generator (A7P300) to Data Generator (A8P3) (Option UN8) |
| W21 | 8120-5556 | 1 | Bit Error Rate Test Board (A6) to BER GATE IN (Option UN7) |
| W22 | 8120-5556 | 1 | Bit Error Rate Test Board (A6) to BER CLK IN (Option UN7) |
| W23 | 8120-5556 | 1 | Bit Error Rate Test Board (A6) to BER DATA IN (Option UN7) |
| W27 | 8120-8725 | 1 | 16-Pin Ribbon Cable, Parallel Data In, Data Generator (A8) to Baseband Generator (A7) |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

Figure 4-8 Top View (ESG-DP Series - Options UN7, UN8 with IEM)



sk7116b

Top View (ESG-DP Series - Options UN7, UN8, UND)

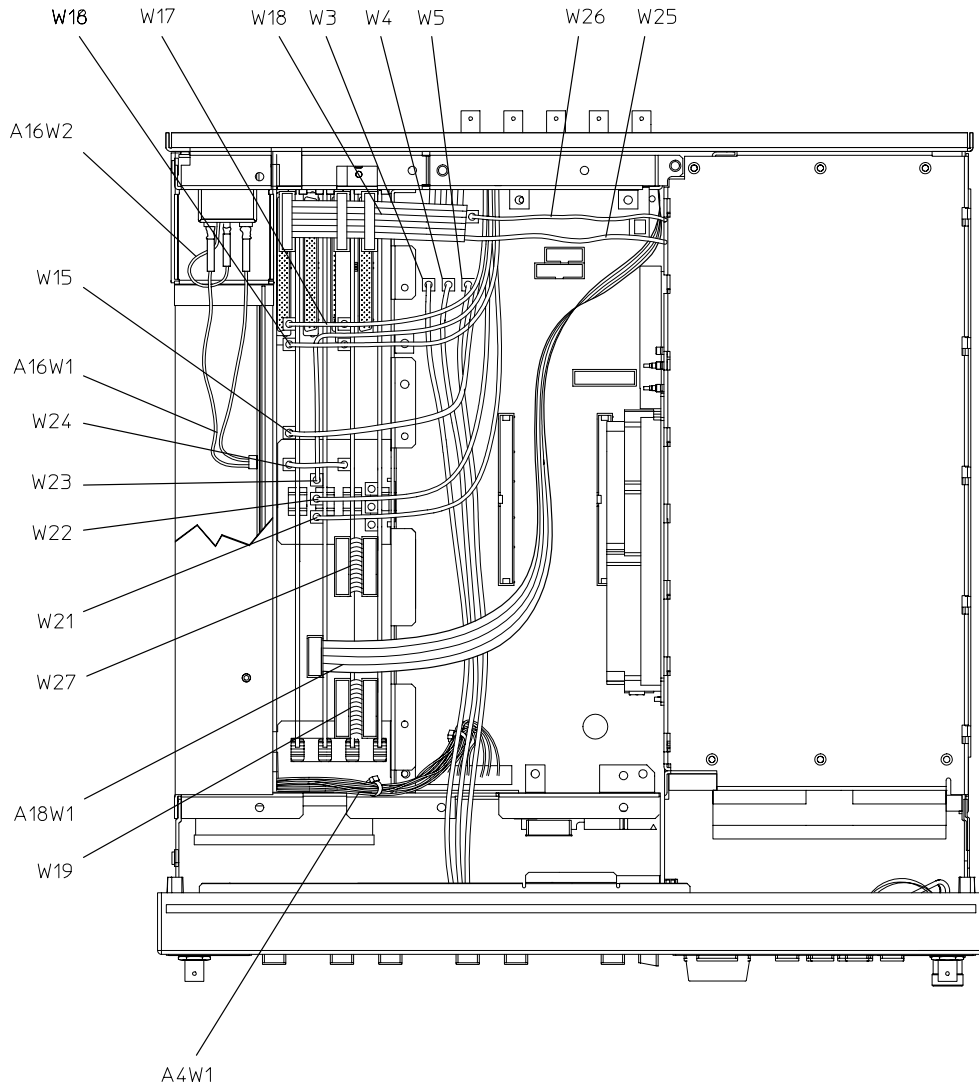
Refer to [Table 4-9](#) and [Figure 4-9](#).

Table 4-9 Top View (ESG-D Series - Options UN7, UN8, UND)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|---|
| A4W1* | (part of A4) | 1 | Power Supply (A4) to CPU/Motherboard (A14J6) |
| A16W1* | (part of A16) | 1 | Line Module (A16) to Power Supply (A4J1) |
| A16W2* | (part of A16) | 1 | Line Module (A16) to Chassis Ground Post on Rear Panel |
| A18W1* | (part of A18) | 1 | BERT Rear Panel Interface Board (A18) to BERT (A6) (Option UN7) |
| W3 | 8120-5556 | 1 | DATA to Data Generator (A8J2) (Option UN8) |
| W4 | 8120-5556 | 1 | DATA CLOCK to Data Generator (A8J1) (Option UN8) |
| W5 | 8120-5556 | 1 | SYMBOL SYNC to Data Generator (A8J3) (Option UN8) |
| W15 | 8120-5055 | 1 | Baseband Generator (A7P403) to BASEBAND GENREF IN (Option UN8) |
| W16 | 8120-5055 | 1 | Baseband Generator (A7P404) to Q OUT (Option UN8) |
| W17 | 8120-5055 | 1 | Baseband Generator (A7P405) to I OUT (Option UN8) |
| W18 | 8120-8457 | 1 | Rear Panel Interface Board (A17) to Data Generator (A8P2) and Baseband Generator (A7P2) (Option UN8 - connects in three places) |
| W19 | 8120-8349 | 1 | Baseband Generator (A7P300) to Data Generator (A8P3) (Option UN8) |
| W21 | 8120-5556 | 1 | Bit Error Rate Test Board (A6) to BER GATE IN (Option UN7) |
| W22 | 8120-5556 | 1 | Bit Error Rate Test Board (A6) to BER CLK IN (Option UN7) |
| W23 | 8120-5556 | 1 | Bit Error Rate Test Board (A6) to BER DATA IN (Option UN7) |
| W24 | E4400-20131 | 1 | Baseband Generator-13 MHz (A7) to Dual Arb Waveform Generator - 13 MHz (A5) (Option UN3 or UN4) |
| W25 | 8120-8748 | 1 | Motherboard (A14P103) to Daughterboard - Q INT (A15J8) |
| W26 | 8120-8748 | 1 | Motherboard (A14P102) to Daughterboard - I INT (A15J9) |
| W27 | 8120-8725 | 1 | 16-Pin Ribbon Cable, Parallel Data In, Data Generator (A8) to Baseband Generator (A7) |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

Figure 4-9 Top View (ESG-DP Series - Options UN7, UN8, UND)



sk7160b

Top View (ESG-DP Series - Option UND with 1EM)

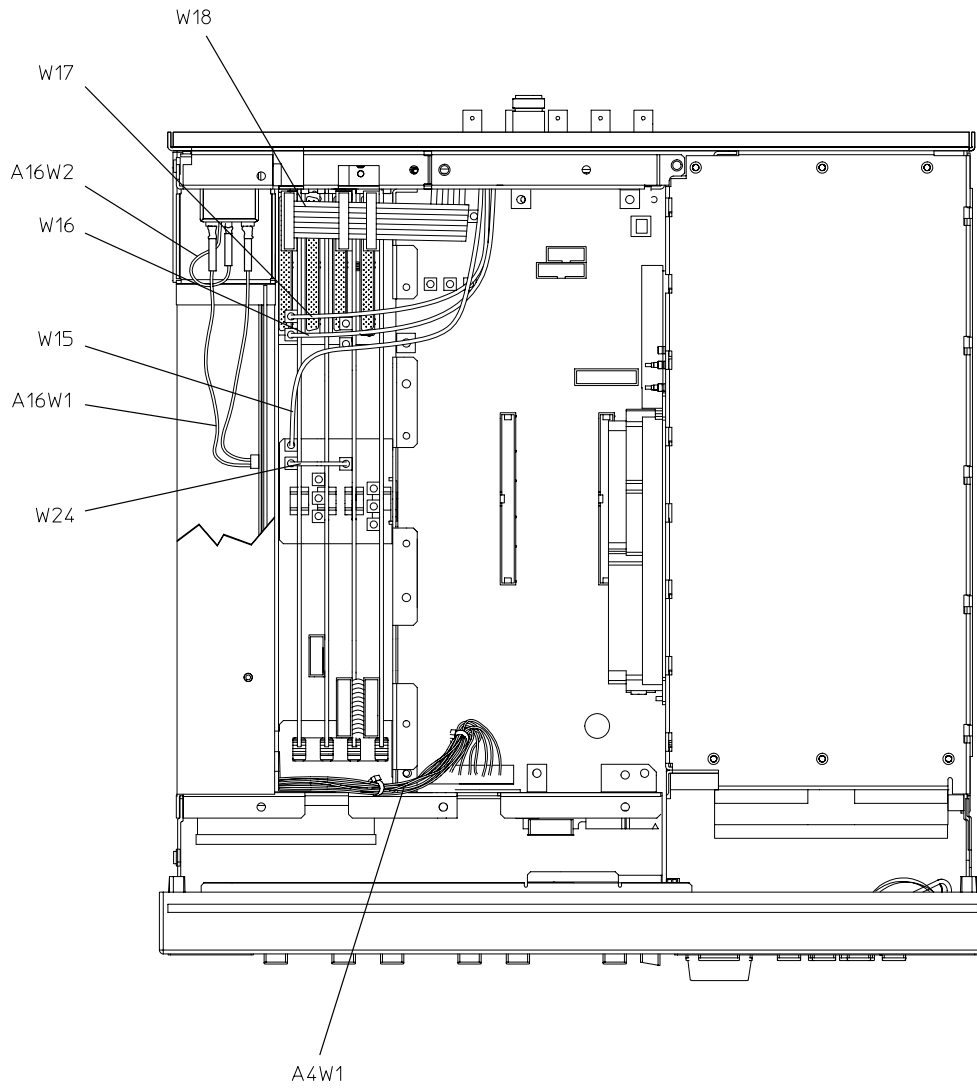
Refer to [Table 4-10](#) and [Figure 4-10](#).

Table 4-10 Top View (ESG-DP Series - Option UND with 1EM)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|---|
| A4W1* | (part of A4) | 1 | Power Supply (A4) to CPU/Motherboard (A14J6) |
| A16W1* | (part of A16) | 1 | Line Module (A16) to Power Supply (A4J1) |
| A16W2* | (part of A16) | 1 | Line Module (A16) to Chassis Ground Post on Rear Panel |
| W15 | 8120-5556 | 1 | Dual Arb Waveform Generator (A5) to BASEBAND GENREF IN |
| W16 | 8120-5556 | 1 | Dual Arb Waveform Generator (A5) to Q OUT |
| W17 | 8120-5556 | 1 | Dual Arb Waveform Generator (A5) to I OUT |
| W18 | 8120-8458 | 1 | Rear Panel Interface Board (A7) to Dual Arb Waveform Generator (A5) |
| | 8120-8457 | 1 | Rear Panel Interface Board (A17) to Data Generator (A8P2), Baseband Generator (A7P2), and Dual Arb Waveform Generator (A5) (Option UN8 - connects in four places) |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

Figure 4-10 Top View (ESG-DP Series - Option UND with 1EM)



sk711b

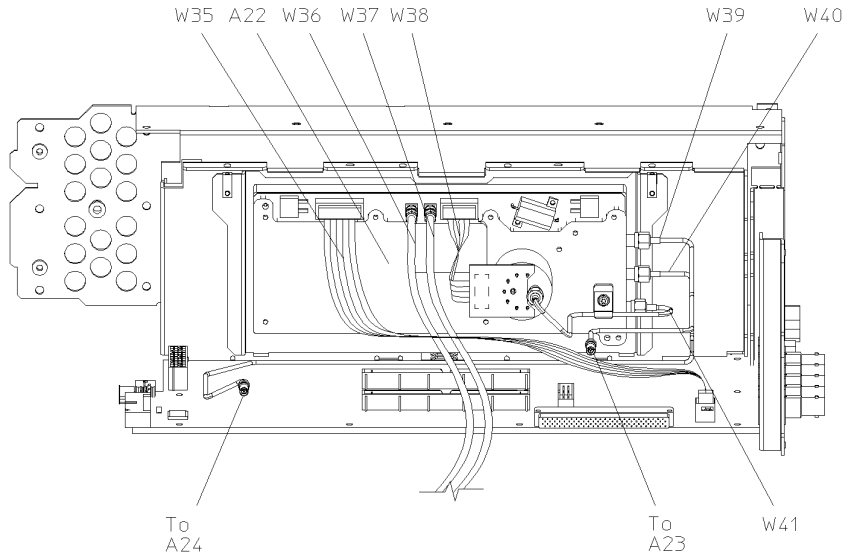
Side View — YIG Driver Assembly

Refer to [Table 4-11](#) and [Figure 4-11](#).

Table 4-11 Side View — YIG Driver Assembly

| Reference Designator | Part Number | Qty | Description |
|----------------------|-------------|-----|--|
| A22 | E4423-60024 | 1 | YIG Output Loop Assembly |
| W35 | 8120-8789 | 1 | Ribbon Cable, YIG Driver (A22) to Motherboard (A14, J26) |
| W36 | 8120-8784 | 1 | Flexible Cable, Daughterboard (A15, YTO FM) to YIG Driver (A22) |
| W37 | 8120-8784 | 1 | Flexible Cable, Daughterboard (A15, PH Lock) to YIG Driver (A22) |
| W38 | 8120-8788 | 1 | Ribbon Cable, YIG Driver (A22) to YIG Driver Oscillator Assembly (part of A22) |
| W39 | E4423-20010 | 1 | Semi-Rigid Cable, YIG Driver (A22) to Sampler (A23) |
| W40 | E4423-20009 | 1 | Semi-Rigid Cable, YIG Driver (A22) to Frac-N/Divider (A24) |
| W41 | E4423-20013 | 1 | Semi-Rigid Cable, YIG to YIG Driver (A22, Osc Assy) |

Figure 4-11 Side View — YIG Driver Assembly



sk7107b

Inside Front Panel View

Refer to [Table 4-12](#) and [Figure 4-12](#).

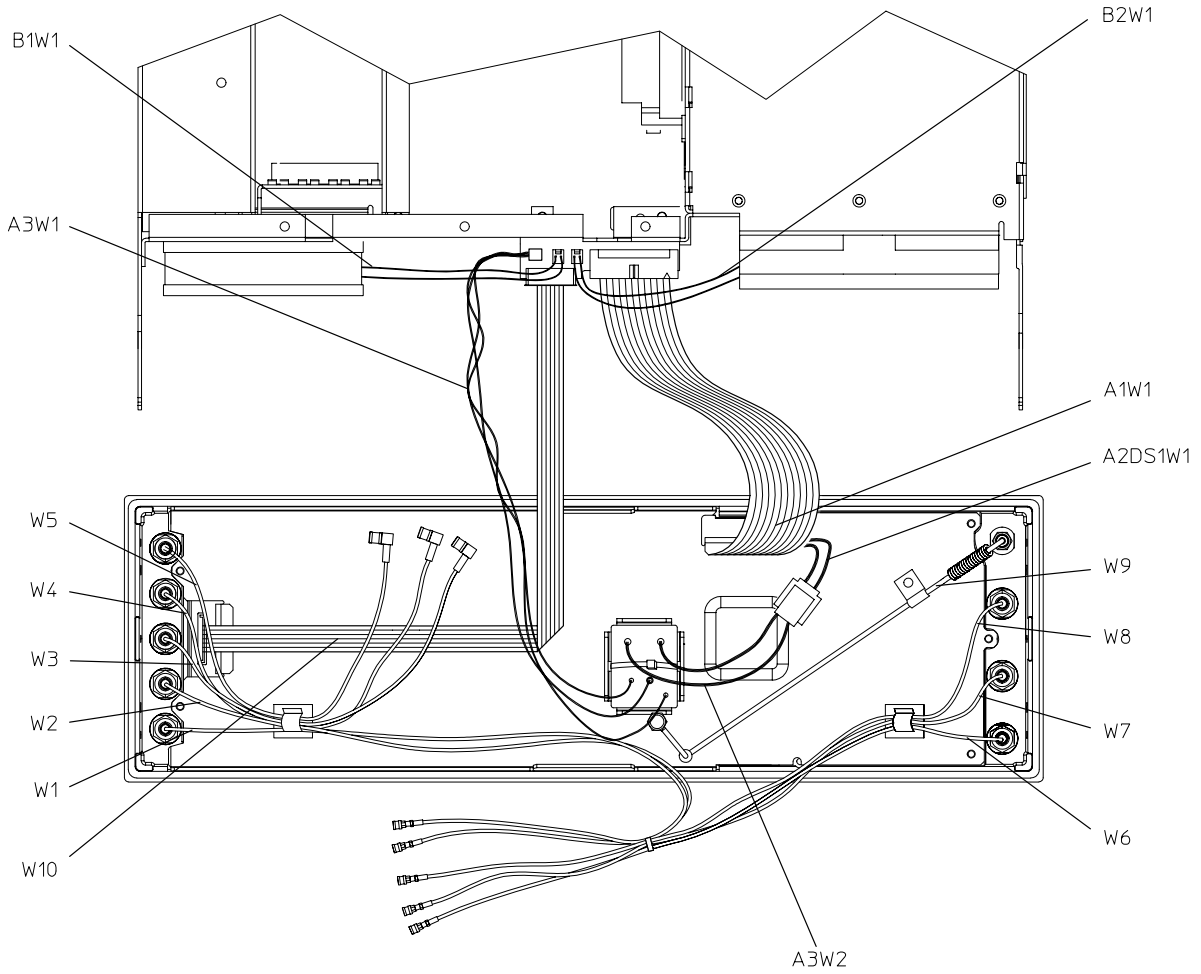
Table 4-12 Inside Front Panel View

| Reference Designator | Part Number | Qty | Description |
|----------------------|-----------------|-----|---|
| A1W1* | (part of A1) | 1 | Front Panel Board (A1) to CPU/Motherboard (A14J20) |
| A2DS1W1* | (part of A2DS1) | 1 | Florescent Lamp (A2DS1) to A3W2 |
| A3W1* | (part of A3) | 1 | Inverter (A3) to CPU/Motherboard (A14J19) |
| A3W2* | (part of A3) | 1 | Inverter (A3) to A2DS1W1 |
| B1W1* | (part of B1) | 1 | Small Fan (B1) to CPU/Motherboard (A14J16) |
| B2W1* | (part of B2) | 1 | Large Fan (B2) to CPU/Motherboard (A14J17) |
| W1 | 8120-8786 | 1 | I IN to Daughterboard (A15J2) |
| W2 | 8120-8786 | 1 | Q IN to Daughterboard (A15J3) |
| W3 | 8120-5063 | 1 | DATA to Baseband Generator (A7P100) (Options UN8) |
| W4 | 8120-5063 | 1 | DATA CLOCK to Baseband Generator (A7P103) (Options UN8) |
| W5 | 8120-5063 | 1 | SYMBOL SYNC to Baseband Generator (A7P101) (Options UN8) |
| W6 | 8120-8786 | 1 | EXT 1 to Daughterboard (A15J4) |
| W7 | 8120-8786 | 1 | EXT 2 to Daughterboard (A15J5) |
| W8 | 8120-8786 | 1 | LF OUTPUT to Daughterboard (A15J6) |
| W9 | E4400-20018 | 1 | RF OUTPUT to Electronic Attenuator/RPP (AT1) |
| | E4400-20125 | 1 | RF OUTPUT to RPP (AT1) (Option 1EM, UNB) |
| W10 | 8120-6759 | 1 | Display (A2) to CPU/Motherboard (A14J21) |
| W47 | 8120-8783 | 1 | Flexible Cable, PULSE IN (FP) to Pulse Modulator (A25) (Option 1E6 - not shown) |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

NOTE The figure on the adjacent page represents an ESG-DP series front panel having option UN8. On a standard ESG-DP series front panel, W3, W4, and W5 do not exist and the front panel connectors for W1 and W2 will be in a slightly different location. An ESG-AP series front panel does not include W1 through W5, but will include W47 with Option 1E6 (not shown). All models having Option 1EM do not have W1 through W9 on the front panel.

Figure 4-12 Inside Front Panel View



sk7146b

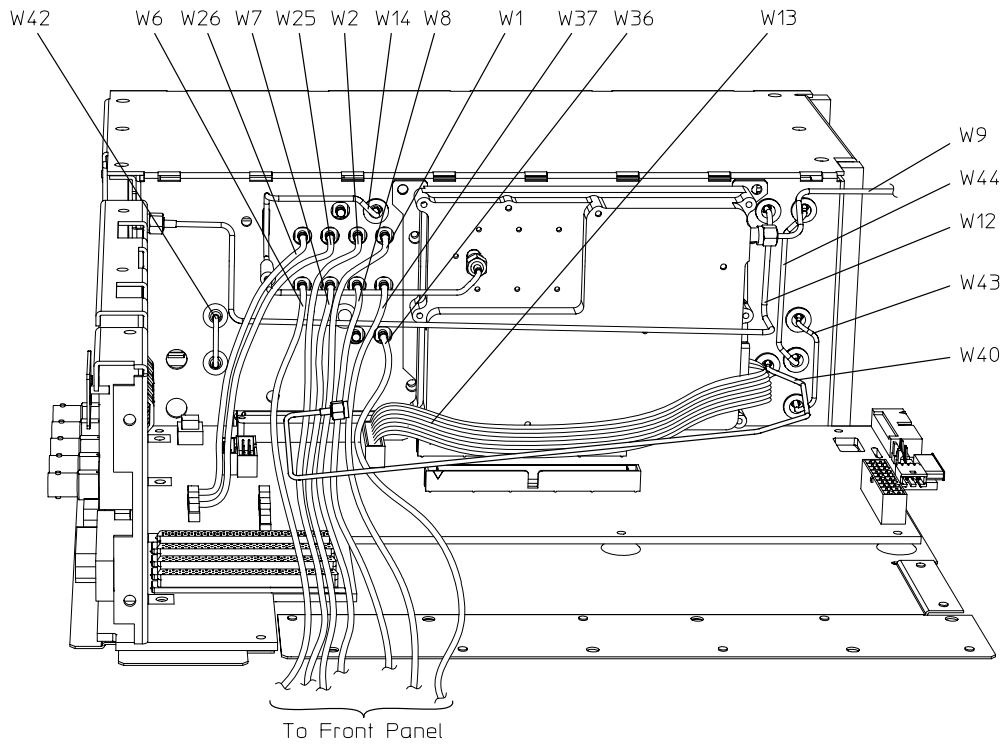
Electronic Attenuator/RPP View

Refer to [Table 4-13](#) and [Figure 4-13](#).

Table 4-13 Electronic Attenuator/RPP View

| Reference Designator | Part Number | Qty | Description |
|----------------------|-------------|-----|--|
| W1 | 8120-8786 | 1 | I IN to Daughterboard (A15J2) |
| W2 | 8120-8786 | 1 | Q IN to Daughterboard (A15J3) |
| W6 | 8120-8786 | 1 | EXT 1 to Daughterboard (A15J4) |
| W7 | 8120-8786 | 1 | EXT 2 to Daughterboard (A15J5) |
| W8 | 8120-8786 | 1 | LF OUTPUT to Daughterboard (A15J6) |
| W9 | E4400-20018 | 1 | RF OUTPUT to Electronic Attenuator/RPP (AT1) |
| W12 | E4400-60060 | 1 | Output Board (A9) to COHERENT CARRIER (includes cable retainer and ring) |
| W13 | 8120-6837 | 1 | Electronic Attenuator/RPP (AT1) to CPU/Motherboard (A14J14) |
| W14 | E4400-60061 | 1 | Electronic Attenuator/RPP (AT1) to Output Board (A9) (includes cable retainer and ring) used with the E4400-60007, E4400-60042, and E4400-60205 attenuators. |
| | E4400-60726 | 1 | Electronic Attenuator/RPP (AT1) to Output Board (A9) (includes cable retainer and ring) used with the E4400-600680 attenuator. |
| W25 | 8120-8781 | 1 | Motherboard (A14P103) to Daughterboard - Q INT (A15J8) |
| W26 | 8120-8781 | 1 | Motherboard (A14P102) to Daughterboard - I INT (A15J9) |
| W36 | 8120-8784 | 1 | Flexible Cable, Daughterboard (A15, YTO FM) to YIG Driver (A22) |
| W37 | 8120-8784 | 1 | Flexible Cable, Daughterboard (A15, PH Lock) to YIG Driver (A22) |
| W40 | E4423-20009 | 1 | Semi-Rigid Cable, YIG Driver (A22) to Fractional-N (A24) |
| W42 | E4423-20025 | 1 | Semi-Rigid Cable, Sampler (A23) to Fractional-N (A24) |
| W43 | E4423-10026 | 1 | Semi-Rigid Cable, Sampler (A23) to Reference (A11) |
| W44 | E4423-10024 | 1 | Semi-Rigid Cable, Output (A9) to Fractional-N (A24) |

Figure 4-13 Electronic Attenuator/RPP View



sk7126b

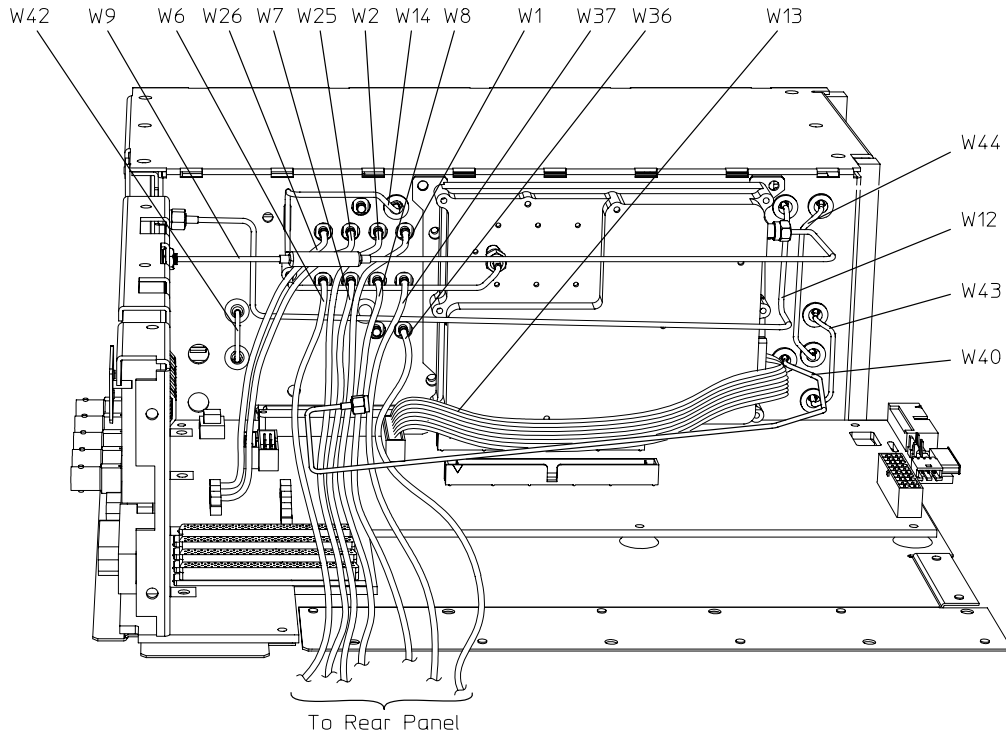
Electronic Attenuator/RPP View (with Option 1EM)

Refer to [Table 4-14](#) and [Figure 4-14](#).

Table 4-14 Electronic Attenuator/RPP View (with Option 1EM)

| Reference Designator | Part Number | Qty | Description |
|----------------------|-------------|-----|--|
| W1 | 8120-8786 | 1 | I IN to Daughterboard (A15J2) |
| W2 | 8120-8786 | 1 | Q IN to Daughterboard (A15J3) |
| W6 | 8120-8786 | 1 | EXT 1 to Daughterboard (A15J4) |
| W7 | 8120-8786 | 1 | EXT 2 to Daughterboard (A15J5) |
| W8 | 8120-8786 | 1 | LF OUTPUT to Daughterboard (A15J6) |
| W9 | E4400-20025 | 1 | RF OUTPUT to Electronic Attenuator/RPP (AT1) |
| W12 | E4400-60060 | 1 | Output Board (A9) to COHERENT CARRIER (includes cable retainer and ring) |
| W13 | 8120-6837 | 1 | Electronic Attenuator/RPP (AT1) to CPU/Motherboard (A14J14) |
| W14 | E4400-60061 | 1 | Electronic Attenuator/RPP (AT1) to Output Board (A9) (includes cable retainer and ring) used with the E4400-60007, E4400-60042, and E4400-60680 attenuators. |
| | E4400-60726 | 1 | Electronic Attenuator/RPP (AT1) to Output Board (A9) (includes cable retainer and ring) used with the E4400-60680 attenuator. |
| W25 | 8120-8781 | 1 | Motherboard (A14P103) to Daughterboard - Q INT (A15J8) |
| W26 | 8120-8781 | 1 | Motherboard (A14P102) to Daughterboard - I INT (A15J9) |
| W36 | 8120-8784 | 1 | Flexible Cable, Daughterboard (A15, YTO FM) to YIG Driver (A22) |
| W37 | 8120-8784 | 1 | Flexible Cable, Daughterboard (A15, PH Lock) to YIG Driver (A22) |
| W40 | E4423-20009 | 1 | Semi-Rigid Cable, YIG Driver (A22) to Fractional-N (A24) |
| W42 | E4423-20025 | 1 | Semi-Rigid Cable, Sampler (A23) to Fractional-N (A24) |
| W43 | E4423-10026 | 1 | Semi-Rigid Cable, Sampler (A23) to Reference (A11) |
| W44 | E4423-10024 | 1 | Semi-Rigid Cable, Output (A9) to Fractional-N (A24) |

Figure 4-14 Electronic Attenuator/RPP View (with Option 1EM)



sk7143b

Mechanical Attenuator View (Option UNB)

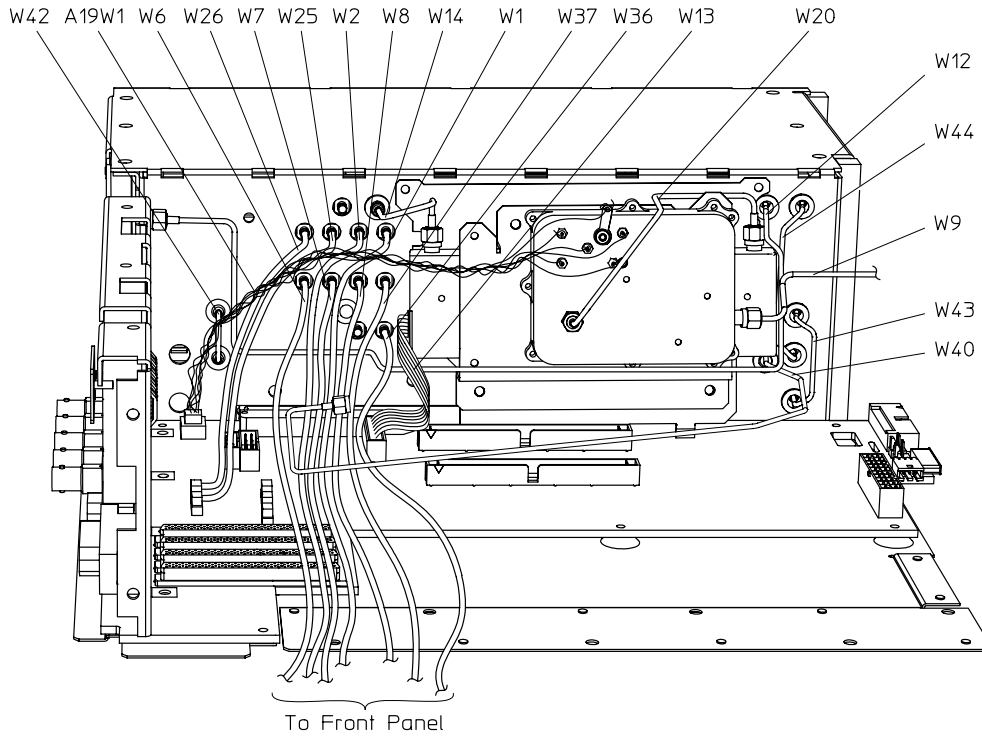
Refer to [Table 4-15](#) and [Figure 4-15](#).

Table 4-15 Mechanical Attenuator View (Option UNB)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|---|
| A19W1* | (part of A19) | 1 | RPP (A19) to Motherboard (A14J15) |
| W1 | 8120-8786 | 1 | I IN to Daughterboard (A15J2) |
| W2 | 8120-8786 | 1 | Q IN to Daughterboard (A15J3) |
| W6 | 8120-8786 | 1 | EXT 1 to Daughterboard (A15J4) |
| W7 | 8120-8786 | 1 | EXT 2 to Daughterboard (A15J5) |
| W8 | 8120-8786 | 1 | LF OUTPUT to Daughterboard (A15J6) |
| W9 | E4400-20125 | 1 | RF OUTPUT to RPP (A19) |
| W12 | E4400-60060 | 1 | Output Board (A9) to COHERENT CARRIER (includes cable retainer and ring) |
| W13 | E4400-20132 | 1 | Mechanical Attenuator (AT1) to CPU/Motherboard (A14J14) |
| W14 | E4400-60177 | 1 | Mechanical Attenuator (AT1) to Output Board (A9) (includes cable retainer and ring) |
| W20 | E4400-20126 | 1 | Semi-Rigid Cable, Mechanical Attenuator (AT1) to RPP (A19) |
| W25 | 8120-8781 | 1 | Motherboard (A14P103) to Daughterboard - Q INT (A15J8) |
| W26 | 8120-8781 | 1 | Motherboard (A14P102) to Daughterboard - I INT (A15J9) |
| W36 | 8120-8784 | 1 | Flexible Cable, Daughterboard (A15, YTO FM) to YIG Driver (A22) |
| W37 | 8120-8784 | 1 | Flexible Cable, Daughterboard (A15, PH Lock) to YIG Driver (A22) |
| W40 | E4423-20009 | 1 | Semi-Rigid Cable, YIG Driver (A22) to Fractional-N (A24) |
| W42 | E4423-20025 | 1 | Semi-Rigid Cable, Sampler (A23) to Fractional-N (A24) |
| W43 | E4423-10026 | 1 | Semi-Rigid Cable, Sampler (A23) to Reference (A11) |
| W44 | E4423-10024 | 1 | Semi-Rigid Cable, Output (A9) to Fractional-N (A24) |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

Figure 4-15 Mechanical Attenuator View (Option UNB)



sk7144b

Mechanical Attenuator View (Option UNB with 1EM)

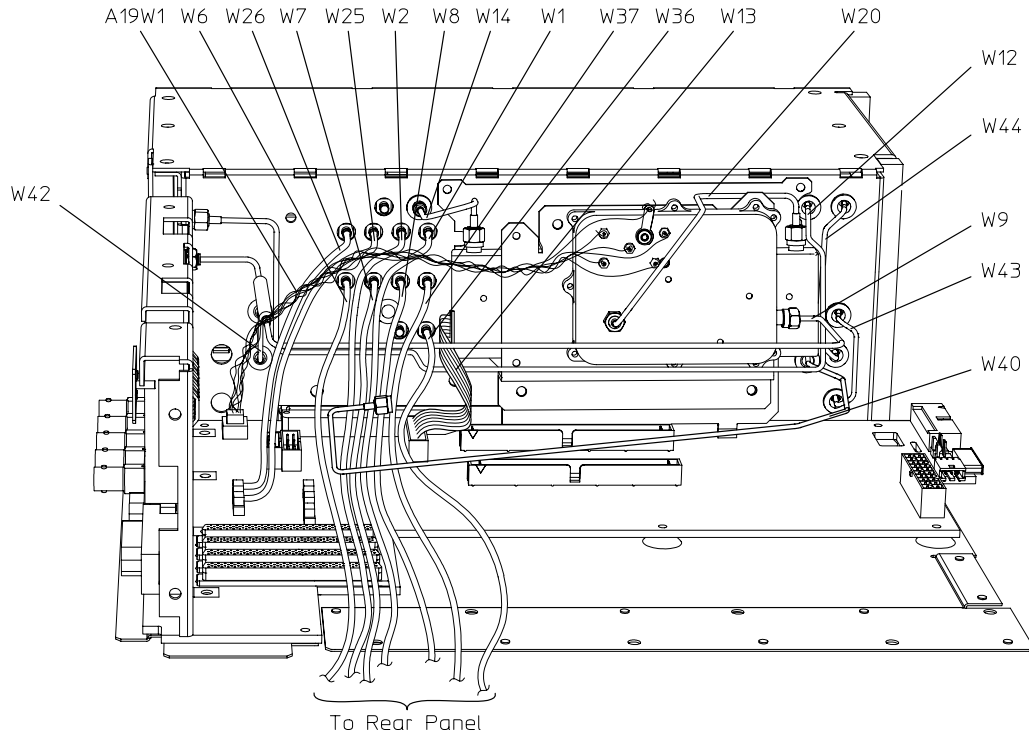
Refer to [Table 4-16](#) and [Figure 4-16](#).

Table 4-16 Mechanical Attenuator View (Option UNB with 1EM)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|---|
| A19W1* | (part of A19) | 1 | RPP (A19) to Motherboard (A14J15) |
| W1 | 8120-8786 | 1 | I IN to Daughterboard (A15J2) |
| W2 | 8120-8786 | 1 | Q IN to Daughterboard (A15J3) |
| W6 | 8120-8786 | 1 | EXT 1 to Daughterboard (A15J4) |
| W7 | 8120-8786 | 1 | EXT 2 to Daughterboard (A15J5) |
| W8 | 8120-8786 | 1 | LF OUTPUT to Daughterboard (A15J6) |
| W9 | E4423-20012 | 1 | RF OUTPUT to RPP (A19) |
| W12 | E4400-60060 | 1 | Output Board (A9) to COHERENT CARRIER (includes cable retainer and ring) |
| W13 | E4400-20132 | 1 | Mechanical Attenuator (AT1) to CPU/Motherboard (A14J14) |
| W14 | E4400-60177 | 1 | Mechanical Attenuator (AT1) to Output Board (A9) (includes cable retainer and ring) |
| W20 | E4400-20126 | 1 | Semi-Rigid Cable, Mechanical Attenuator (AT1) to RPP (A19) |
| W25 | 8120-8781 | 1 | Motherboard (A14P103) to Daughterboard - Q INT (A15J8) |
| W26 | 8120-8781 | 1 | Motherboard (A14P102) to Daughterboard - I INT (A15J9) |
| W36 | 8120-8784 | 1 | Flexible Cable, Daughterboard (A15, YTO FM) to YIG Driver (A22) |
| W37 | 8120-8784 | 1 | Flexible Cable, Daughterboard (A15, PH Lock) to YIG Driver (A22) |
| W40 | E4423-20009 | 1 | Semi-Rigid Cable, YIG Driver (A22) to Fractional-N (A24) |
| W42 | E4423-20025 | 1 | Semi-Rigid Cable, Sampler (A23) to Fractional-N (A24) |
| W43 | E4423-10026 | 1 | Semi-Rigid Cable, Sampler (A23) to Reference (A11) |
| W44 | E4423-10024 | 1 | Semi-Rigid Cable, Output (A9) to Fractional-N (A24) |

*. This cable is not replaceable by itself. You must order the corresponding assembly.

Figure 4-16 Mechanical Attenuator View (Option UNB with 1EM)



sk7145b

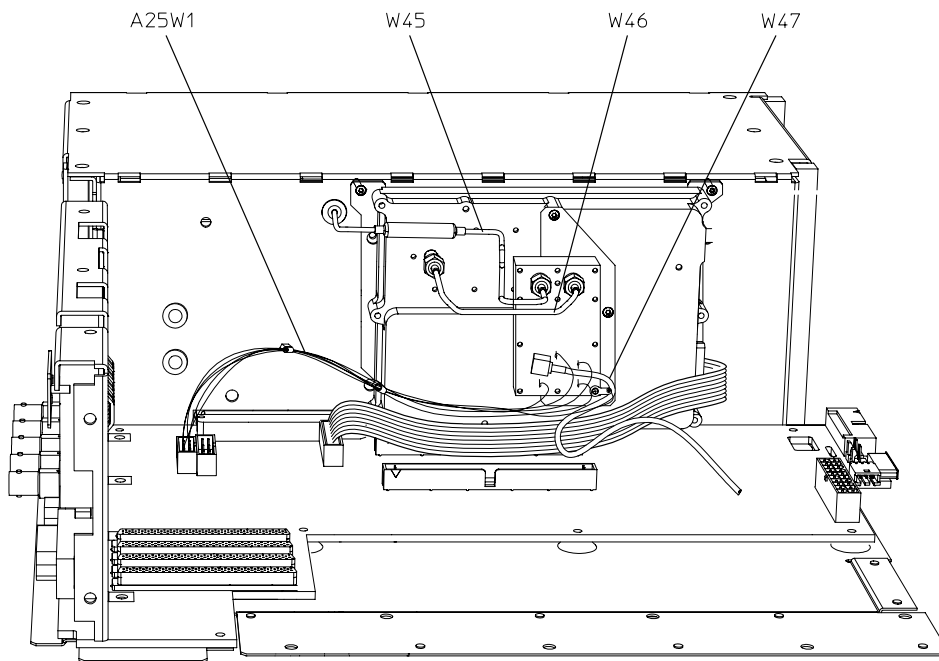
Pulse Modulator View (Option 1E6)

Refer to [Table 4-17](#) and [Figure 4-17](#).

Table 4-17 Pulse Modulator View (Option 1E6)

| Reference Designator | Part Number | Qty | Description |
|----------------------|---------------|-----|--|
| A25W1 | (part of A25) | 1 | Wire Harness, Pulse Modulator (A25) to Motherboard (A14) |
| W45 | E4423-20017 | 1 | Semi-Rigid Cable, Output (A9) to Pulse Modulator (A25) |
| | E4423-20012 | 1 | Semi-Rigid Cable, Output (A9) to Pulse Modulator (A25) (Option UNB - not shown) |
| W46 | E4423-20014 | 1 | Semi-Rigid Cable, Electronic Attenuator (AT1) to Pulse Modulator (A25) used with the E4400-60007, E4400-60042, and E4400-60205 attenuators. |
| | E4423-20726 | 1 | Semi-Rigid Cable, Electronic Attenuator (AT1) to Pulse Modulator (A25) used with the E4400-60680 attenuator. |
| | E4423-20011 | | Semi-Rigid Cable, Mechanical Attenuator (AT1) to Pulse Modulator (A25) (Option UNB - not shown) |
| W47 | 8120-8783 | 1 | Flexible Cable, PULSE IN (FP) to Pulse Modulator (A25) |
| | 8120-8787 | 1 | Flexible Cable, PULSE IN (RP) to Pulse Modulator (A25) (Option 1EM) |

Figure 4-17 Pulse Modulator View (Option 1E6)



sk7139b

Hardware and Other Instrument Parts

This section lists part numbers for hardware and other parts in your signal generator. The following instrument views are provided to help you locate specific parts.

- “Top View” on page 4-40
- “YIG Driver View” on page 4-42
- “Disassembled Mechanical Attenuator View (Option UNB)” on page 4-43
- “Disassembled Pulse Modulator View (Option 1E6)” on page 4-44
- “Disassembled Pulse Modulator View (Option 1E6/UNB)” on page 4-45
- “Front Panel View (ESG-AP Series)” on page 4-46
- “Front Panel View (ESG-DP Series)” on page 4-48
- “Disassembled Front-Panel View” on page 4-50
- “Daughterboard Card Cage View” on page 4-52
- “Inside Rear-Panel View” on page 4-53
- “Rear-Panel View (ESG-AP Series)” on page 4-54
- “Rear-Panel View (ESG-AP Series - Option 1EM)” on page 4-56
- “Rear-Panel View (ESG-DP Series)” on page 4-58
- “Rear Panel View (ESG-DP Series - Option 1EM)” on page 4-60
- “Instrument Chassis with Top and Right-Side Hardware” on page 4-62
- “Power Supply Shield and Left-Side Hardware” on page 4-64
- “Motherboard and Bottom-Side Hardware” on page 4-65
- “Instrument Cover and Associated Parts” on page 4-66

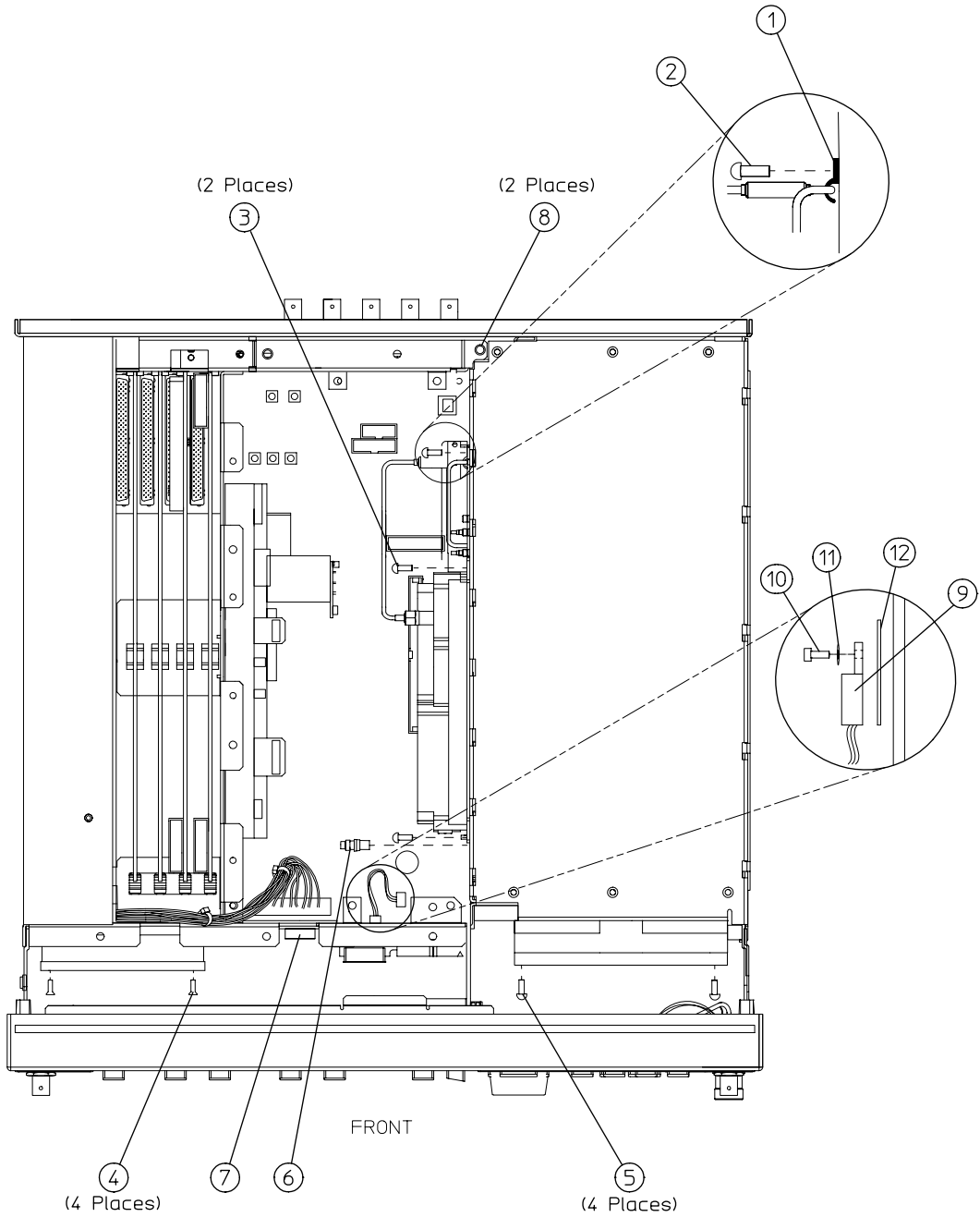
Top View

Refer to [Table 4-18](#) and [Figure 4-18](#).

Table 4-18 Top View

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|----------------------------------|
| 1 | 1400-0054 | 1 | Clamp-Semi-Rigid Cable (W14) |
| 2 | 0515-0372 | 1 | Screw-Machine M3x8 CW-PN-TX |
| 3 | 0515-0430 | 2 | Screw-Machine M3x6 CW-PN-TX |
| 4 | 0361-1341 | 4 | Rivet-Plastic |
| 5 | 0515-0374 | 4 | Screw-Machine M3x10 CW-PN-TX |
| 6 | E4400-20041 | 1 | Shield Cap |
| 7 | 0400-0001 | 1 | Grommet Round .562ID |
| 8 | 0515-1521 | 2 | Screw-Machine M3x5 FL-TX |
| 9 | E4400-60221 | 1 | A14Q501 Transistor Assembly |
| 10 | 0515-0374 | 1 | Screw-Machine M3x10 CW-PN-TX |
| 11 | 0340-1162 | 1 | Bushing, Insulator 0.119 ID |
| 12 | 0340-0614 | 1 | Insulator Pad, Transistor TO-220 |

Figure 4-18 Top View



sk7123b

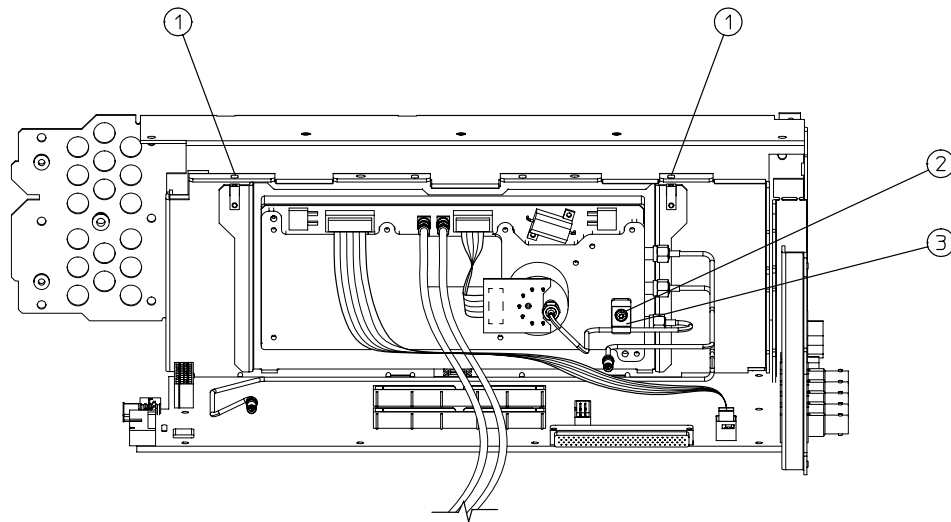
YIG Driver View

Refer to [Table 4-19](#) and [Figure 4-19](#).

Table 4-19 YIG Driver View

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|-----------------------------|
| 1 | 0515-0372 | 2 | Screw-Machine M3x8 CW-PN-TX |
| 2 | 0515-0372 | 1 | Screw-Machine M3x8 CW-PN-TX |
| 3 | 1400-0054 | 1 | Clamp-Semi-Rigid Cable |

Figure 4-19 YIG Driver View



sk7151b

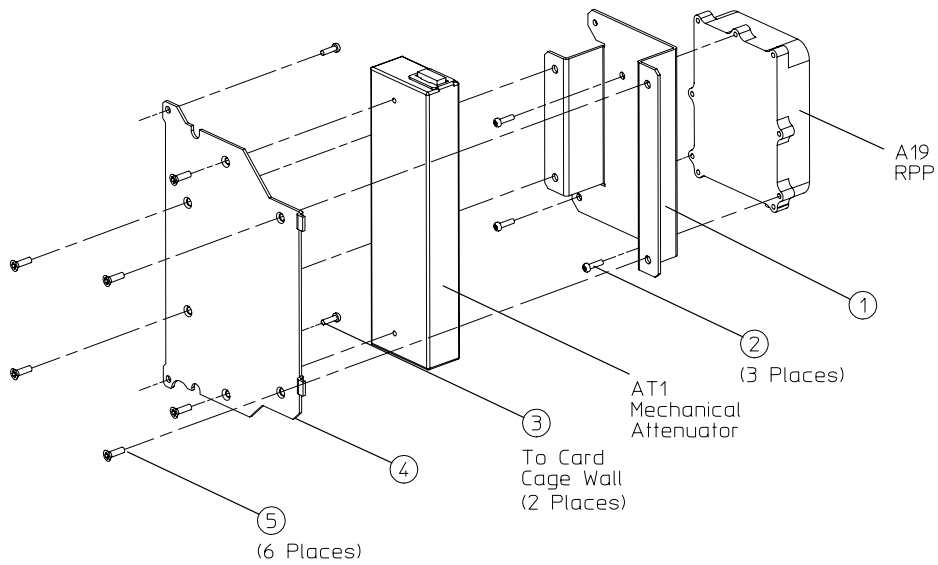
Disassembled Mechanical Attenuator View (Option UNB)

Refer to [Table 4-20](#) and [Figure 4-20](#).

Table 4-20 Disassembled Mechanical Attenuator View (Option UNB)

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|------------------------------|
| 1 | E4400-00027 | 1 | Bracket-RPP |
| 2 | 0515-0664 | 3 | Screw-Machine M3x12 CW-PN-TX |
| 3 | 0515-0430 | 2 | Screw-Machine M3x6 CW-PN-TX |
| 4 | E4400-00028 | 1 | Bracket-Attenuator |
| 5 | 0515-1102 | 6 | Screw-Machine M3x8 FL-TX |

Figure 4-20 Disassembled Mechanical Attenuator View (Option UNB)



sk718b

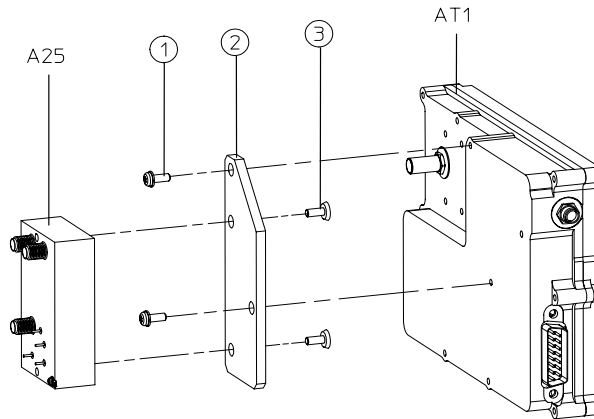
Disassembled Pulse Modulator View (Option 1E6)

Refer to [Table 4-21](#) and [Figure 4-21](#).

Table 4-21 Disassembled Pulse Modulator View (Option 1E6)

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|-----------------------------|
| 1 | 0515-0372 | 2 | Screw-Machine M3x8 CW-PN-TX |
| 2 | E4423-00003 | 1 | Bracket-Pulse Modulator |
| 3 | 0515-2001 | 2 | Screw-Machine M2.5x10 FL-TX |

Figure 4-21 Disassembled Pulse Modulator View (Option 1E6)



sk7152b

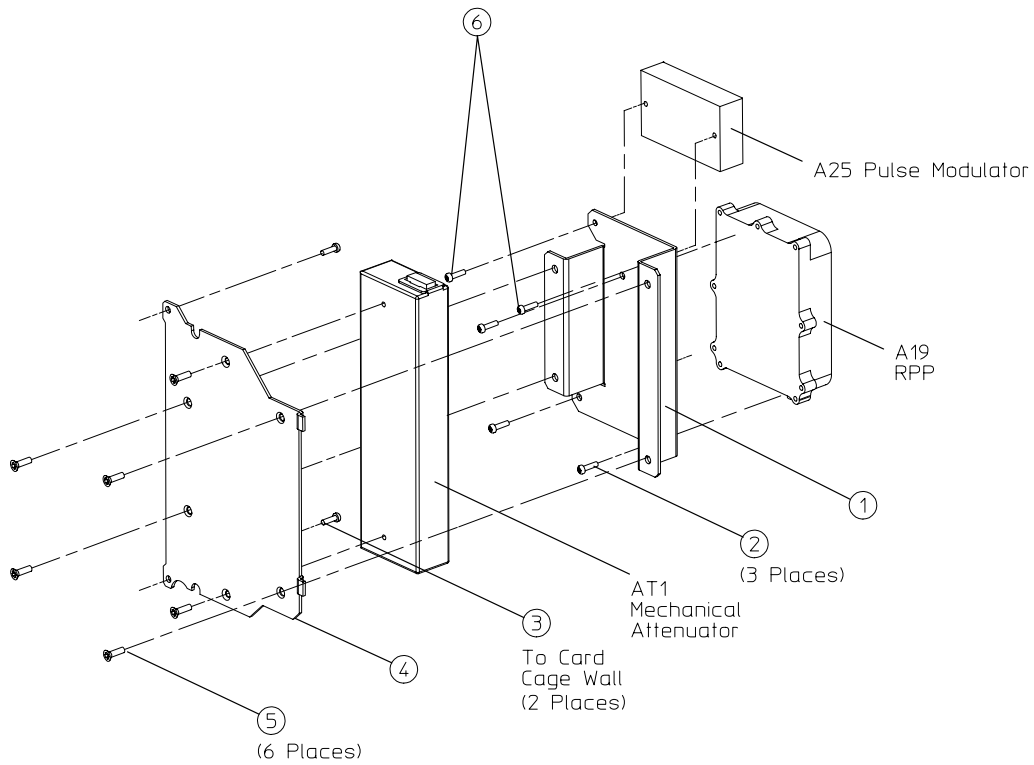
Disassembled Pulse Modulator View (Option 1E6/UNB)

Refer to [Table 4-22](#) and [Figure 4-22](#).

Table 4-22 Disassembled Pulse Modulator View (Option 1E6/UNB)

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|-------------------------------|
| 1 | E4400-00027 | 1 | Bracket-RPP |
| 2 | 0515-0664 | 3 | Screw-Machine M3x12 CW-PN-TX |
| 3 | 0515-0430 | 2 | Screw-Machine M3x6 CW-PN-TX |
| 4 | E4400-00028 | 1 | Bracket-Attenuator |
| 5 | 0515-1102 | 6 | Screw-Machine M3x8 FL-TX |
| 6 | 0515-0367 | 2 | Screw-Machine M2.5x8 CW-PN-TX |

Figure 4-22 Disassembled Pulse Modulator View (Option 1E6/UNB)



sk7149b

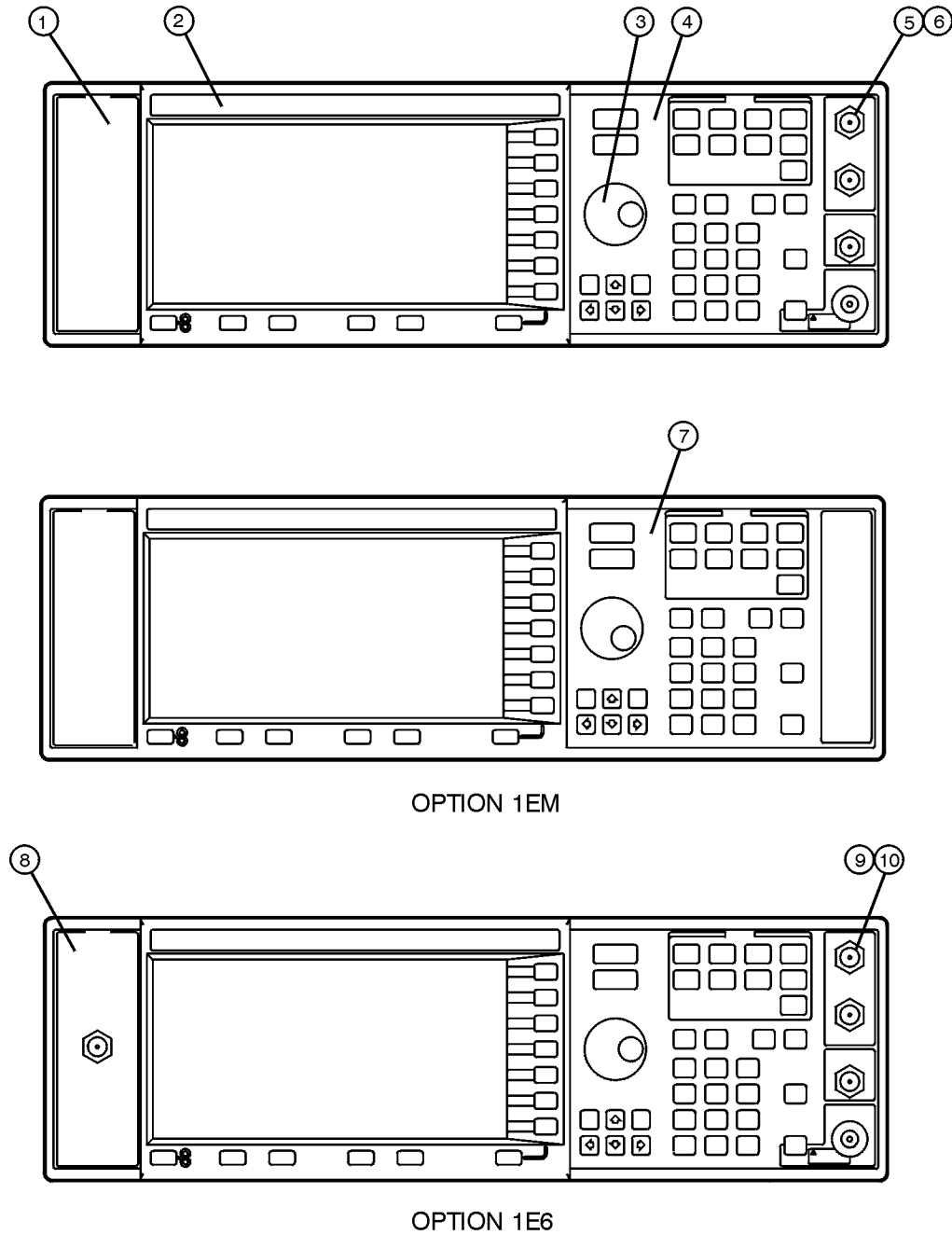
Front Panel View (ESG-AP Series)

Refer to [Table 4-23](#) and [Figure 4-23](#).

Table 4-23 Front Panel View (ESG-AP Series)

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|--------------------------------|
| 1 | E4400-80011 | 1 | Label-Connectors |
| 2 | E4423-80003 | 1 | Nameplate - E4423B 250k - 1GHz |
| 2 | E4423-80004 | 1 | Nameplate - E4424B 250k - 2GHz |
| 2 | E4423-80005 | 1 | Nameplate - E4425B 250k - 3GHz |
| 2 | E4423-80006 | 1 | Nameplate - E4426B 250k - 4GHz |
| 3 | E4400-40003 | 1 | Knob-RPG |
| 4 | E4400-80016 | 1 | Label-Keypad |
| 5 | 2950-0035 | 3 | Nut-Hex 15/32-32 |
| 6 | 3050-1919 | 3 | Washer-Wavy.490ID |
| 7 | E4400-80017 | 1 | Label-Keypad (Option 1EM) |
| 8 | E4423-80001 | 1 | Label-Connectors (Option 1E6) |
| 9 | 2950-0035 | 4 | Nut-Hex 15/32-32 |
| 10 | 3050-1919 | 4 | Washer-Wavy.490ID |

Figure 4-23 Front Panel View (ESG-AP Series)



sk799b

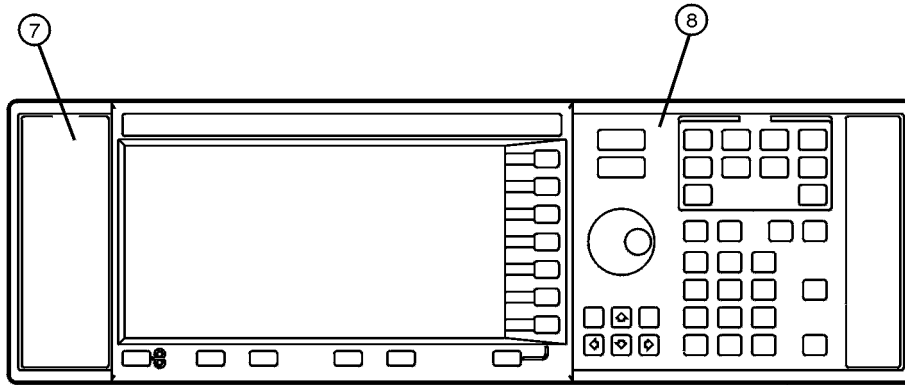
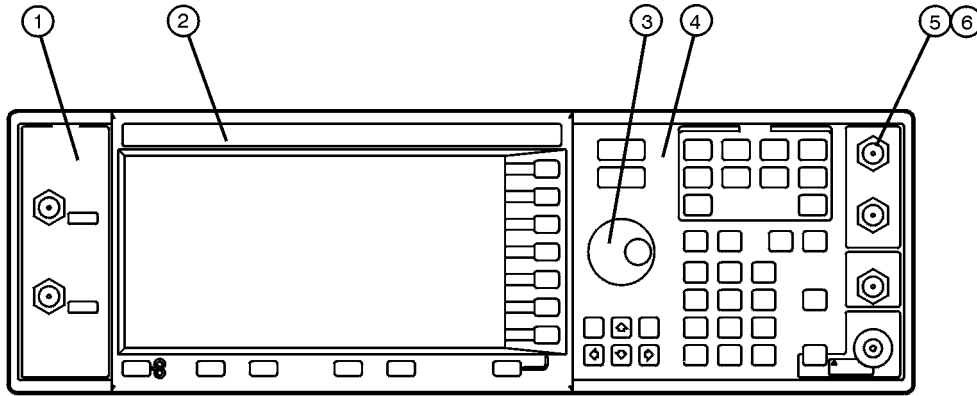
Front Panel View (ESG-DP Series)

Refer to [Table 4-24](#) and [Figure 4-24](#).

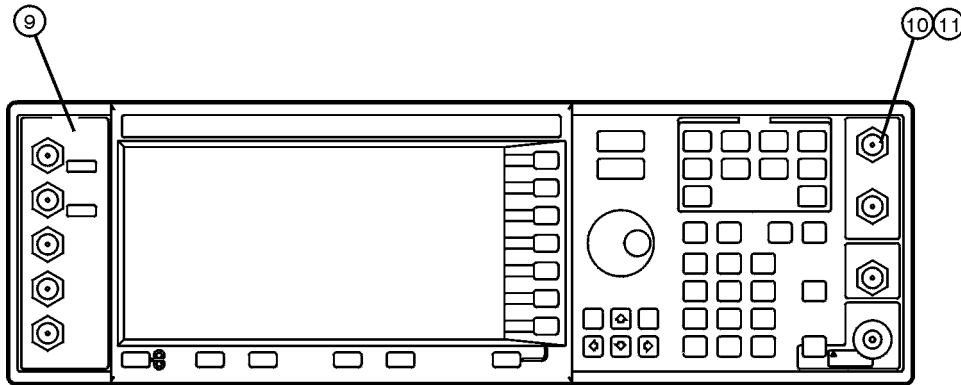
Table 4-24 Front Panel View (ESG-DP Series)

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|--|
| 1 | E4400-80010 | 1 | Label-Connectors |
| 2 | E4423-80007 | 1 | Nameplate - E4434B 250k - 1GHz |
| 2 | E4423-80008 | 1 | Nameplate - E4435B 250k - 2GHz |
| 2 | E4423-80009 | 1 | Nameplate - E4436B 250k - 3GHz |
| 2 | E4423-80010 | 1 | Nameplate - E4437B 250k - 4GHz |
| 3 | E4400-40003 | 1 | Knob-RPG |
| 4 | E4400-80005 | 1 | Label-Keypad |
| 5 | 2950-0035 | 5 | Nut-Hex 15/32-32 |
| 6 | 3050-1919 | 5 | Washer-Wavy .490ID |
| 7 | E4400-80011 | 1 | Label-Connectors (Option 1EM) |
| 8 | E4400-80015 | 1 | Label-Keypad (Option 1EM) |
| 9 | E4400-80006 | 1 | Label-Connectors (Options UN7, UN8, UND) |
| 10 | 2950-0035 | 8 | Nut-Hex 15/32-32 (Options UN7, UN8, UND) |
| 11 | 3050-1919 | 8 | Washer-Wavy .490ID (Options UN7, UN8, UND) |

Figure 4-24 Front-Panel View (ESG-DP Series)



OPTION 1EM



OPTIONS UN7, UN8, UND

sk7158b

Disassembled Front-Panel View

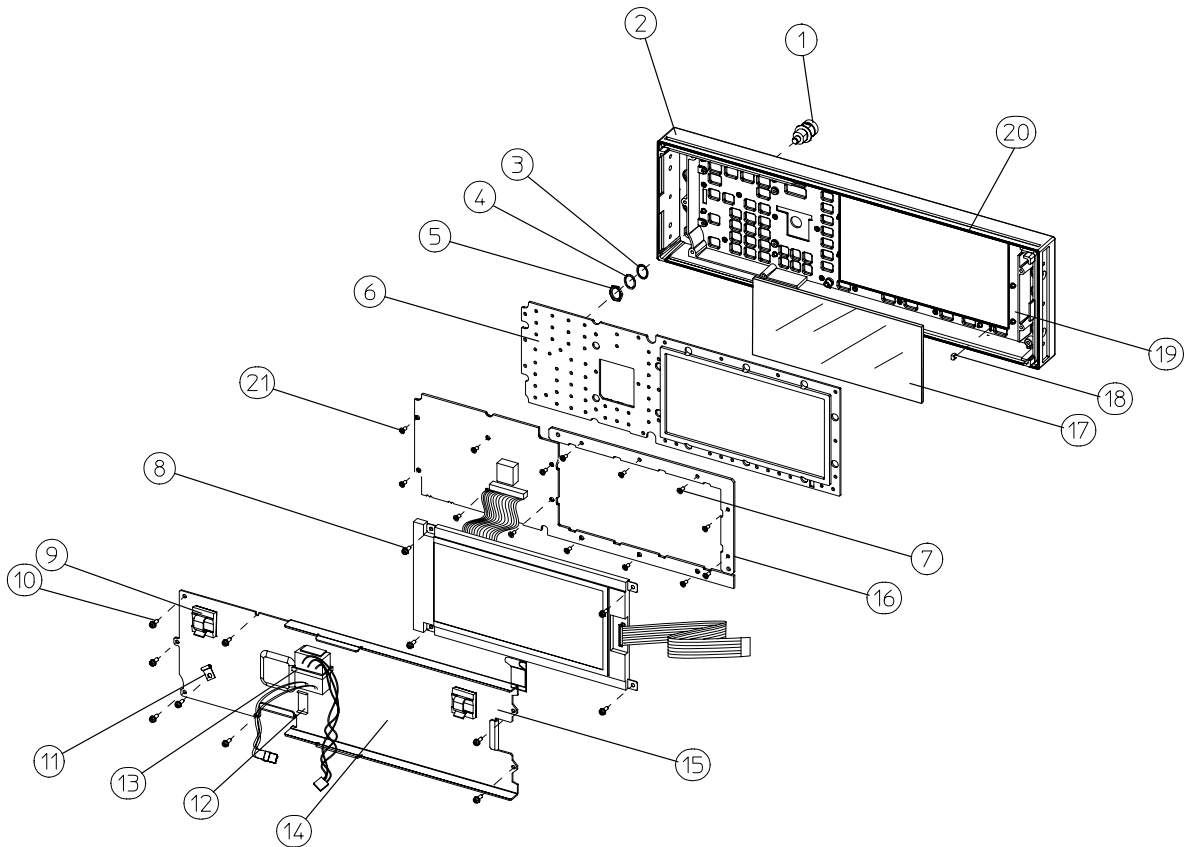
Refer to [Table 4-25](#) and [Figure 4-25](#).

Table 4-25 Disassembled Front-Panel View

| Item No. | Part Number | Qty | Description |
|----------|-------------|------|-------------------------------------|
| 1 | 1250-1811 | 1 | Adapter-Female SMA to Female Type-N |
| 2 | E4400-20012 | 1 | Frame-Front |
| 3 | 3050-1935 | 1 | Washer-Flat |
| 4 | 2190-0383 | 1 | Washer-Lock |
| 5 | 2950-0054 | 1 | Nut-Hex 1/2-28 |
| 6 | E4400-40001 | 1 | Rubber Keypad |
| 7 | 0515-1521 | 5 | Screw-Machine M3x5 FL-TX |
| 8 | 0515-0372 | 4 | Screw-Machine M3x8 CW-PN-TX |
| 9 | 1400-1594 | 2* | Clamp-Flexible Cables |
| 10 | 0515-0372 | 8 | Screw-Machine M3x8 CW-PN-TX |
| 11 | 1400-0054 | 1 | Clamp-Semi-Rigid Cable (W9) |
| 12 | 1400-1533 | 1 | Clamp-Ribbon Cable (A1W1) |
| 13 | 1400-0493 | 1 | Cable Tie Wrap |
| 14 | 1400-0611 | 1 | Clamp-Ribbon Cable (W10) |
| 15 | E4400-00008 | 1 | Front Frame RFI Shield |
| 16 | E4400-00009 | 1 | Filter Bracket |
| 17 | 4330-1711 | 1 | Glass Filter 70% XMT |
| 18 | E4400-40008 | 1 | Light Pipe |
| 19 | 8160-0723 | 2 Ft | Spiral Gasket-BC CY .094 |
| 20 | 8160-0660 | 4 Ft | RFI Round Mesh.125 |
| 21 | 0515-1227 | 9 | Screw-Machine M3x6 FL-TX |

*. ESG-AP Series uses a quantity of one.

Figure 4-25 Disassembled Front-Panel View



sk7148b

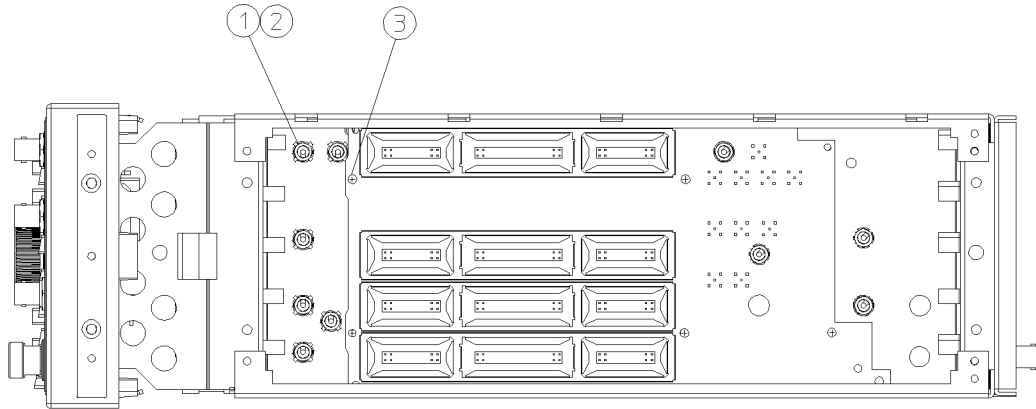
Daughterboard Card Cage View

Refer to [Table 4-26](#) and [Figure 4-26](#).

Table 4-26 Daughterboard Card Cage View

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|-----------------------------|
| 1 | E4400-40002 | 10 | Retainer-Cable |
| 2 | 0510-1643 | 10 | Retainer Ring .309ID |
| 3 | 0515-0430 | 5 | Screw-Machine M3x6 CW-PN-TX |

Figure 4-26 Daughterboard Card Cage View



sk7124b

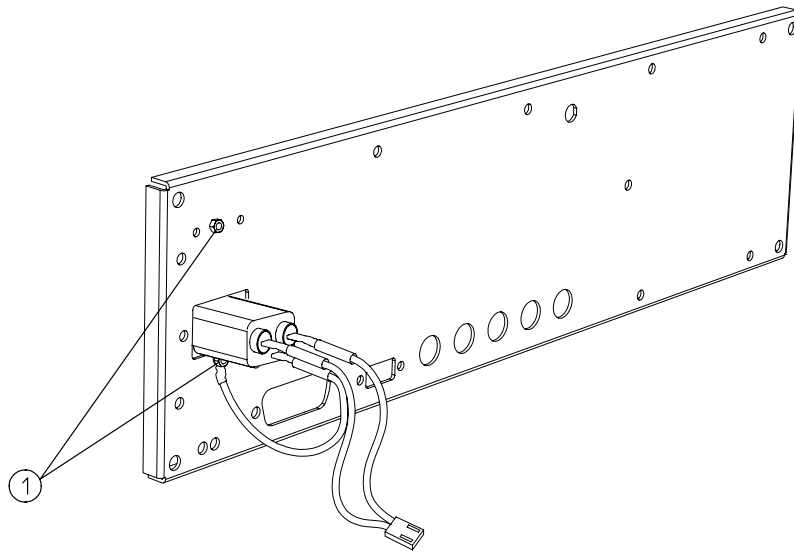
Inside Rear-Panel View

Refer to [Table 4-27](#) and [Figure 4-27](#).

Table 4-27 Inside Rear-Panel View

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|--------------|
| 1 | 0535-0031 | 2 | Nut-Hex M3.0 |

Figure 4-27 Inside Rear-Panel View



sk720b

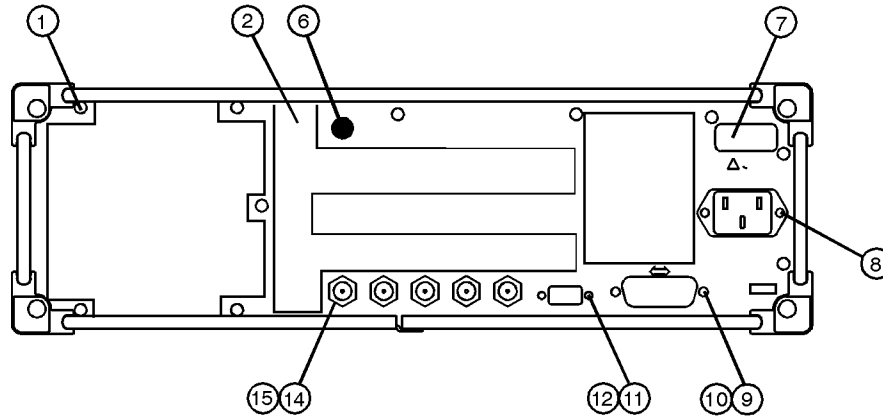
Rear-Panel View (ESG-AP Series)

Refer to [Table 4-28](#) and [Figure 4-28](#).

Table 4-28 Rear-Panel View (ESG-AP Series)

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|-----------------------------|
| 1 | 0515-0372 | 10 | Screw-Machine M3x8 CW-PN-TX |
| 2 | E4400-00032 | 1 | Panel-Rear |
| 6 | 6960-0023 | 1 | Plug-Hole .312D |
| 7 | E4400-00017 | 1 | Serial Number Plate |
| 8 | 0515-1102 | 2 | Screw-Machine M3x8 FL-TX |
| 9 | 0380-0644 | 2 | Standoff-Hex .327L 6-32 |
| 10 | 2190-0577 | 2 | Washer-Lock |
| 11 | 0380-2079 | 2 | Standoff-Hex .312L 4-40 |
| 12 | 2190-0003 | 2 | Washer-Lock |
| 14 | 2950-0054 | 5 | Nut-Hex 1/2-28 |
| 15 | 2190-0068 | 5 | Washer-Lock .505ID |

Figure 4-28 Rear-Panel View (ESG-AP Series)



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Rear-Panel View (ESG-AP Series - Option 1EM)

Refer to [Table 4-29](#) and [Figure 4-29](#).

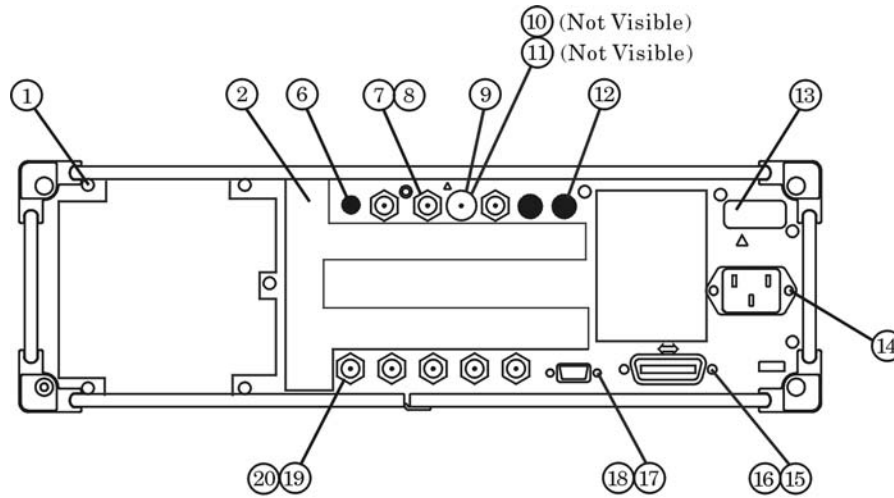
Table 4-29 Rear-Panel View (ESG-AP Series - Option 1EM)

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|-----------------------------|
| 1 | 0515-0372 | 10 | Screw-Machine M3x8 CW-PN-TX |
| 2 | E4400-00033 | 1 | Panel-Rear |
| 6 | 6960-0023 | 1 | Plug-Hole .312D |
| 7 | 2950-0035 | 3* | Nut-Hex 15/32-32 |
| 8 | 2190-0102 | 3* | Washer-Lock .472ID |
| 9 | 08559-60002 | 1 | RF Output Assy |
| 10 | 2950-0132 | 1 | Nut-Hex 7/16-28 |
| 11 | 2190-0102 | 1 | Washer-Lock |
| 12 | 6960-0002 | 2† | Plug-Hole .500D |
| 13 | E4400-00017 | 1 | Serial Number Plate |
| 14 | 0515-1102 | 2 | Screw-Machine M3x8 FL-TX |
| 15 | 0380-0644 | 2 | Standoff-Hex .327L 6-32 |
| 16 | 2190-0577 | 2 | Washer-Lock |
| 17 | 0380-2079 | 2 | Standoff-Hex .312L 4-40 |
| 18 | 2190-0003 | 2 | Washer-Lock |
| 19 | 2950-0054 | 5 | Nut-Hex 1/2-28 |
| 20 | 2190-0068 | 5 | Washer-Lock .505ID |

*. For Option 1E6 the quantity is 1.

†. For Option 1E6 the quantity is 4.

Figure 4-29 Rear-Panel View (ESG-AP Series - Option 1EM)



sk7100b

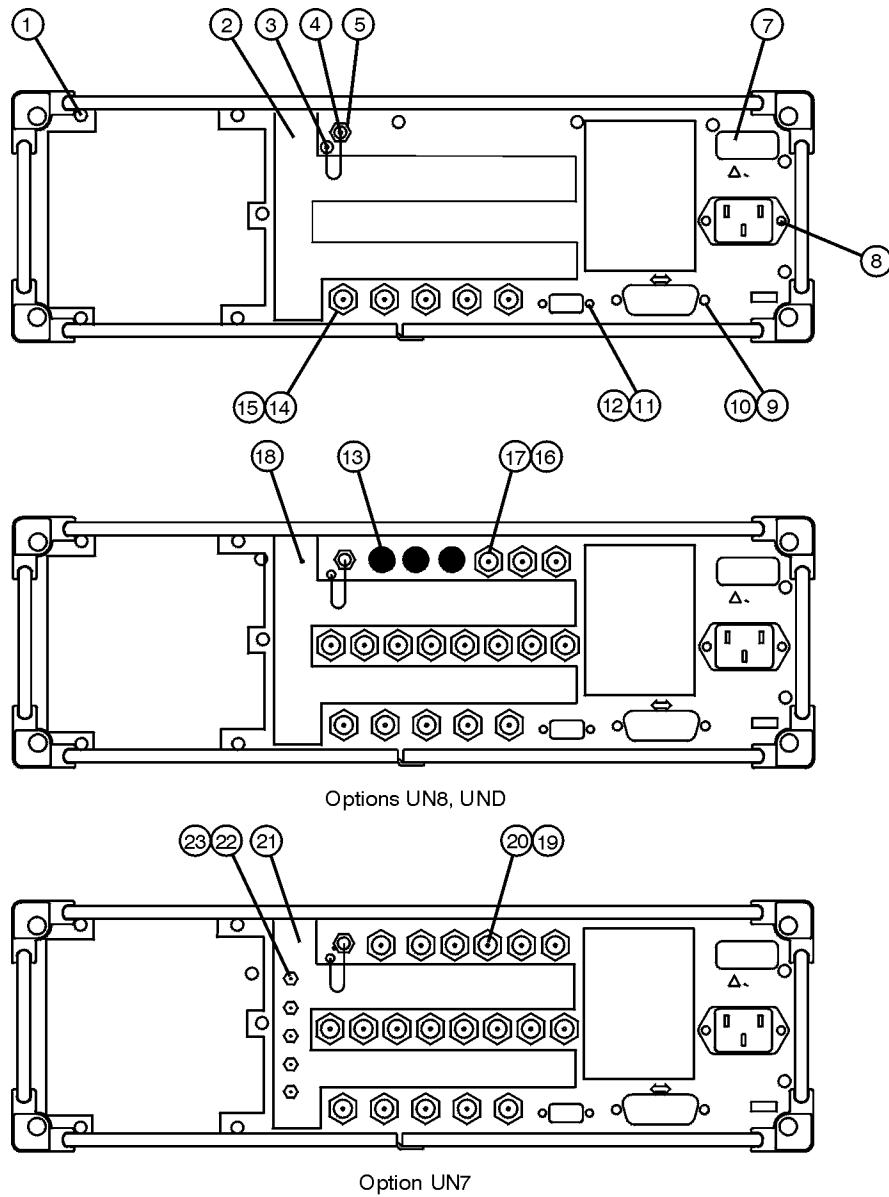
Rear-Panel View (ESG-DP Series)

Refer to [Table 4-30](#) and [Figure 4-30](#).

Table 4-30 Rear-Panel View (ESG-DP Series)

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|--|
| 1 | 0515-0372 | 10 | Screw-Machine M3x8 CW-PN-TX |
| 2 | E4400-00032 | 1 | Panel-Rear |
| 3 | 0515-0372 | 1 | Screw-Machine M3x8 CW-PN-TX (used to attach item 4)) |
| 4 | 1250-2759 | 1 | Dust Cap Female SMA |
| 5 | 1250-1753 | 1 | Adapter-Female SMA to Female SMA |
| 7 | E4400-00017 | 1 | Serial Number Plate |
| 8 | 0515-1102 | 2 | Screw-Machine M3x8 FL-TX |
| 9 | 0380-0644 | 2 | Standoff-Hex .327L 6-32 |
| 10 | 2190-0577 | 2 | Washer-Lock |
| 11 | 0380-2079 | 2 | Standoff-Hex .312L 4-40 |
| 12 | 2190-0003 | 2 | Washer-Lock |
| 13 | 6960-0002 | 3 | Plug-Hole .500D (Options UN8, UND) |
| 14 | 2950-0054 | 5 | Nut-Hex 1/2-28 |
| 15 | 2190-0068 | 5 | Washer-Lock .505ID |
| 16 | 2950-0035 | 11 | Nut-Hex 15/32-32 (Options UN8, UND) |
| 17 | 2190-0102 | 11 | Washer-Lock .472ID (Options UN8, UND) |
| 18 | E4400-00031 | 1 | Panel-Rear (Options UN8, UND) |
| 19 | 2950-0035 | 14 | Nut-Hex 15/32-32 (Option UN7) |
| 20 | 2190-0102 | 14 | Washer-Lock .472ID (Option UN7) |
| 21 | E4400-00025 | 1 | Panel-Rear (Option UN7) |
| 22 | 2950-0078 | 5 | Nut-Hex 10-32 (for the SMBs) (Option UN7) |
| 23 | 2190-0124 | 5 | Washer-Lock .195ID (for the SMBs) (Option UN7) |

Figure 4-30 Rear-Panel View (ESG-DP Series)



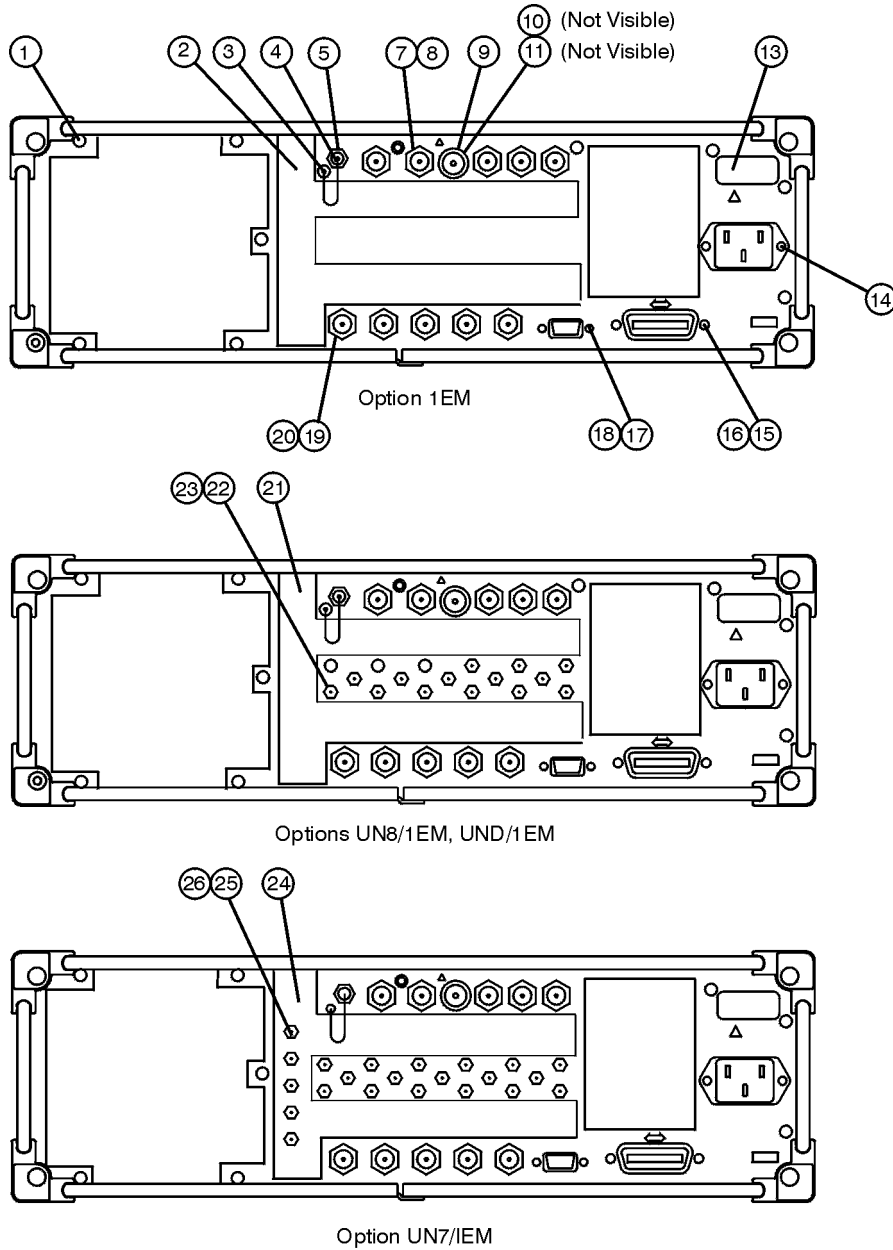
Rear Panel View (ESG-DP Series - Option 1EM)

Refer to [Table 4-31](#) and [Figure 4-31](#).

Table 4-31 Rear Panel View (ESG-DP Series - Option 1EM)

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|--|
| 1 | 0515-0372 | 10 | Screw-Machine M3x8 CW-PN-TX |
| 2 | E4400-00033 | 1 | Panel-Rear |
| 3 | 0515-0372 | 1 | Screw-Machine M3x8 CW-PN-TX (used to attach item 4) |
| 4 | 1250-2759 | 1 | Dust Cap Female SMA |
| 5 | 1250-1753 | 1 | Adapter-Female SMA to Female SMA |
| 7 | 2950-0035 | 5 | Nut-Hex 15/32-32 |
| 8 | 2190-0102 | 5 | Washer-Lock .472ID |
| 9 | 08559-60002 | 1 | RF Output Assy |
| 10 | 2950-0132 | 1 | Nut-Hex 7/16-28 |
| 11 | 2190-0102 | 1 | Washer-Lock |
| 13 | E4400-00017 | 1 | Serial Number Plate |
| 14 | 0515-1102 | 2 | Screw-Machine M3x8 FL-TX |
| 15 | 0380-0644 | 2 | Standoff-Hex .327L 6-32 |
| 16 | 2190-0577 | 2 | Washer-Lock |
| 17 | 0380-2079 | 2 | Standoff-Hex .312L 4-40 |
| 18 | 2190-0003 | 2 | Washer-Lock |
| 19 | 2950-0054 | 5 | Nut-Hex 1/2-28 |
| 20 | 2190-0068 | 5 | Washer-Lock .505ID |
| 21 | E4400-00034 | 1 | Panel-Rear (Option UN8) |
| 22 | 2950-0078 | 14 | Nut-Hex 10-32 (for the SMBs) (Options UN8, UND) |
| 23 | 2190-0124 | 14 | Washer-Lock .195ID (for the SMBs) (Options UN8, UND) |
| 24 | E4400-00026 | 1 | Panel-Rear (Option UN7) |
| 25 | 2950-0078 | 22 | Nut-Hex 10-32 (for the SMBs) (Option UN7) |
| 26 | 2190-0124 | 22 | Washer-Lock .195ID (for the SMBs) (Option UN7) |

Figure 4-31 Rear-Panel View (ESG-DP Series - Option 1EM)



sk7156b

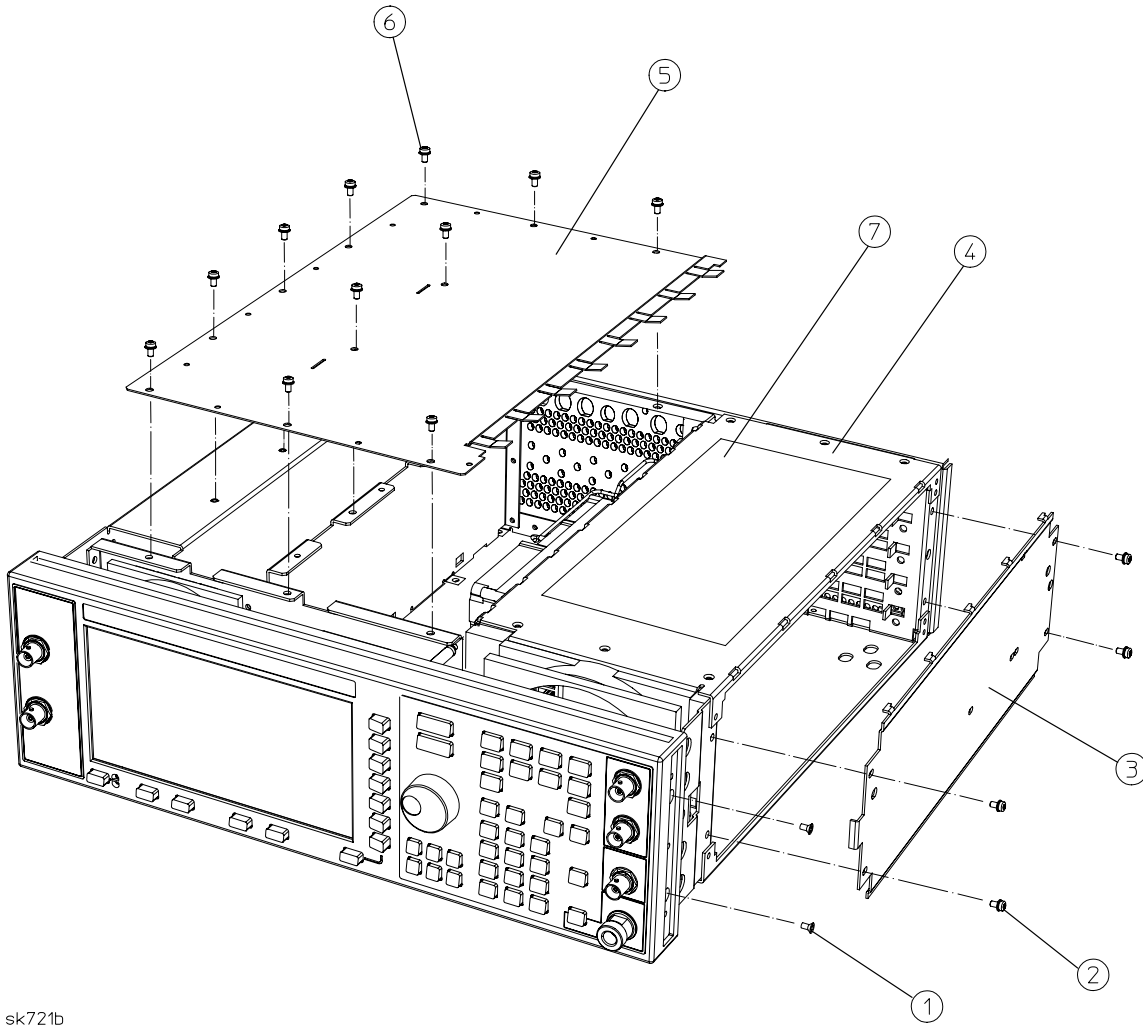
Instrument Chassis with Top and Right-Side Hardware

Refer to [Table 4-32](#) and [Figure 4-32](#).

Table 4-32 Instrument Chassis with Top and Right-Side Hardware

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|---|
| 1 | 0515-1269 | 2 | Screw-Machine M4X10 FL-TX |
| 2 | 0515-2087 | 4 | Screw-Machine M3x6 CW-BN-TX |
| 3 | E4400-00003 | 1 | Cover-Side (Serial Prefix US3833, or GB3832, and below) |
| 3 | E4400-00037 | 1 | Cover-Side (Serial Prefix US3844, or GB3845, and above) |
| 4 | E4400-00035 | 1 | Chassis |
| 5 | E4400-00036 | 1 | Cover-Top Chassis |
| 6 | 0515-0430 | 11 | Screw-Machine M3x6 CW-PN-TX |
| 7 | E4423-80002 | 1 | Label-Connection Diagram |

Figure 4-32 Instrument Chassis with Top and Right-Side Hardware



sk721b

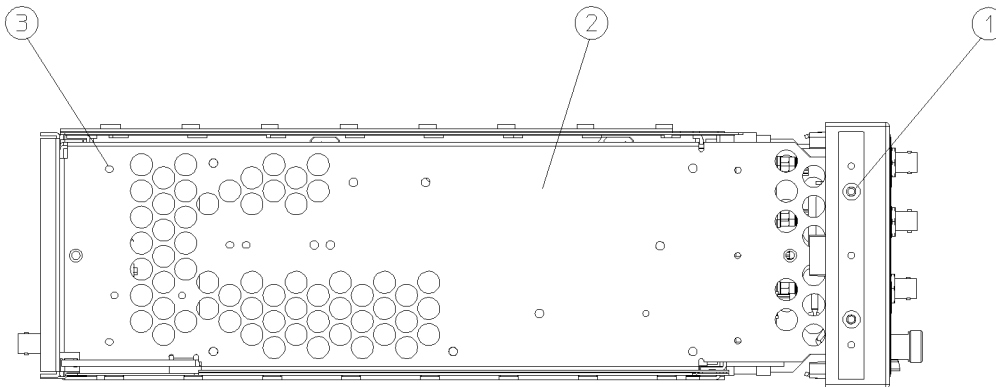
Power Supply Shield and Left-Side Hardware

Refer to [Table 4-33](#) and [Figure 4-33](#).

Table 4-33 Power Supply Shield and Left-Side Hardware

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|-----------------------------|
| 1 | 0515-1269 | 2 | Screw-Machine M4X10 FL-TX |
| 2 | E4400-00011 | 1 | Shield-Power Supply |
| 3 | 0515-0372 | 17 | Screw-Machine M3x8 CW-PN-TX |

Figure 4-33 Power Supply Shield and Left-Side Hardware



sk706a

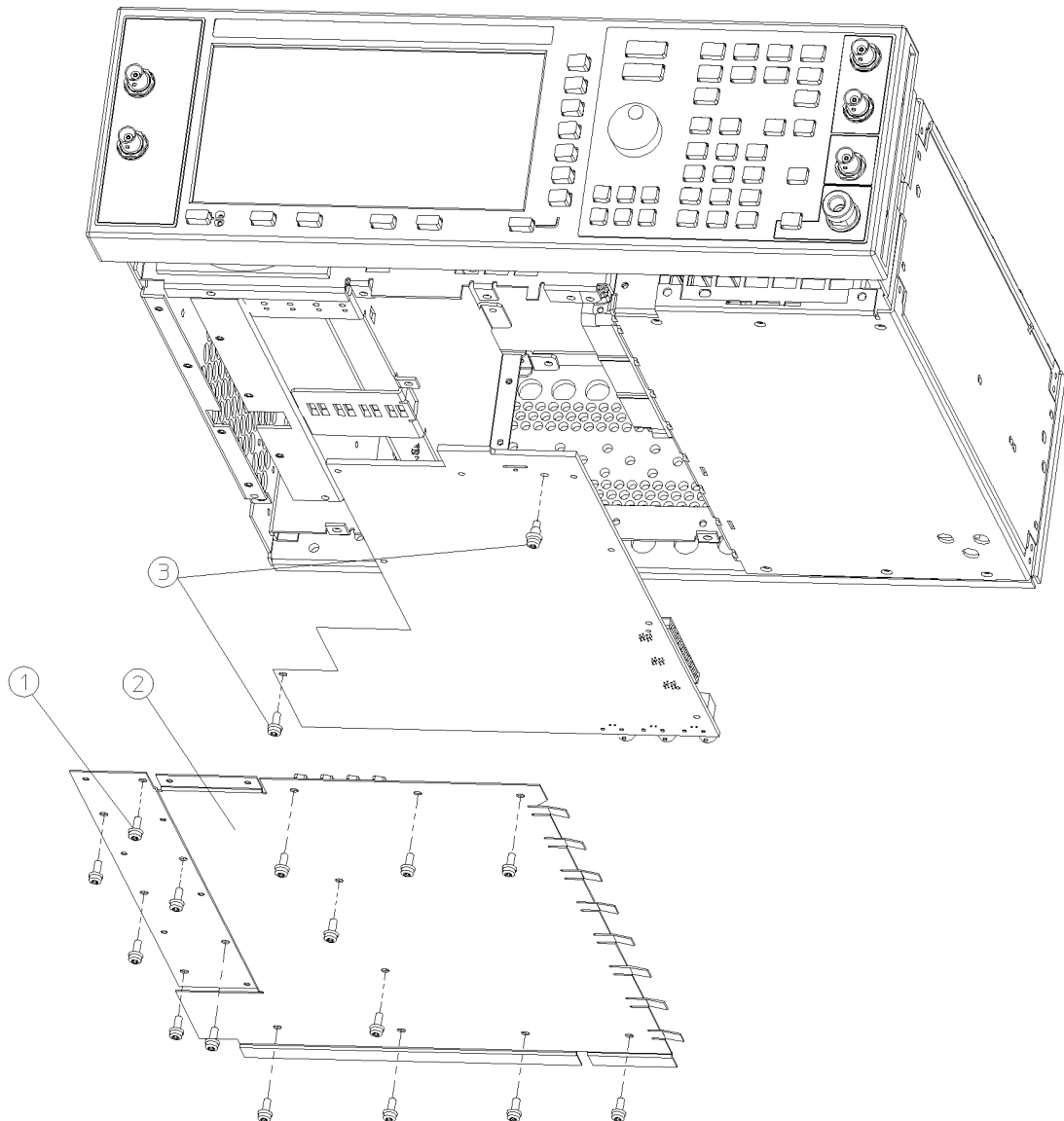
Motherboard and Bottom-Side Hardware

Refer to [Table 4-34](#) and [Figure 4-34](#).

Table 4-34 Motherboard and Bottom-Side Hardware

| Item No. | Part Number | Qty | Description |
|----------|-------------|-----|-----------------------------|
| 1 | 0515-0372 | 15 | Screw-Machine M3x8 CW-PN-TX |
| 2 | E4400-00007 | 1 | Cover-Bottom Chassis |
| 3 | 0515-0372 | 2 | Screw-Machine M3x8 CW-PN-TX |

Figure 4-34 Motherboard and Bottom-Side Hardware



sk7104b

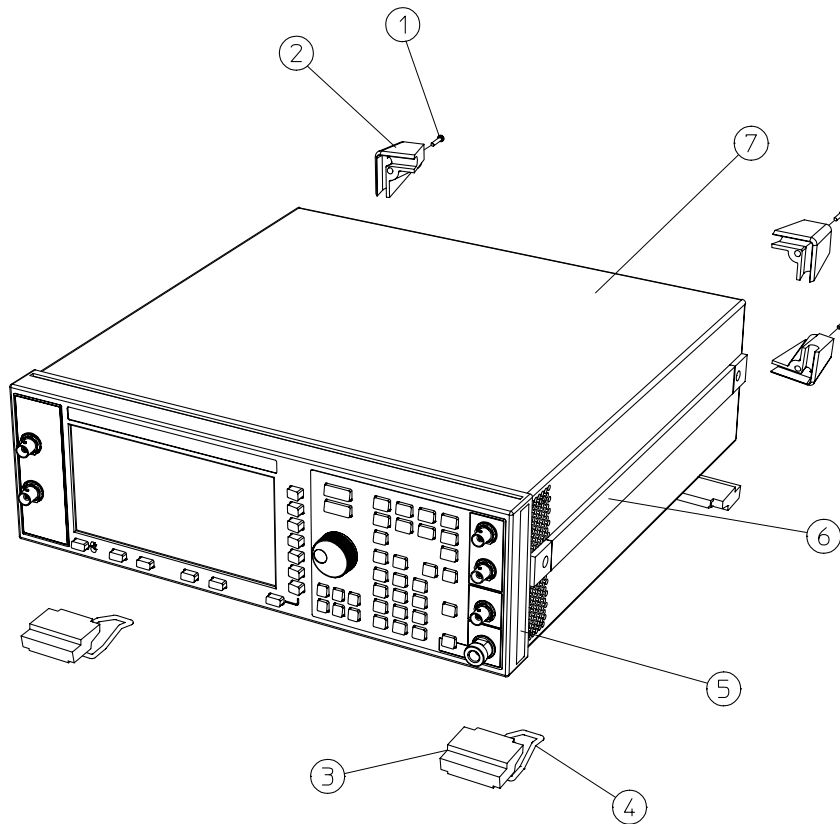
Instrument Cover and Associated Parts

Refer to [Table 4-35](#) and [Figure 4-35](#).

Table 4-35 Instrument Cover and Associated Parts

| Item No. | Part Number | Qty | Description |
|------------------------------------|-------------|-----|---|
| 1 | 0515-1619 | 4 | Screw-Machine M4x25 PN-TX |
| 2 | 5041-9611 | 4 | Foot-Rear Long |
| 3 | 5041-9167 | 4 | Feet-Bottom |
| 4 | 1460-1345 | 2 | Spring-Wire Frame 3.000 Long |
| 5 | 5041-9171 | 2 | Side Trim |
| 6 | E4400-60026 | 2 | Assy-Strap Handle - includes the following parts: |
| Item 6 includes these parts: | 5063-9209 | 1 | Strap Assembly |
| | E4400-00015 | 2 | Ground Spring |
| | E4400-20023 | 2 | Handle Retainer |
| | E4400-40007 | 2 | End Cap |
| | 0515-0710 | 2 | Screw-Machine M5x18 FL-TX |
| 7 | E4400-00004 | 1 | Cover-Instrument |

Figure 4-35 Instrument Cover and Associated Parts



sk755b

Miscellaneous

This section lists part numbers for miscellaneous items that can be used with your signal generator. These items are categorized as follows:

- “[Accessories](#)” on page 4-68
- “[Documentation](#)” on page 4-69
- “[Electrostatic Discharge \(ESD\) Protective Supplies](#)” on page 4-72
- “[Upgrade and Retrofit Kits](#)” on page 4-72

Accessories

Refer to [Table 4-36](#).

Table 4-36 Accessories

| Description | Part Number |
|--|-------------|
| Connector End Cap-RF Output | 1401-0247 |
| Connector End Cap-GPIB | 1401-5007 |
| Connector End Cap Coherent Carrier Out | 1252-4696 |
| Remote Interface | 83300A |
| Transit Case | 9211-1296 |

Documentation

Refer to [Table 4-37](#) and [Table 4-38](#).

Table 4-37 ESG Family Signal Generators Documentation

| Description | Part Number |
|--|-------------|
| ESG-A and ESG-AP Series Manual Set (includes items listed below) | E4400-90334 |
| User's Guide | E4400-90323 |
| Programming Guide | E4400-90324 |
| Calibration Guide | E4400-90325 |
| Quick Start Guide | E4400-90326 |
| Error Messages | E4400-90333 |
| Technical Specifications | 5965-3096E |
| Feature Releases Document | E4400-90363 |
| ESG-D and ESG-DP Series Manual Set (includes items listed below) | E4400-90322 |
| User's Guide | E4400-90323 |
| Programming Guide | E4400-90324 |
| Calibration Guide | E4400-90325 |
| Quick Start Guide | E4400-90326 |
| Error Messages | E4400-90333 |
| Technical Specifications | 5965-3096E |
| Feature Releases Document | E4400-90363 |
| Option 200 Fully Coded 3GPP W-CDMA Personality User's and Programming Guide | E4400-90390 |
| Option 201 Real-Time cdma2000 Personality User's and Programming Guide | E4400-90386 |
| Option UN8 Real-Time I/Q Baseband Generator with TDMA Standards User's and Programming Guide (includes Option 202, EDGE) | E4400-90327 |
| Option UND Dual Arbitrary Waveform Generator and Option UN5 Multichannel, Multicarrier CDMA Personality User's and Programming Guide | E4400-90328 |
| Option 100 W-CDMA Personality User's and Programming Guide | E4400-90329 |
| Option 101 CDMA2000 Personality User's and Programming Guide | E4400-90330 |
| Option UN7 Bit Error Rate Test User's and Programming Guide | E4400-90331 |
| Option 300 Base Station BERT Extension for Option UN7 User's and Programming Guide | E4400-90305 |
| Service Guide | E4400-90335 |
| Component-Level Information | E4400-90336 |

Table 4-38 Localized Documentation for ESG Family Signal Generators

| Description | Part Number |
|--|-------------|
| Chinese | |
| User's Guide - Chinese | E4400-90172 |
| Option UN8 DECT User's and Programming Guide - Chinese | E4400-90194 |
| Option UN8 GSM User's and Programming Guide - Chinese | E4400-90201 |
| Option UN8 Custom Digital Modulation User's and Programming Guide - Chinese | E4400-90180 |
| Option UN8 Dual Arbitrary Waveform Generator and Option UN5 Multichannel, Multicarrier CDMA Personality User's and Programming Guide - Chinese | E4400-90187 |
| Taiwanese | |
| User's Guide - Taiwanese | E4400-90173 |
| Option UN8 DECT User's and Programming Guide - Taiwanese | E4400-90195 |
| Option UN8 GSM User's and Programming Guide - Taiwanese | E4400-90202 |
| Option UN8 Custom Digital Modulation User's and Programming Guide - Taiwanese | E4400-90181 |
| Option UN8 Dual Arbitrary Waveform Generator and Option UN5 Multichannel, Multicarrier CDMA Personality User's and Programming Guide - Taiwanese | E4400-90188 |
| French | |
| User's Guide - French | E4400-90174 |
| Option UN8 DECT User's and Programming Guide - French | E4400-90196 |
| Option UN8 GSM User's and Programming Guide - French | E4400-90203 |
| Option UN8 TETRA User's and Programming Guide - French | E4400-90212 |
| Option UN8 Custom Digital Modulation User's and Programming Guide - French | E4400-90182 |
| Option UN8 Dual Arbitrary Waveform Generator and Option UN5 Multichannel, Multicarrier CDMA Personality User's and Programming Guide - French | E4400-90189 |
| German | |
| User's Guide - German | E4400-90175 |
| Option UN8 DECT User's and Programming Guide - German | E4400-90197 |
| Option UN8 GSM User's and Programming Guide - German | E4400-90204 |
| Option UN8 TETRA User's and Programming Guide - German | E4400-90210 |
| Option UN8 Custom Digital Modulation User's and Programming Guide - German | E4400-90183 |
| Option UN8 Dual Arbitrary Waveform Generator and Option UN5 Multichannel, Multicarrier CDMA Personality User's and Programming Guide - German | E4400-90190 |

| Description | Part Number |
|---|-------------|
| Japanese | |
| User's Guide - Japanese | E4400-90176 |
| Option UN8 DECT User's and Programming Guide - Japanese | E4400-90198 |
| Option UN8 GSM User's and Programming Guide - Japanese | E4400-90205 |
| Option UN8 PDC User's and Programming Guide - Japanese | E4400-90208 |
| Option UN8 PHS User's and Programming Guide - Japanese | E4400-90209 |
| Option UN8 Custom Digital Modulation User's and Programming Guide - Japanese | E4400-90184 |
| Option UND Dual Arbitrary Waveform Generator and Option UN5 Multichannel, Multicarrier CDMA Personality User's and Programming Guide - Japanese | E4400-90191 |
| Option UN7 Bit Error Rate Test User's and Programming Guide - Japanese | E4400-90179 |
| Korean | |
| User's Guide - Korean | E4400-90177 |
| Option UND Dual Arbitrary Waveform Generator and Option UN5 Multichannel, Multicarrier CDMA Personality User's and Programming Guide - Korean | E4400-90192 |
| Spanish | |
| User's Guide - Spanish | E4400-90178 |
| Option UN8 DECT User's and Programming Guide - Spanish | E4400-90200 |
| Option UN8 GSM User's and Programming Guide - Spanish | E4400-90207 |
| Option UN8 TETRA User's and Programming Guide - Spanish | E4400-90211 |
| Option UN8 Custom Digital Modulation User's and Programming Guide - Spanish | E4400-90186 |
| Option UND Dual Arbitrary Waveform Generator and Option UN5 Multichannel, Multicarrier CDMA Personality User's and Programming Guide - Spanish | E4400-90193 |

Electrostatic Discharge (ESD) Protective Supplies

Refer to [Table 4-39](#).

Table 4-39 Electrostatic Discharge (ESD) Protective Supplies

| Description | Part Number |
|--|-------------|
| 2 X 4 Ft Antistatic Table Mat with 15 Ft Ground Wire | 9300-0797 |
| 5 Ft Grounding Cord (for wrist strap) | 9300-0980 |
| Adjustable Antistatic Wrist Strap | 9300-1367 |
| Antistatic Heel Strap (for use on conductive floors) | 9300-1126 |

Upgrade and Retrofit Kits

Refer to [Table 4-40](#).

Table 4-40 Upgrade and Retrofit Kits

| Description | Part Number |
|--|-------------|
| Kit-Firmware Upgrade | E4400-60174 |
| Kit-Firmware Upgrade with ESG-A Series Manual Set | E4400-60171 |
| Kit-Firmware Upgrade with ESG-D Series Manual Set | E4400-60172 |
| Kit-RS-232 Cable | E4400-60049 |
| Kit-Rack Mount Flanges without Handles (Option 1CM) | 5063-9214 |
| Kit-Rack Mount Flanges with Handles (Option 1CP) | 5063-9221 |
| Retrofit Kit-Rack Slide for Rack Mount | 5182-1272 |
| Retrofit Kit-Modified Rack Rail for Rack Mount | 5182-1273 |
| Retrofit Kit-Add Option UND to ESG-DP Series | E4400-60166 |
| Retrofit Kit-Upgrade Add Option UN8 to ESG-P Series | E4400-60170 |
| Retrofit Kit-Upgrade Add Option UN9 (Options UN8 and UN9) to ESG-DP Series | E4400-60185 |

5 Assembly Replacement

This chapter provides removal and replacement procedures for the major assemblies of your signal generator.

Before You Replace an Assembly

Be sure to review the warning and caution statements described in [Chapter 7](#) prior to replacing an assembly in your signal generator.

After Replacing an Assembly

After you have replaced or repaired an assembly, certain performance tests and adjustments may have to be performed. [Chapter 6, "Post-Repair Procedures,"](#) lists the performance tests and adjustments required for each assembly.

Assemblies That You Can Replace

This chapter provides removal and replacement procedures for the following assemblies:

- A1 Front Panel Board
- A2 Display
- A2DS1 Fluorescent Lamp
- A3 Inverter
- A4 Power Supply
- A4 Power Supply (with Option 1EM)
- A14 CPU/Motherboard
- A14BT1 Battery
- A14Q501 Transistor
- A15 Daughterboard
- A16 Line Module
- A17 and A18 Rear Panel Interface Boards
- A19 Reverse Power Protection (RPP)
- A20 Downconvertor
- A22 YIG Driver
- A25 Pulse Modulator
- A25 Pulse Modulator (with Option UNB)
- AT1 Electronic Attenuator/RPP
- AT1 Mechanical Attenuator
- B1 Small Fan
- B2 Large Fan
- Daughterboard Card Cage Boards
- Digital Card Cage Boards
- Front Panel
- Instrument Cover
- Rear Panel
- Rear Panel (with Option 1EM)
- Semi-Rigid Cables

A1 Front Panel Board

Tools Required

- T-10 TORX screwdriver
- 5/16-inch open-end wrench

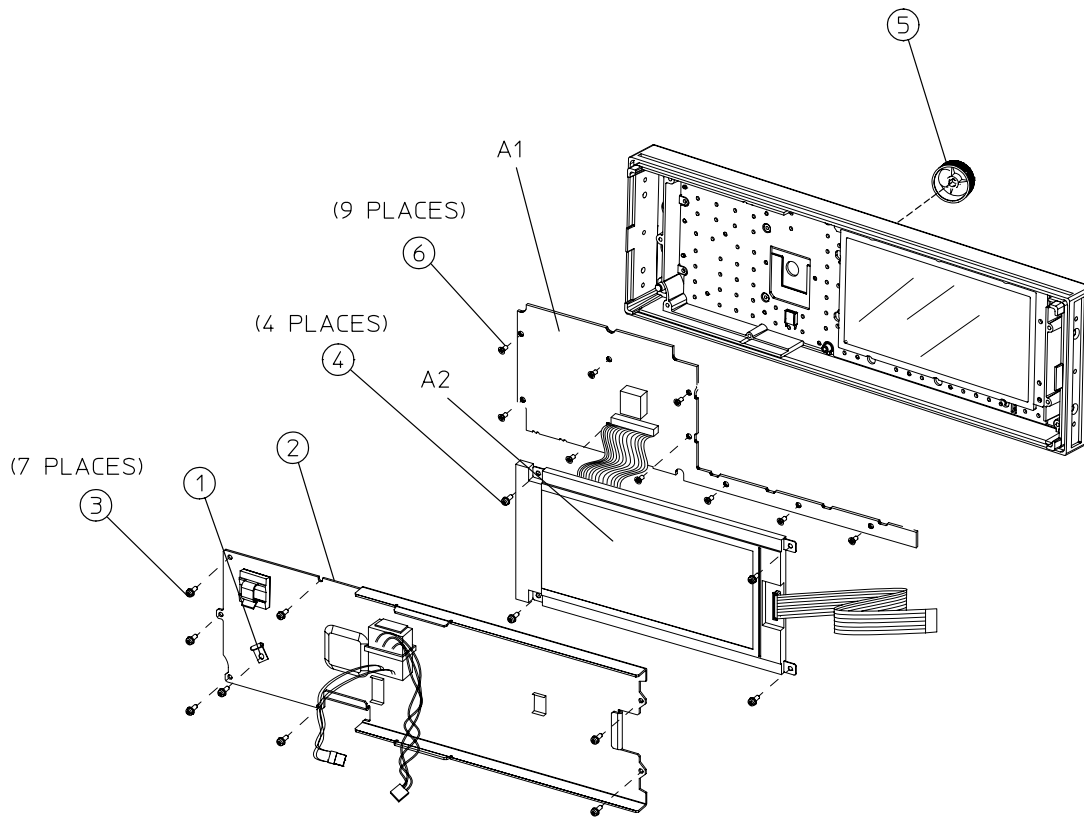
Removal

1. Remove the front panel assembly. (Refer to the “[Front Panel](#)” replacement procedure on page 5-60.)
2. Remove the small bracket (item 1 in [Figure 5-1](#)) that secures W9 (not shown) to the RFI shield (item 2). Disconnect W9.
3. Remove the RFI shield by removing the seven screws (item 3) that secure it.
4. Remove the display (A2) by removing the four screws (item 4) that secure it.
5. Remove the front panel knob (item 5) by pulling it directly away from the front panel.
6. Remove the front panel board (A1) by removing the nine screws (item 6) that secure it.

Replacement

1. Reverse the removal procedure and do the following:
 - Torque all T-10 TORX screws to 9 in-lbs.
 - Torque W9 to 9 in-lbs.

Figure 5-1 A1 Front Panel Board



sk7138b

A2 Display

Tools Required

- T-10 TORX screwdriver
- 5/16-inch open-end wrench

Removal

1. Remove the front panel assembly. (Refer to the “Front Panel” replacement procedure on page 5-60.)
2. Remove the small bracket (item 1 in [Figure 5-2](#)) that secures W9 (not shown) to the RFI shield (item 2). Disconnect W9.
3. Remove the RFI shield by removing the seven screws (item 3) that secure it.
4. Remove the display (A2) by removing the four screws (item 4) that secure it.

Replacement

1. Reverse the removal procedure and do the following:
 - Torque all T-10 TORX screws to 9 in-lbs.
 - Torque W9 to 9 in-lbs.
 - If you know the part number of the replacement display, on the CPU/motherboard, set the jumpers for P104, P105, and P106 to the correct positions for your display. (See [Figure 5-3](#).)

For part number 2090-0375, set P104, P105, and P106 to the + position.

For part number 1990-1910, set P104, P105, and P106 to the – position.
 - If you *do not* know the part number of the replacement display, do the following:
 - a. On the CPU/motherboard, set the jumpers for P104, P105, and P106 to the + position.

CAUTION Damage can occur to the CPU/motherboard if the signal generator remains turned on for a prolonged period with the jumpers for P104, P105, and P106 positioned incorrectly.

- b. Turn the signal generator on, and observe the display.
- c. If the display does not show text or characters within five seconds, turn the signal generator off and move the jumpers for P104, P105, and P106 to the – position. Repeat the previous step.

- On the A14 CPU/motherboard, set switch #4 on switch pack S201 to the correct position for your display: (See [Figure 5-3](#).)

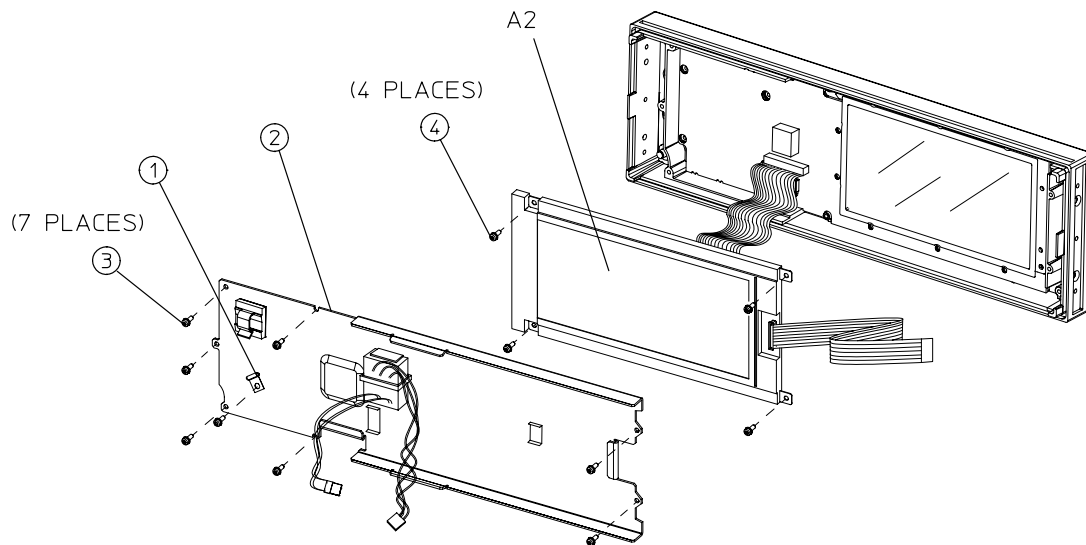
If P104, P105, and P106 are set to the + position, set switch #4 of S201 to the up (open) position, away from the CPU/motherboard.

If P104, P105, and P106 are set to the – position, set switch #4 of S201 to the down (closed) position, toward the CPU/motherboard.

NOTE Switch #5 of S201 is set to the up (open) position in all circumstances.

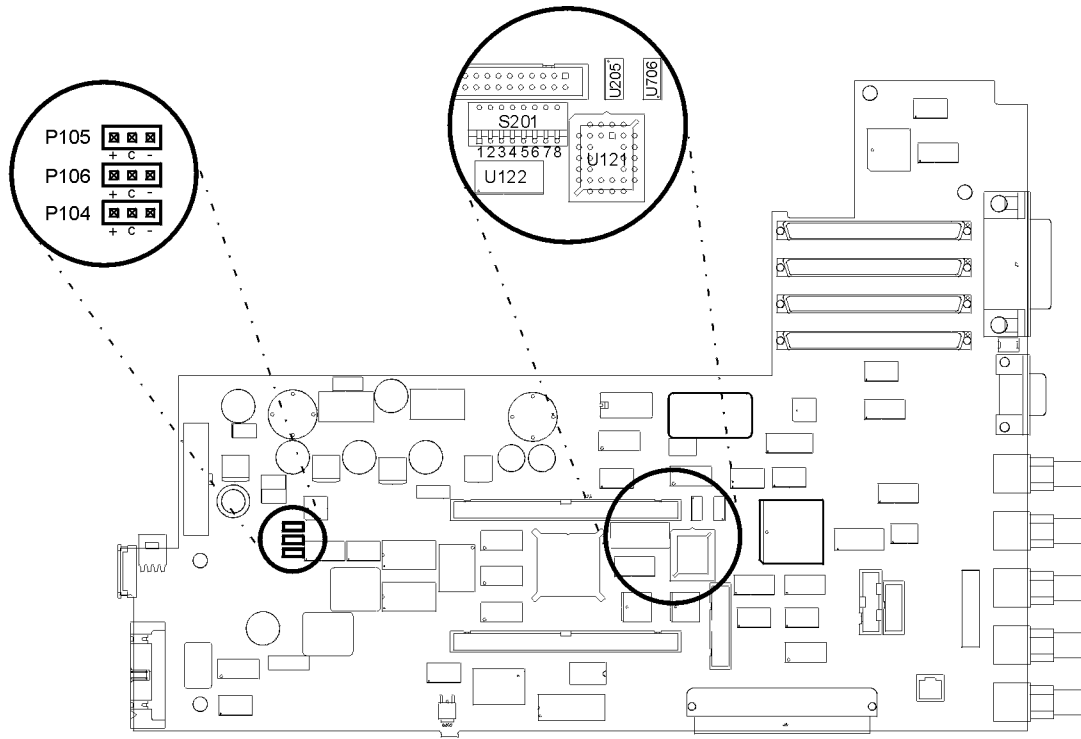
NOTE You must reset the signal generator for the switch settings to take effect.

Figure 5-2 A2 Display (1 of 2)



sk7137b

Figure 5-3 A2 Display (2 of 2)



sk7109b

A2DS1 Fluorescent Lamp

Tools Required

- Phillips #0 screwdriver

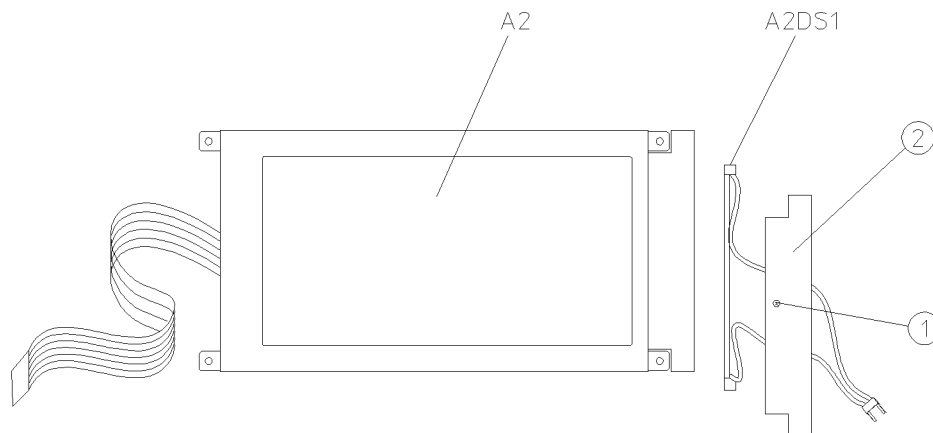
Removal

1. Remove the display (A2). (Refer to the “A2 Display” replacement procedure on page 5-6.)
2. Loosen the screw (item 1 in [Figure 5-4](#)) on the compartment door (item 2) of the display. Remove the door.
3. Remove the fluorescent lamp (A2DS1) from the compartment.

Replacement

1. Reverse the removal procedure. Ensure the lamp is correctly positioned in the reflective paper of the compartment.

Figure 5-4 A2DS1 Fluorescent Lamp



sk744a

A3 Inverter

Tools Required

- wire cutters

Removal

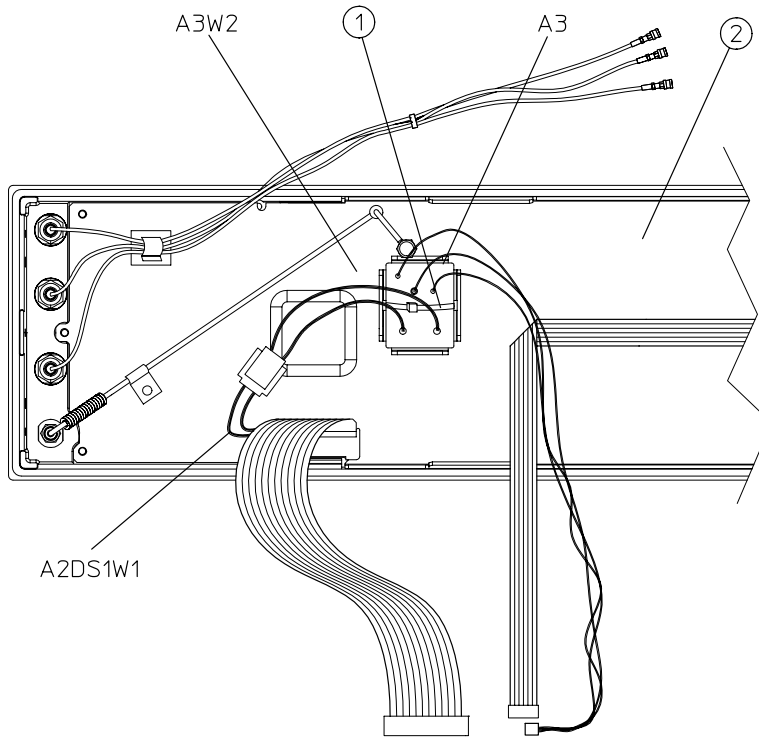
| | |
|-------------|---|
| NOTE | It is best to attempt this procedure without removing the front panel assembly. If the front panel assembly is removed, you will be required to perform time-consuming “Power Level Accuracy” verification tests and adjustments. |
|-------------|---|

1. Remove the instrument cover. (Refer to the “[Instrument Cover](#)” replacement procedure on page 5-64.)
2. Disconnect A3W2 from A2DS1W1. (See [Figure 5-5](#).)
3. Cut the tie wrap (item 1) that secures the inverter (A3) to the RFI shield (item 2).
4. Remove the inverter.

Replacement

1. Reverse the removal procedure and secure the inverter (A3) with a new tie wrap.

Figure 5-5 A3 Inverter



sk7136b

A4 Power Supply

Tools Required

- T-10 TORX screwdriver
- T-15 TORX screwdriver

Removal

1. Remove the rear panel assembly. (Refer to the “[Rear Panel](#)” replacement procedure on page 5-66.)
2. Remove the screw (item 1 in [Figure 5-6](#)) that attaches the CPU/motherboard (A14) to the bottom of the power supply shield (item 2).
3. Disconnect A4W1 from the CPU/motherboard (A14). (See [Figure 5-7](#) on page 5-14.)
4. Carefully peel off the side trim (item 3) from the left side of the front panel assembly (item 4).
5. Remove the two screws (item 5) that attach the power supply shield (item 2) to the front panel assembly.
6. Remove the five screws (item 6) that attach the power supply shield to the instrument chassis (item 7).
7. Lift the rear of the power supply shield one-quarter inch and then pull it away from the instrument chassis.

NOTE While removing the power supply shield, try to limit the movement of the front panel assembly. This will reduce the stress on W9.

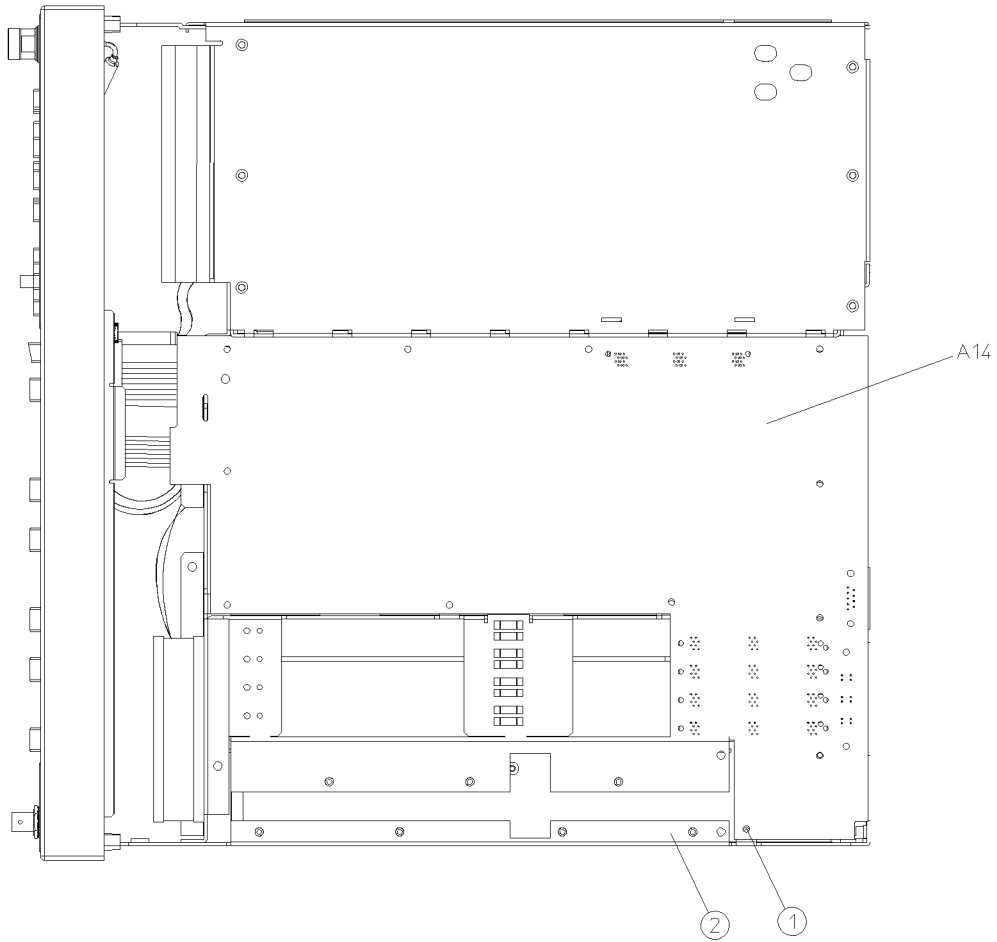
8. Remove the 12 screws (item 8) that attach the power supply to the power supply shield.
9. Remove the power supply (A4) from the front end of the shield.

NOTE Before proceeding to the next step ensure that the instrument is fully supported on a flat surface. This will keep the front panel assembly stable during the time it is attached only to the right side of the instrument.

Replacement

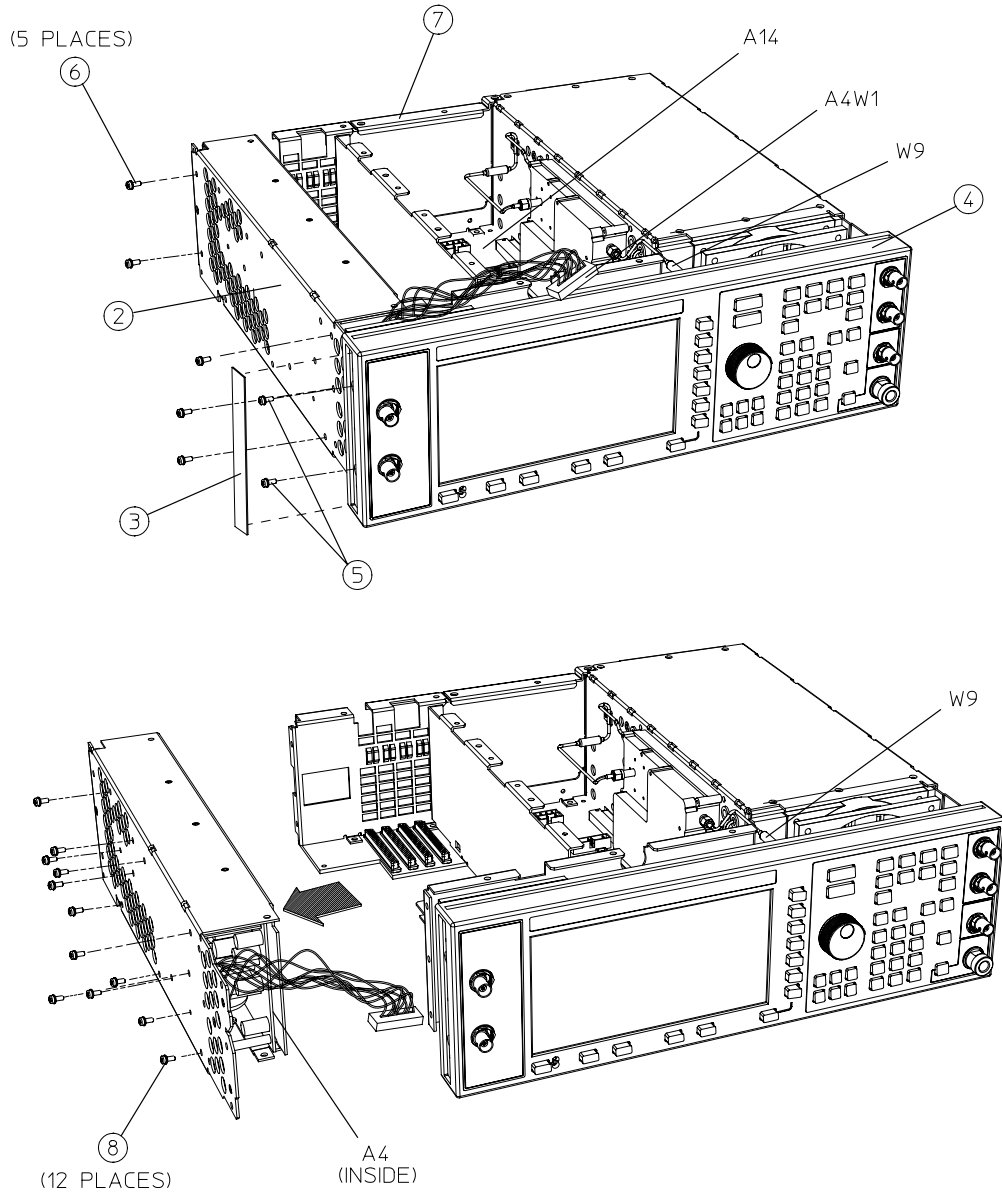
1. Reverse the removal procedure and do the following:
 - Torque all T-10 TORX screws to 9 in-lbs.
 - Torque all T-15 TORX screws to 21 in-lbs.

Figure 5-6 A4 Power Supply (1 of 2)



sk7128b

Figure 5-7 A4 Power Supply (2 of 2)



A4 Power Supply (with Option 1EM)

Tools Required

- T-10 TORX screwdriver

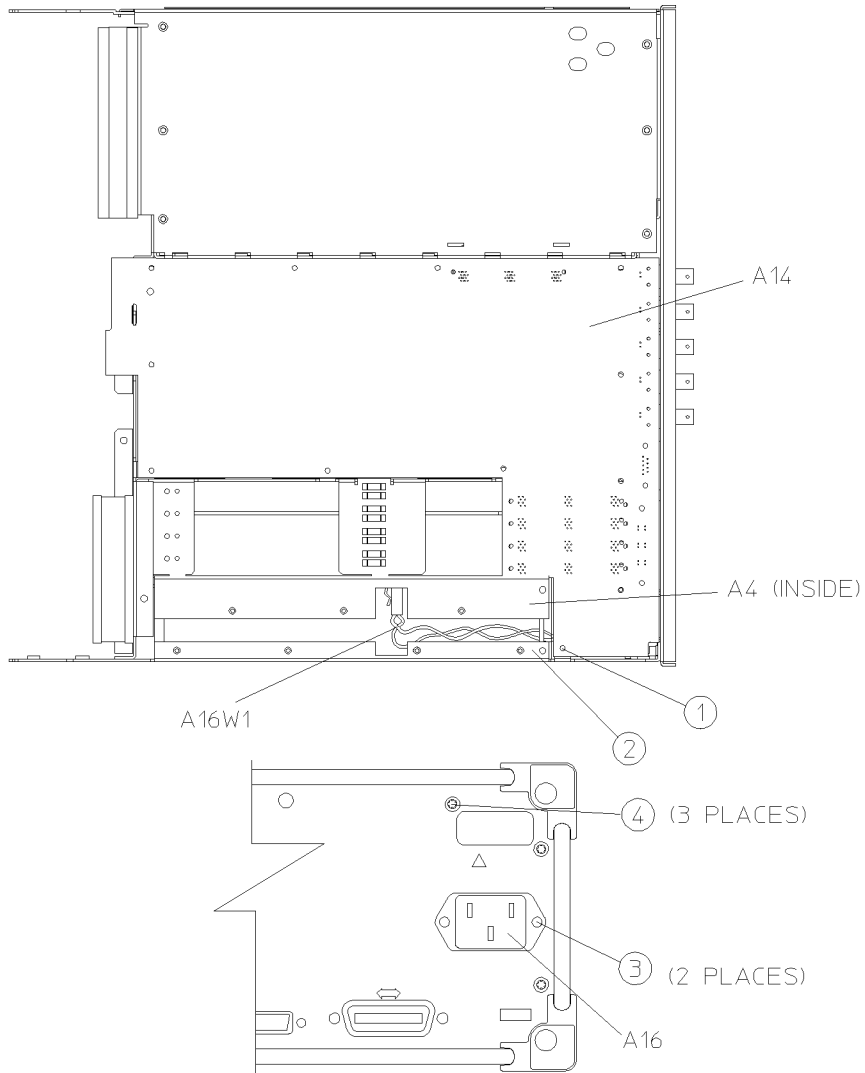
Removal

1. Remove the front panel assembly. (Refer to the “[Front Panel](#)” replacement procedure on page 5-60.)
2. Remove the bottom cover by removing the 15 screws that secure it.
3. Remove the screw (item 1 in [Figure 5-8](#)) that attaches the CPU/motherboard (A14) to the bottom of the power supply shield (item 2).
4. Disconnect A16W1 from the power supply (A4).
5. Remove the two screws (item 3) that attach the line module (A16) to the rear panel.
6. Remove the line module and A16W1 from the opening in the rear panel. The line module will remain connected to the rear panel, however, via the ground wire, A16W2. (See [Figure 5-9](#) on page 5-17.)
7. Remove the three screws (item 4 in [Figure 5-8](#)) that attach the rear panel to the power supply shield.
8. Disconnect A4W1 from the CPU/motherboard (A14). (See [Figure 5-9](#) on page 5-17.)
9. Remove the five screws (item 5) that attach the power supply shield (item 2) to the instrument chassis (item 6).
10. Pull the power supply shield away from the instrument chassis.
11. Remove the 12 screws (item 7) that attach the power supply to the power supply shield.
12. Remove the power supply (A4) from the front end of the shield.

Replacement

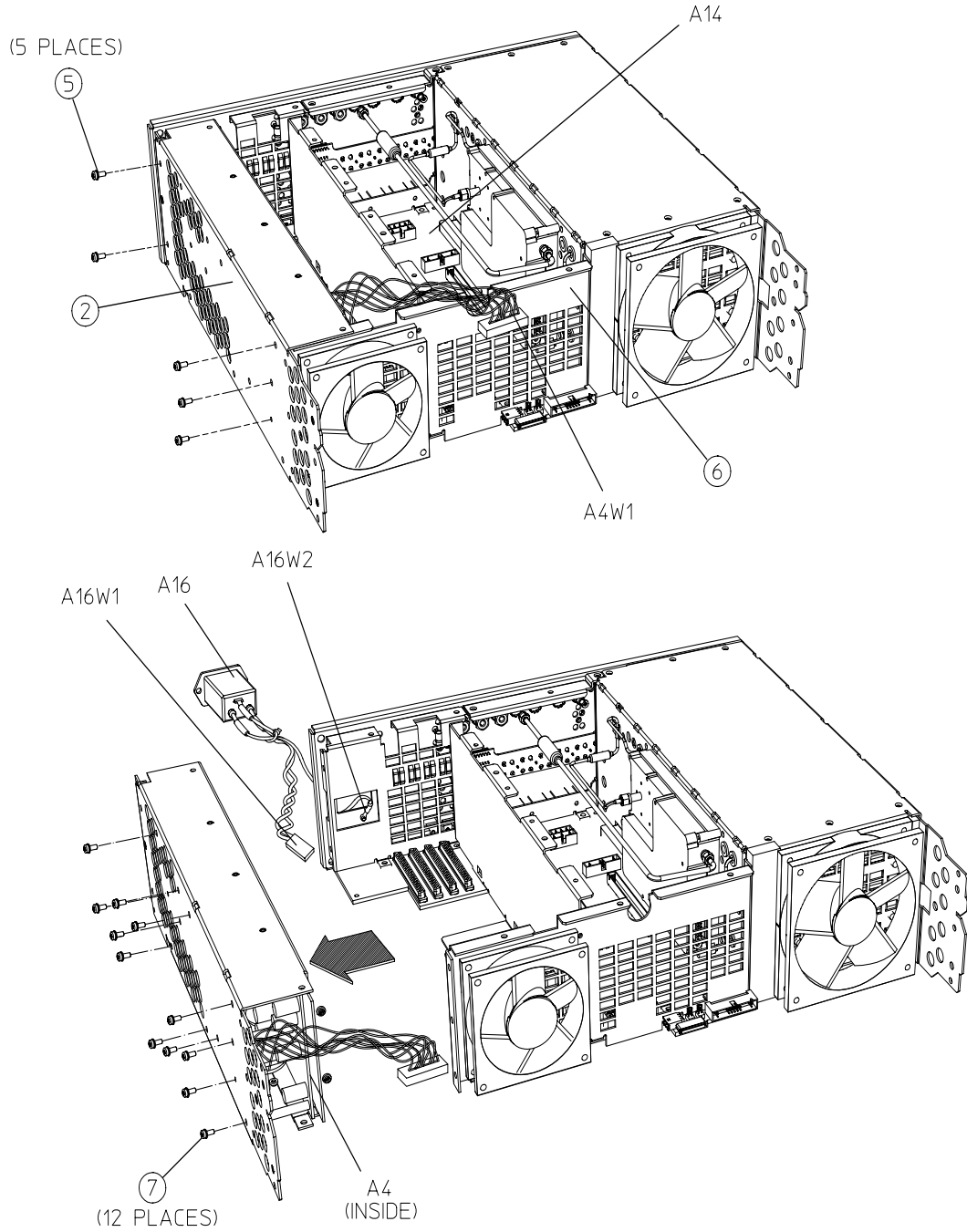
1. Reverse the removal procedure and torque all T-10 TORX screws to 9 in-lbs.

Figure 5-8 A4 Power Supply (with Option 1EM) (1 of 2)



sk7127b

Figure 5-9 A4 Power Supply (with Option 1EM) (2 of 2)



sk727b

A14 CPU/Motherboard

Tools Required

- T-10 TORX screwdriver
- EEPROM extraction tool (Part Number 8710-1982)

Removal

1. Remove the rear panel assembly. (Refer to the “[Rear Panel](#)” replacement procedure on page 5-66 or, if you have Option 1EM, refer to the “[Rear Panel \(with Option 1EM\)](#)” replacement procedure on page 5-70.)
2. Remove all of the boards in the digital card cage (if installed for your model). (Refer to the “[Digital Card Cage Boards](#)” replacement procedure on page 5-58.)
3. Disconnect A1W1, A3W1, A4W1, B1W1, B2W1, W10, and W13 from the CPU/motherboard (A14). (See [Figure 5-10](#).)

4. Disconnect A14Q501 from the CPU/Motherboard.

If A14Q501 is attached to the back of the CPU/Motherboard (as it is in older models), this step is not necessary.

5. If you have Option UNB, also disconnect A19W1 from the CPU/motherboard.

If you have Option 1E6, also disconnect A25W1 from the CPU/motherboard.

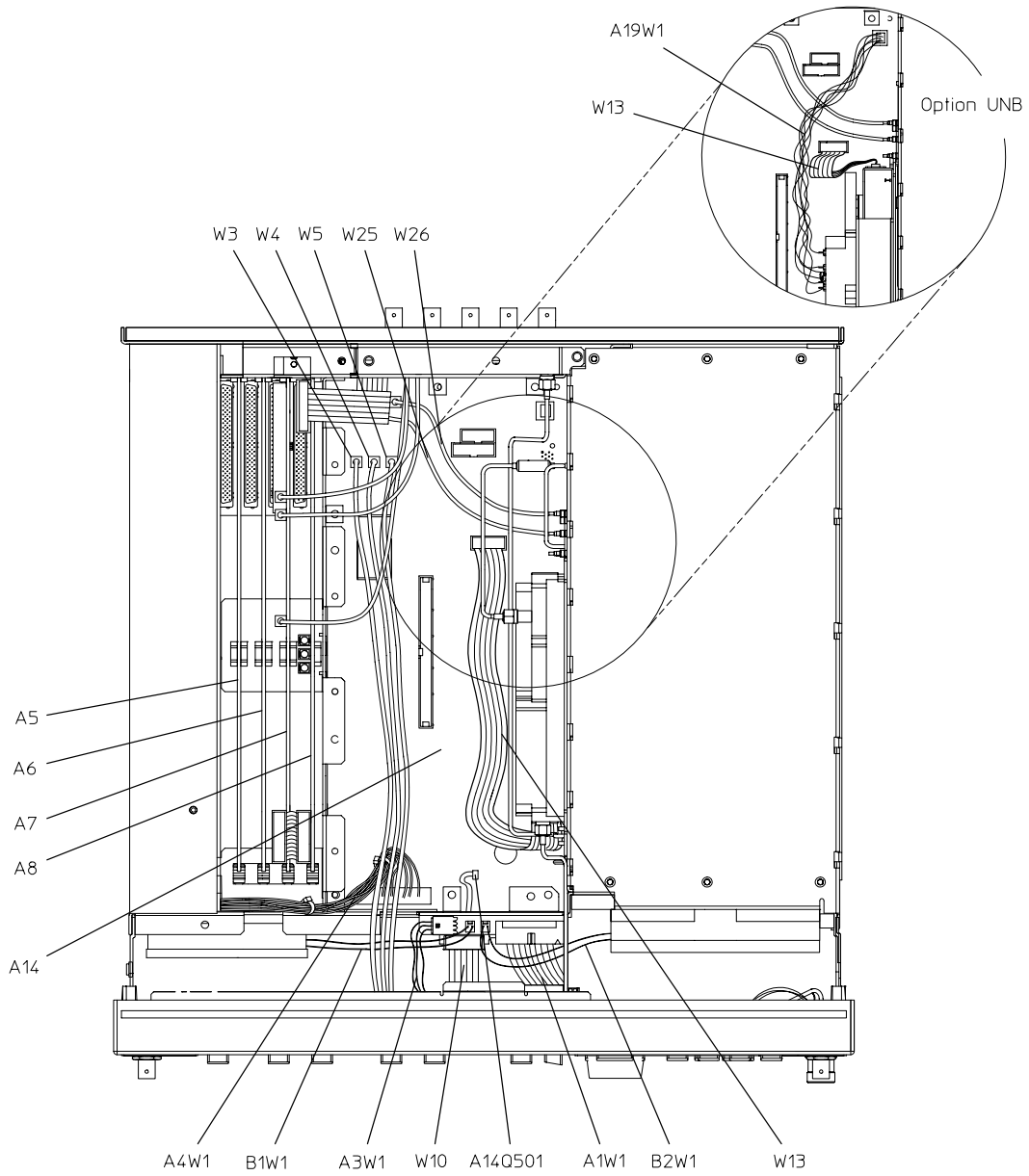
6. If you have an ESG-A Series or ESG-AP Series signal generator, go to step 7.

If you have an ESG-D Series or ESG-DP Series signal generator, disconnect W25 and W26 from the CPU/motherboard (A14).

For all current models, disconnect W3, W4, and W5 from the CPU/motherboard, otherwise go to step 7.

NOTE [Figure 5-10](#) represents an Option UN7/UND.

Figure 5-10 A14 CPU/Motherboard (1 of 3)



sk7121b

7. Turn the signal generator upside-down and remove the screw (item 1 in [Figure 5-11](#)) from the CPU/motherboard (A14).
8. Remove the screw (item 2) from the CPU/motherboard.

NOTE In some models, this screw secures transistor A14Q501 to the chassis. In this case, the screw is installed with an insulator bushing. Be careful not to lose it when removing the screw.

9. Remove the CPU/motherboard.
10. Notice how the jumper connections are set for P104, P105, and P106. (You will need this information when you replace the board.) (See [Figure 5-12](#).) Some CPU/motherboards do not have these components.
11. If the CPU/motherboard includes removable devices in locations U106 and U107, label each device and remove them using the extraction tool. (See [Figure 5-12](#).)

Replacement

1. Insert U106 and U107 into their respective sockets on the replacement CPU/motherboard.

CAUTION U106 and U107 hold critical data including the serial number, option configuration, and calibration information. You must transfer these devices to the new CPU/motherboard for the signal generator to work.

2. Reverse the removal procedure and do the following:
 - When reinstalling the CPU/motherboard, remember to insert the tab and daughterboard connector into the corresponding slots of the instrument chassis before securing it with the screws.
 - Torque the two T-10 TORX screws to 9 in-lbs.
 - Refer to replaceable parts chapter for your signal generator model to verify that the cables are reconnected in the correct locations. (Refer to [Chapter 3](#) for the ESG-A and ESG-D series, refer to [Chapter 4](#) for the ESG-AP and ESG-DP series.)
3. On the CPU/motherboard, set the jumpers for P104, P105, and P106 to the same positions as the previous board. (See [Figure 5-12](#).)

If the previous CPU/motherboard did not have P104, P105, and P106, set the jumpers to the – position.
4. If you *do not* know how the jumpers for P104, P105, and P106 were set on the previous CPU/motherboard, do the following:
 - a. On the CPU/motherboard, set the jumpers for P104, P105, and P106 to the + position.

CAUTION Damage can occur to the CPU/motherboard if the signal generator remains turned on for a prolonged period with the jumpers for P104, P105, and P106 positioned incorrectly.

- b. Turn the signal generator on, and observe the display.
 - c. If the display does not show text or characters within five seconds, turn the signal generator off and move the jumpers for P104, P105, and P106 to the – position. Repeat the previous step.
5. On the A14 CPU/motherboard, set switch #4 on switch pack S201 to the correct position for your display:

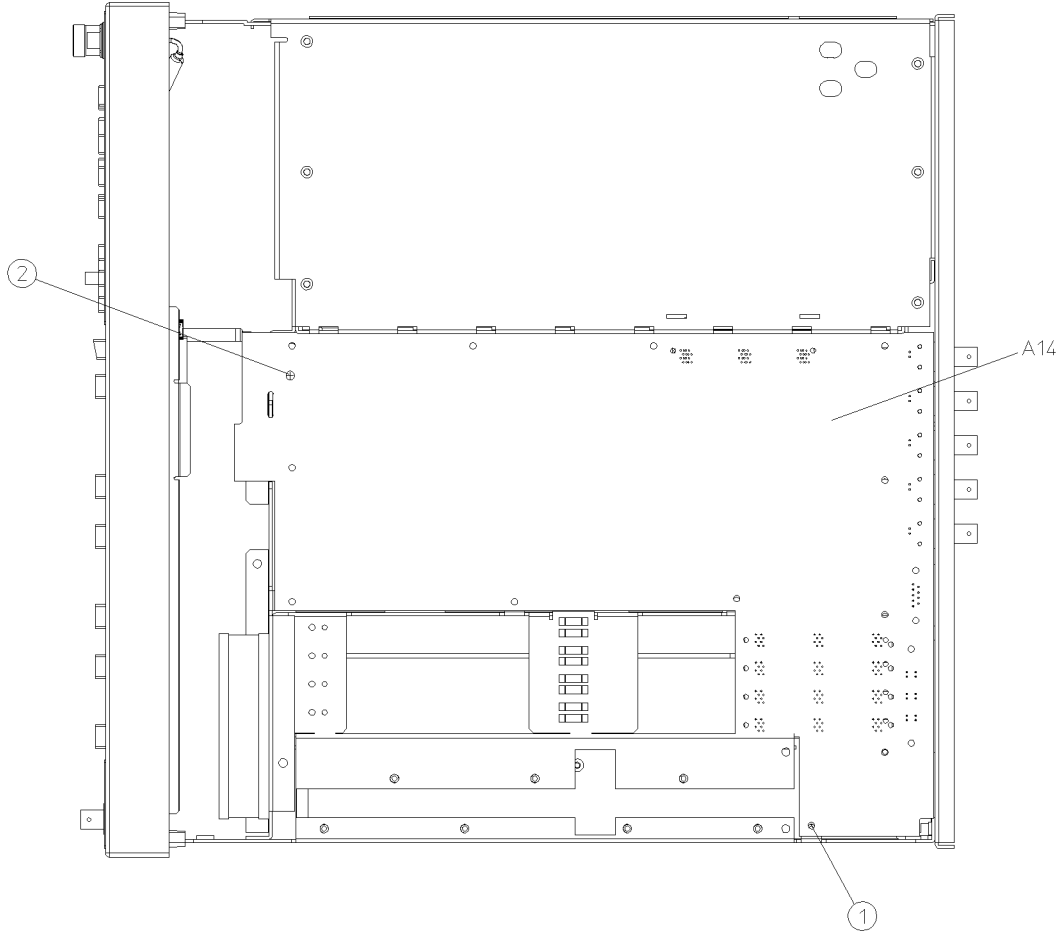
If P104, P105, and P106 are set to the + position, set switch #4 of S201 to the up (open) position, away from the CPU/motherboard. (See [Figure 5-12.](#))

If P104, P105, and P106 are set to the – position, set switch #4 of S201 to the down (closed) position, toward the CPU/motherboard. (See [Figure 5-12.](#))

NOTE Switch #5 of S201 is set to the up (open) position in all circumstances.

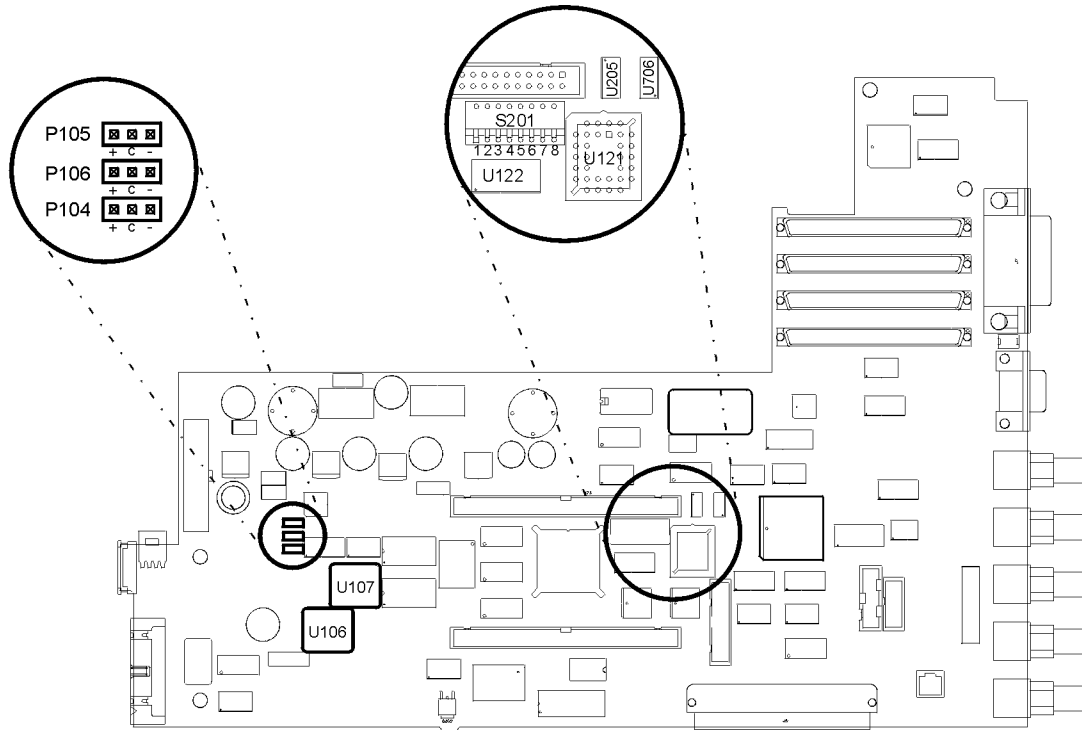
NOTE You must reset the signal generator for the switch settings to take effect.

Figure 5-11 A14 CPU/Motherboard (2 of 3)



sk7120b

Figure 5-12 A14 CPU/Motherboard (3 of 3)



sk7105b

A14BT1 Battery

Tools Required

- T-10 TORX screwdriver
- soldering tools
- utility knife
- Dow Corning 3145 RTV Clear Adhesive Sealant (part number 0470-0450)

Removal

1. Remove the instrument cover. (Refer to the “[Instrument Cover](#)” replacement procedure on page 5-64.)
2. Remove the top cover by removing the 11 screws that secure it.
3. Remove the bottom cover by removing the 15 screws that secure it.
4. Unsolder the leads of the battery (A14BT1) from the CPU/motherboard (A14). (See [Figure 5-13](#).)

CAUTION Calibration data will be preserved with the removal of the battery. However, user data will be lost unless it is saved and later restored using an external controller.

5. The battery is also attached to the CPU/motherboard with a silicon adhesive. Using a utility knife, carefully cut through the adhesive to lift and remove the battery from the CPU/motherboard.

WARNING **Battery A14BT1 contains lithium. Do not incinerate or puncture this battery. Dispose of the discharged battery in a safe manner. Refer to [Chapter 7, “Safety and Regulatory,”](#) for instructions on how to dispose of the battery.**

6. Remove any excess adhesive from the CPU/motherboard surface.

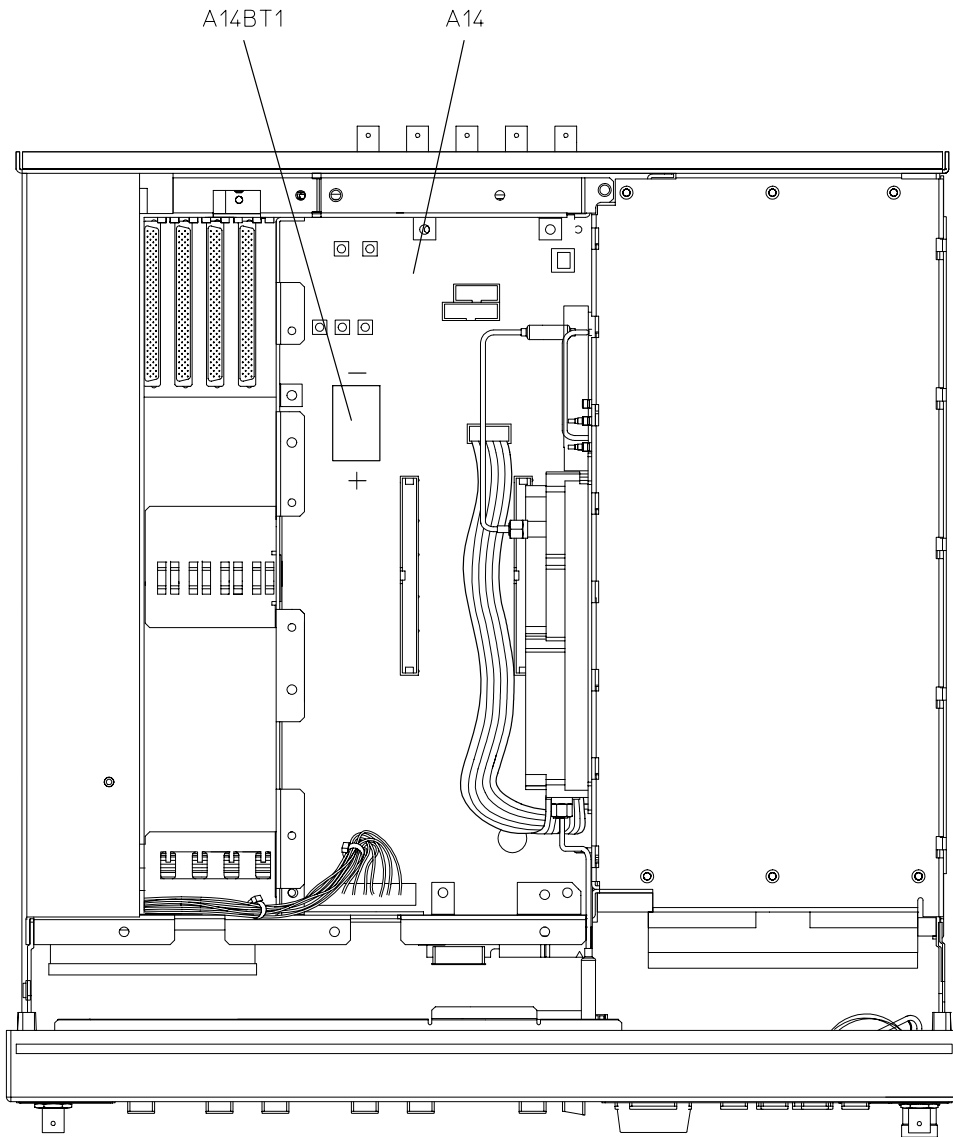
Replacement

WARNING **Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended. Discard used batteries according to manufacturer’s instructions.**

1. Apply a small amount of silicon adhesive to the battery’s location on the CPU/motherboard.
2. Insert the new battery into the CPU/motherboard making sure it is oriented with the correct polarity.
3. Solder the battery’s leads to the CPU/motherboard.

4. Reassemble the instrument.

Figure 5-13 A14BT1 Battery



sk733b

A14Q501 Transistor

Tools Required

- T-10 TORX screwdriver

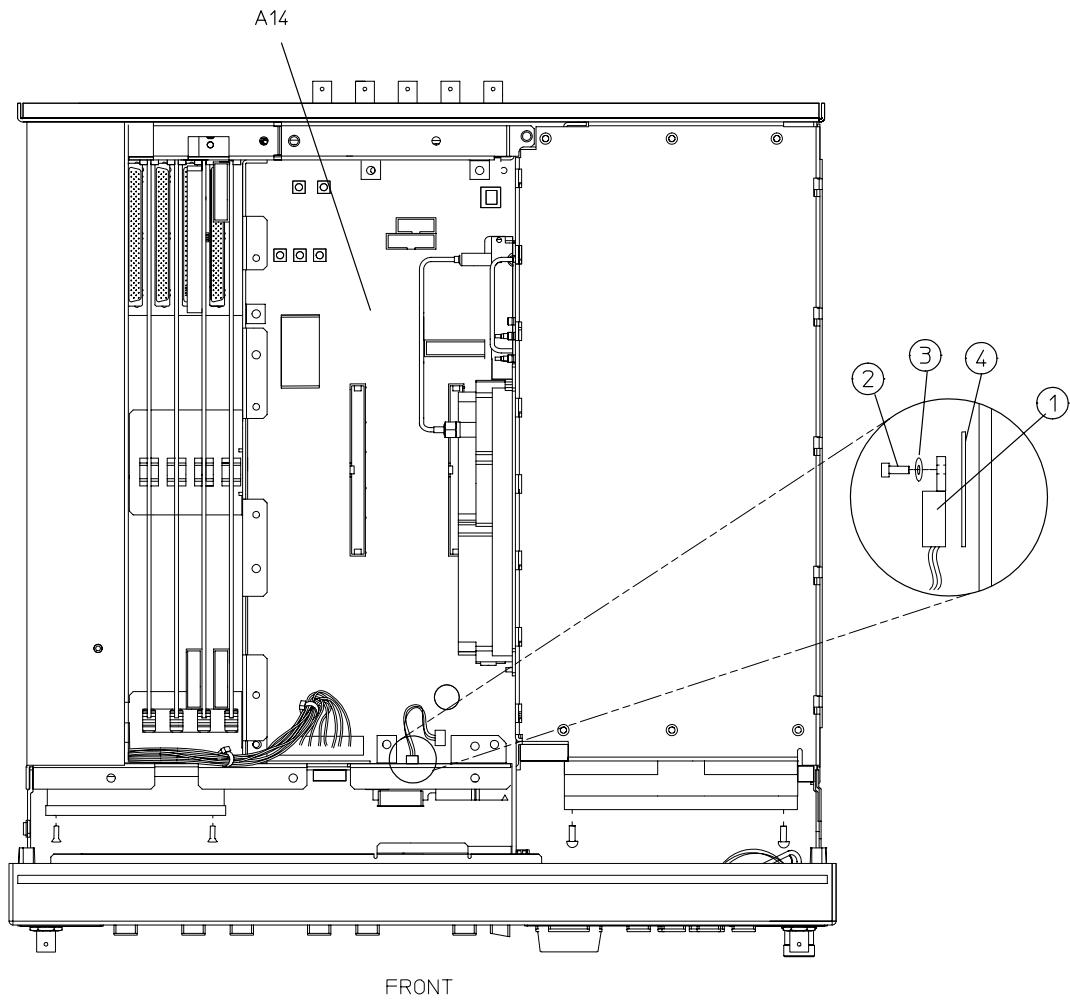
Removal

1. Remove the instrument cover. (Refer to the “[Instrument Cover](#)” replacement procedure on page 5-64.)
2. Disconnect the transistor assembly (item 1 in [Figure 5-14](#)) leads from the CPU/motherboard (A14).
3. Remove the screw (item 2) that attaches the transistor assembly to the chassis.
4. Remove the transistor assembly (item 1), the shoulder washer (item 3), and, if necessary, the insulator pad (item 4).

Replacement

1. Reverse the removal procedure and torque the T-10 TORX screw to 9 in-lbs.

Figure 5-14 A14Q501 Transistor



sk7132b

A15 Daughterboard

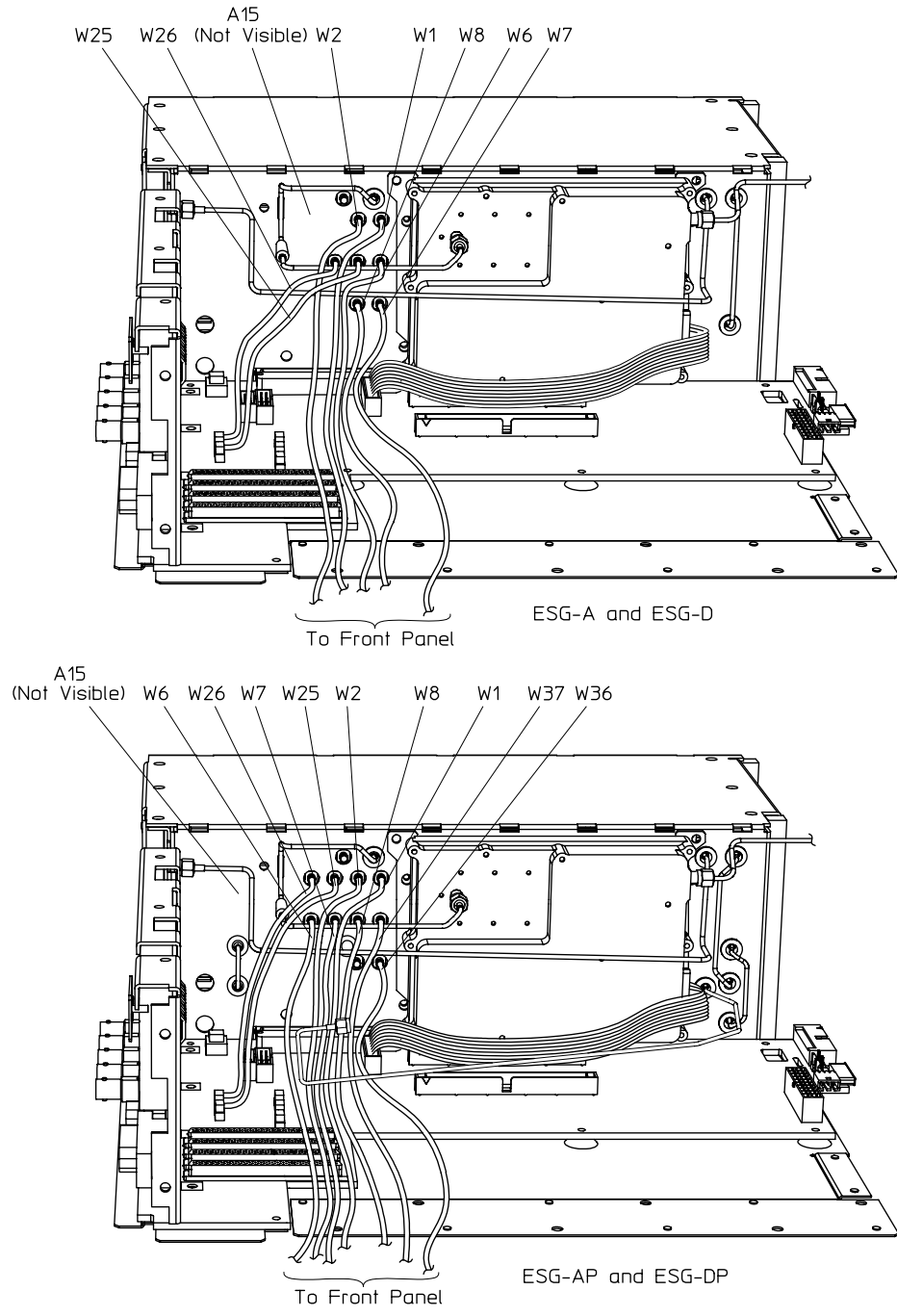
Tools Required

- T-8 TORX screwdriver
- T-10 TORX screwdriver
- long nose pliers

Removal

1. Remove the instrument cover. (Refer to the [“Instrument Cover”](#) replacement procedure on page 5-64.)
2. Remove the top cover by removing the 11 screws that secure it.
3. Remove all of the flexible cables connected to the daughterboard (A15). (See [Figure 5-15](#).)
4. Remove the right-side cover (not shown) by first removing the four screws that attach it to the instrument chassis. Then push down on the cover while sliding it towards the front of the instrument to unhook its tabs from the slots on the top of the chassis.

Figure 5-15 A15 Daughterboard (1 of 2)



sk7135b

5. Simultaneously lift the left and right extractors (item 1 in [Figure 5-16](#)) on each of the daughterboard card cage boards, and remove them from the card cage slots.

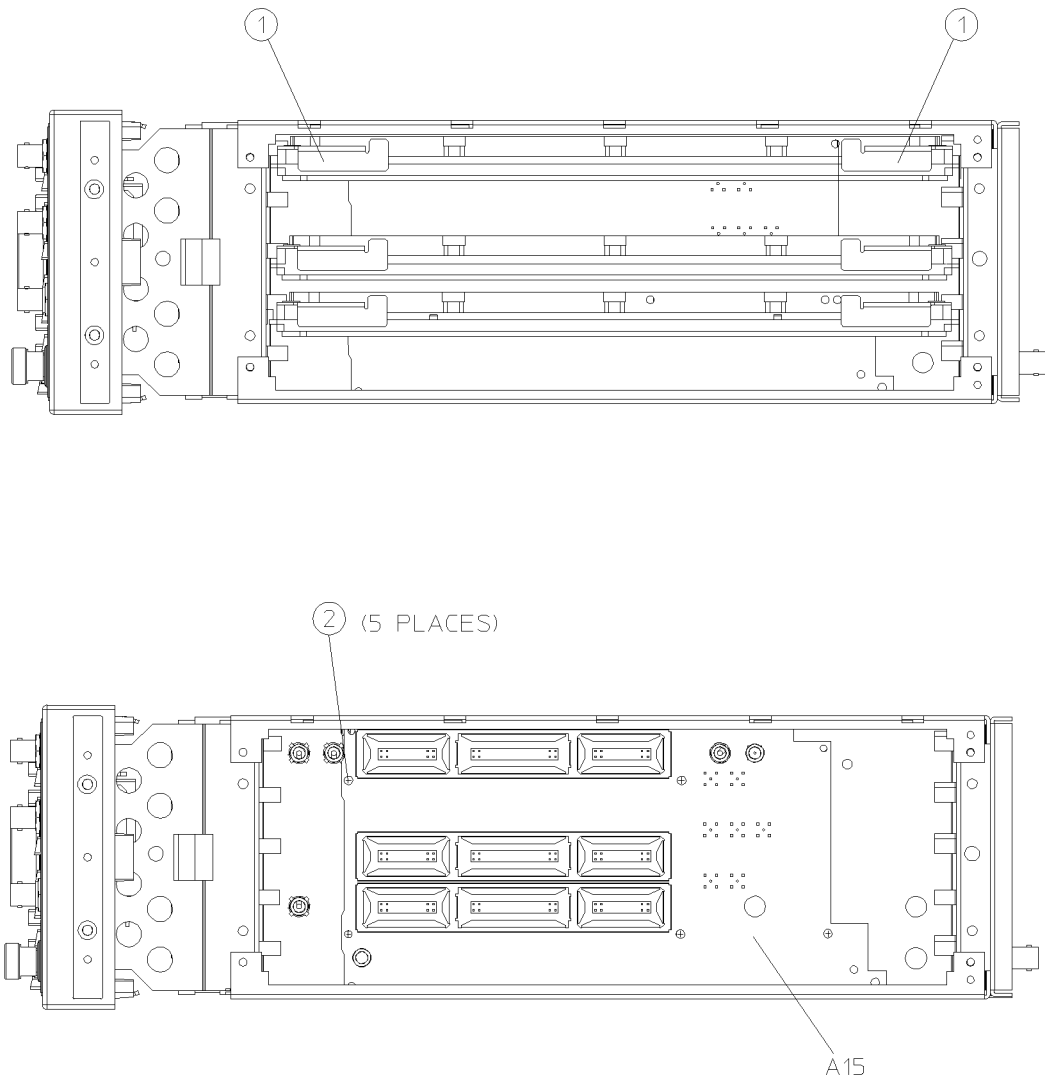
NOTE [Figure 5-16](#) shows an ESG-A or ESG-D series instrument. ESG-AP and ESG-DP series instruments contain four boards in the daughterboard card cage.

6. Remove the five screws (item 2) that attach the daughterboard (A15) to the instrument chassis.
7. Remove the daughterboard.

Replacement

1. Reverse the removal procedure and do the following:
 - Torque all T-8 TORX screws to 9 in-lbs.
 - Torque all T-10 TORX screws to 9 in-lbs.
 - Refer to replaceable parts chapter for your signal generator model to verify that the cables are reconnected in the correct locations. (Refer to [Chapter 3](#) for the ESG-A and ESG-D series, refer to [Chapter 4](#) for the ESG-AP and ESG-DP series.)

Figure 5-16 A15 Daughterboard (2 of 2)



sk7119b

A16 Line Module

Tools Required

- T-10 TORX screwdriver
- 5.5-mm wrench or nut driver

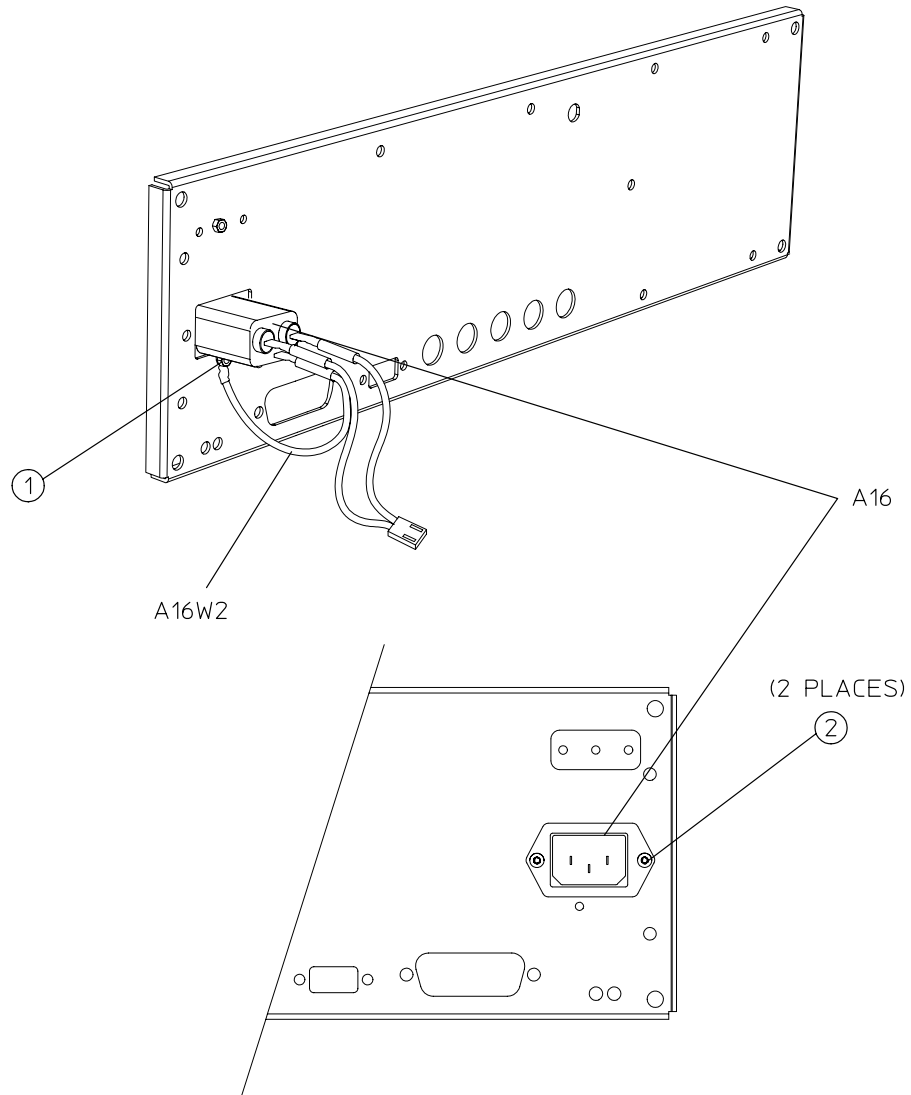
Removal

1. Remove the rear panel assembly. (Refer to the “[Rear Panel](#)” replacement procedure on page 5-66 or, if you have Option 1EM, refer to the “[Rear Panel \(with Option 1EM\)](#)” replacement procedure on page 5-70.)
2. Remove the nut (item 1 in [Figure 5-17](#)) that attaches the line module’s ground wire (A16W2) to the inside of the rear panel.
3. Remove the two screws (item 2) that attach the line module (A16) to the rear panel.
4. Remove the line module from the opening in the rear panel.

Replacement

1. Reverse the removal procedure and do the following:
 - Torque the 5.5-mm nut that attaches the ground wire to the rear panel to 9 in-lbs.
 - Torque all T-10 TORX screws to 9 in-lbs.

Figure 5-17 A16 Line Module



sk736b

A17 and A18 Rear Panel Interface Boards

Tools Required

- 5/8-inch wrench or nut driver
- 1/4-inch wrench or nut driver (Option 1EM)

Removal

1. Remove the rear panel assembly. (Refer to the “[Rear Panel](#)” replacement procedure on page 5-66 or, if you have Option 1EM, refer to the “[Rear Panel \(with Option 1EM\)](#)” replacement procedure on page 5-70.)
2. Depending on the option of your signal generator, do the following: (See [Figure 5-18](#).)

Options UN3, UN4, UN8. Remove the nuts (item 1) and washers (item 2) on the eight BNC connectors of the rear panel. Remove the rear panel interface board (A17) from the rear panel.

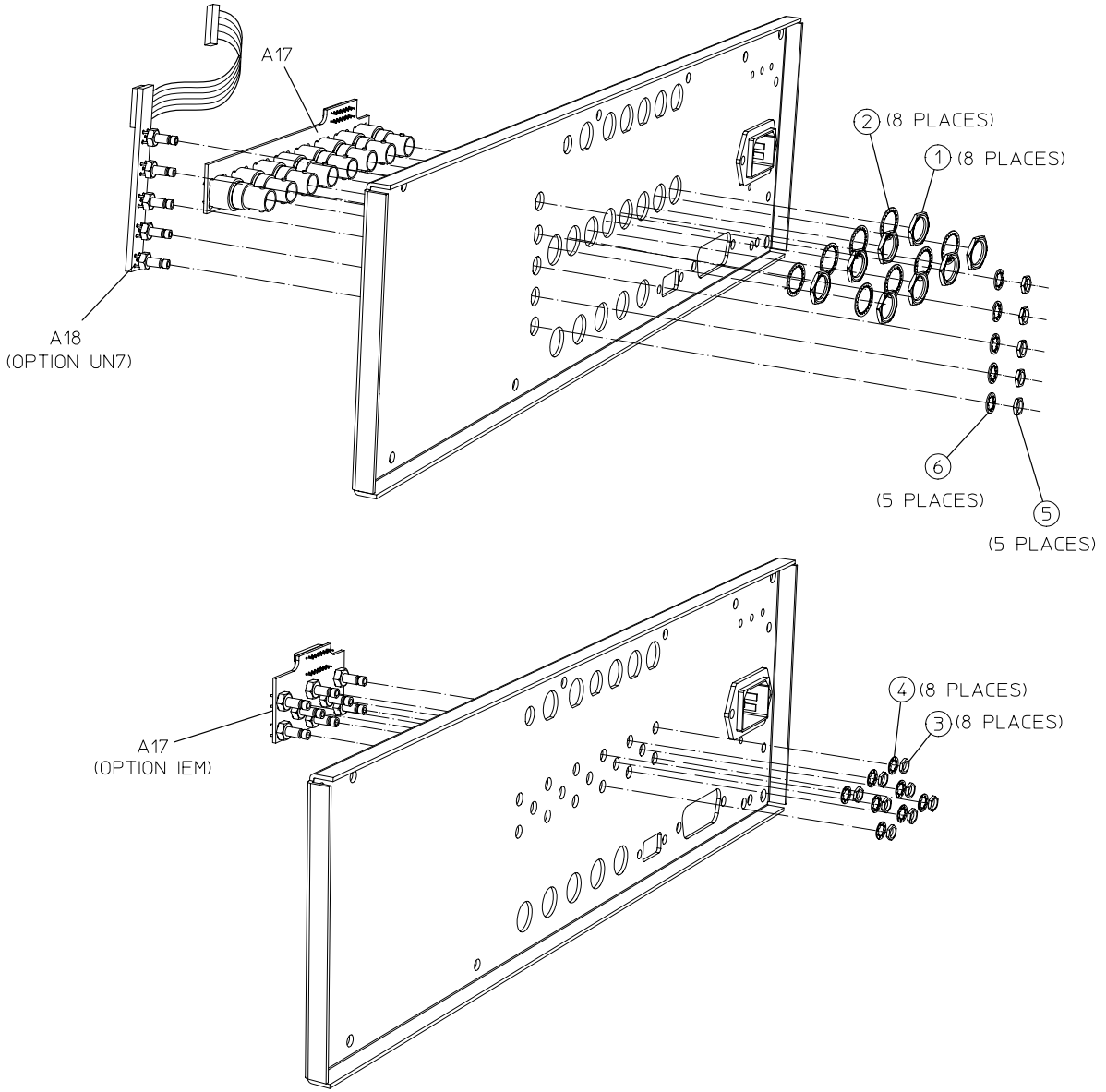
Options 1EM/UN3, 1EM/UN4, 1EM/UN8. Remove the nuts (item 3) and washers (item 4) on eight of the associated SMB connectors on the rear panel. Remove the rear panel interface board (A17) from the rear panel.

Option UN7. Remove the nuts (item 5) and washers (item 6) on five of the associated SMB connectors on the rear panel. Remove the BER rear panel interface board (A18) from the rear panel.

Replacement

1. Reverse the removal procedure and do the following:
 - Torque the 5/8-inch BNC nuts to 21 in-lbs.
 - If you have Option 1EM, torque the 1/4-inch SMB nuts to 14 in-lbs.

Figure 5-18 A17 and A18 Rear Panel Interface Boards



sk737b

A19 Reverse Power Protection (RPP)

Tools Required

- T-10 TORX screwdriver
- 5/16-inch open-end wrench

Removal

1. Remove the instrument cover. (Refer to the “[Instrument Cover](#)” replacement procedure on page 5-64.)
2. Remove the top cover by removing the 11 screws that secure it.
3. If you have Option 1E6, disconnect W45 and W47 from the pulse modulator (A25) and A25W1 from the CPU/motherboard (A14). (See [Figure 5-19](#).)

If you *do not* have Option 1E6, disconnect W14 from the mechanical attenuator (AT1). (See [Figure 5-20](#).)

4. Disconnect A19W1 from the CPU/motherboard.
5. Disconnect W9 from the RPP (A19).
6. Disconnect W13 from the CPU/motherboard.
7. Remove the two screws (item 1) that attach the attenuator/RPP assembly to the instrument chassis.
8. Tilt the assembly away from the chassis wall, then carefully lift it out of the instrument.

NOTE There are two hinged tabs at the bottom of the attenuator/RPP assembly that fit into slots in the instrument chassis. Therefore, it is necessary to tilt the assembly away from the chassis wall so that the tabs can be guided out of the slots.

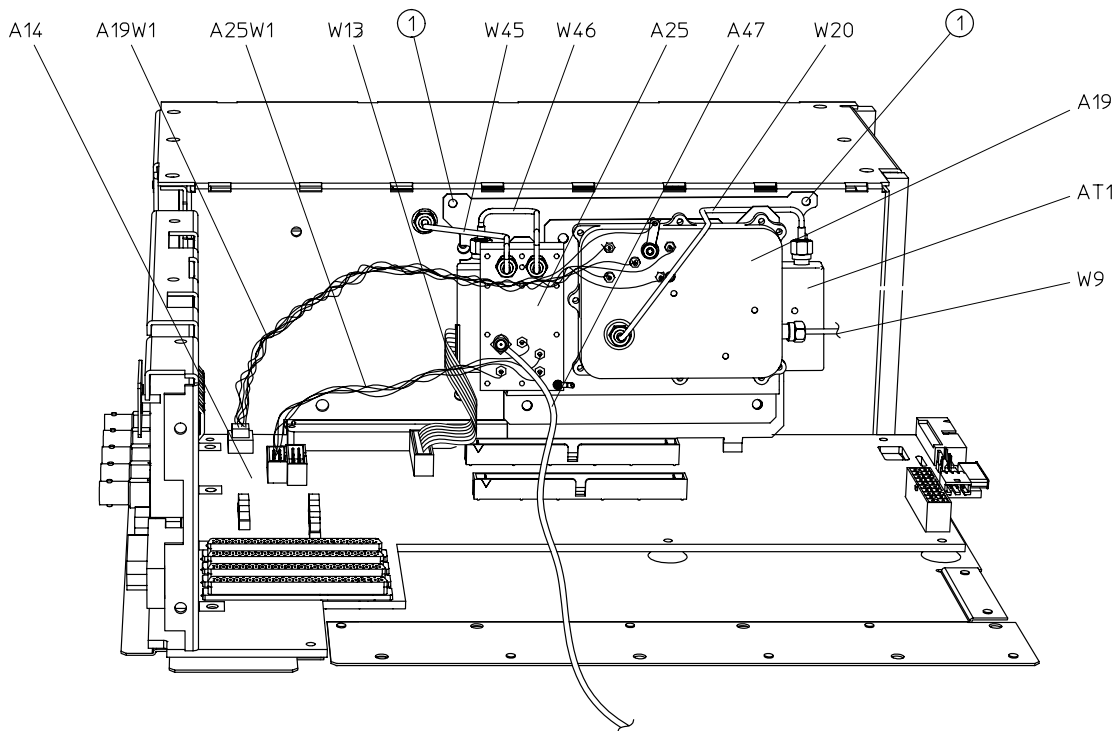
9. Disconnect W20 from the RPP and the mechanical attenuator (AT1).
10. If you have Option 1E6, disconnect W46 from the pulse modulator and the mechanical attenuator. (See [Figure 5-19](#).)
11. Remove the four screws (item 2 in [Figure 5-21](#)) that attach the RPP bracket (item 3) to the attenuator bracket (item 4).
12. Remove the three screws (item 5) that attach the RPP bracket to the RPP.

Replacement

1. Reverse the removal procedure and do the following:

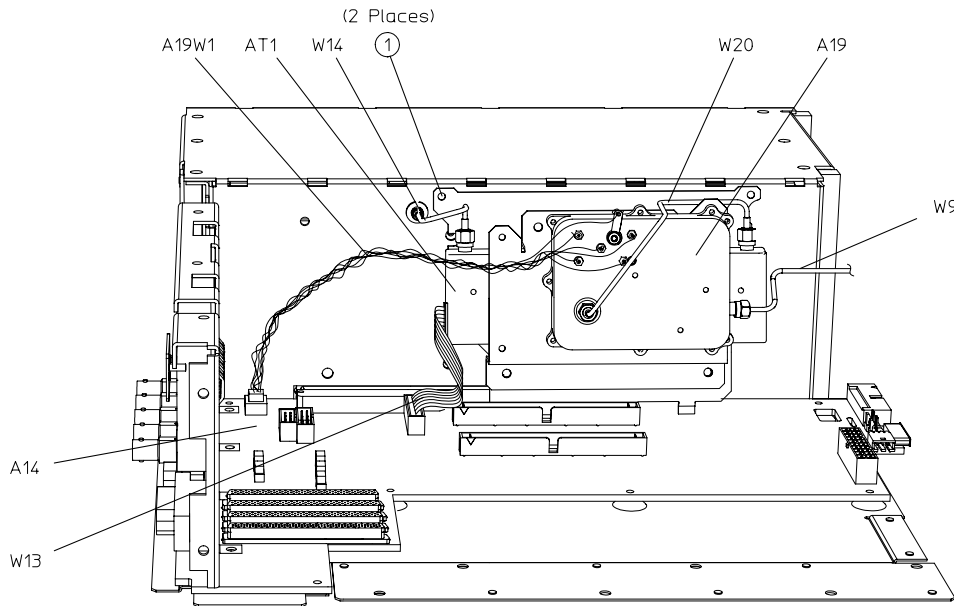
- When reinstalling the electronic attenuator/RPP assembly, remember to insert its hinged tabs into the slots located at the base of the chassis wall on which the assembly will be mounted.
- Torque all semi-rigid cables to 9 in-lbs.
- Torque all screws to 9 in-lbs.

Figure 5-19 A19 Reverse Power Protection (RPP) (1 of 3)



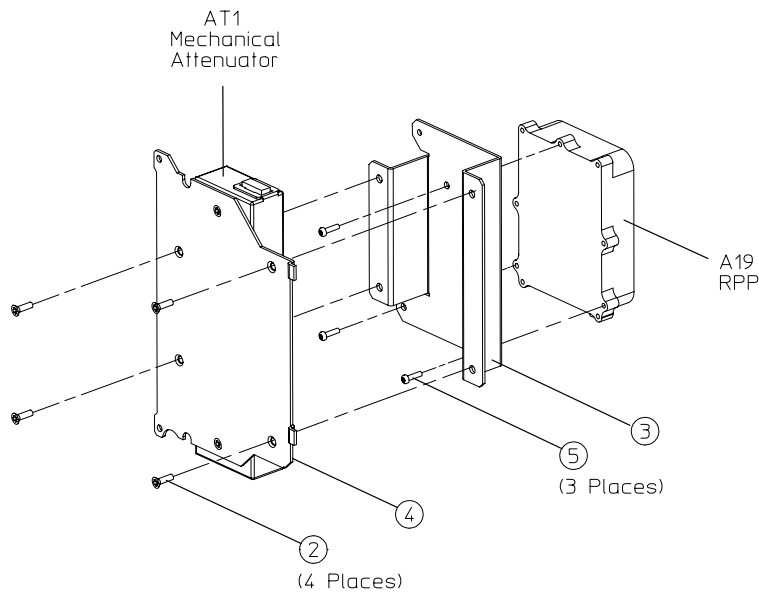
sk7153b

Figure 5-20 A19 Reverse Power Protection (RPP) (2 of 3)



sk738b

Figure 5-21 A19 Reverse Power Protection (RPP) (3 of 3)



sk739b

A20 Downconverter

Tools Required

- T-10 TORX screwdriver
- 5/16" open-end wrench

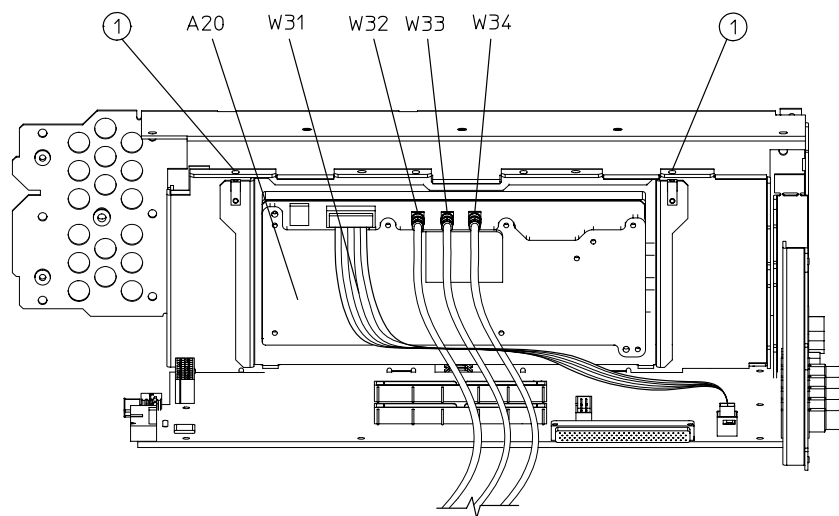
Removal

1. Remove the instrument cover. (Refer to the [“Instrument Cover”](#) replacement procedure on page 5-64.)
2. Remove the top cover by removing the 11 screws that secure it.
3. Disconnect W31, W32, W33, and W34 from the downconverter assembly (A20). (See [Figure 5-22](#).)
4. Remove the two T-10 TORX screws (item 1) holding the assembly to the chassis.
5. Slide the assembly out and up to remove.

Replacement

1. Reverse the removal procedure and do the following:
 - Torque all T-10 TORX screws to 9 in-lbs.
 - Torque all semi-rigid coaxial line connectors to 9 in-lbs.

Figure 5-22 A20 Downconverter



sk7141b

A22 YIG Driver

Tools Required

- T-10 TORX screwdriver
- 5/16" open-end wrench

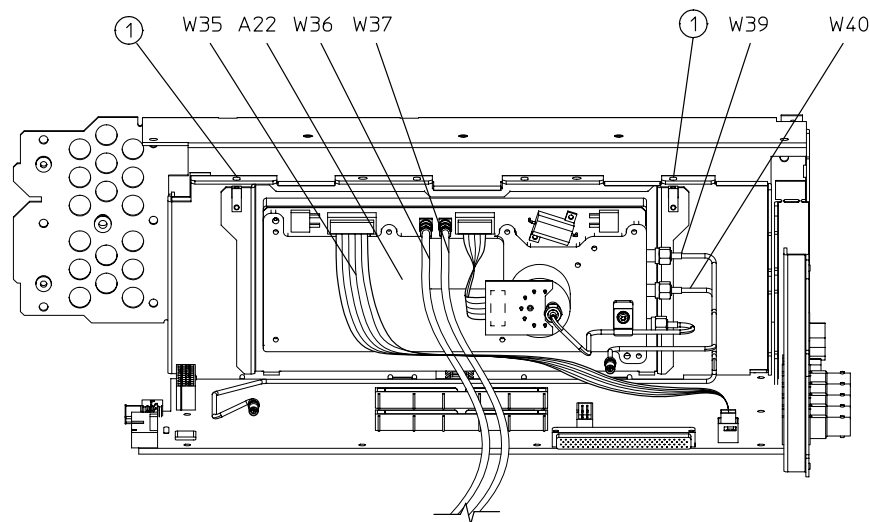
Removal

1. Remove the instrument cover. (Refer to the “[Instrument Cover](#)” replacement procedure on page 5-64.)
2. Remove the top cover by removing the 11 screws that secure it.
3. Disconnect W35, W36, W37, W39, and W40 from the YIG driver assembly (A22). (See [Figure 5-23](#).)
4. Remove the two T-10 TORX screws (item 1) holding the assembly to the chassis.
5. Slide the assembly out and up to remove.

Replacement

1. Reverse the removal procedure and do the following:
 - Torque all T-10 TORX screws to 9 in-lbs.
 - Torque all semi-rigid coaxial line connectors to 9 in-lbs.

Figure 5-23 A22 YIG Driver



sk7140b

A25 Pulse Modulator

Tools Required

- T-10 TORX screwdriver
- 5/16" open-end wrench

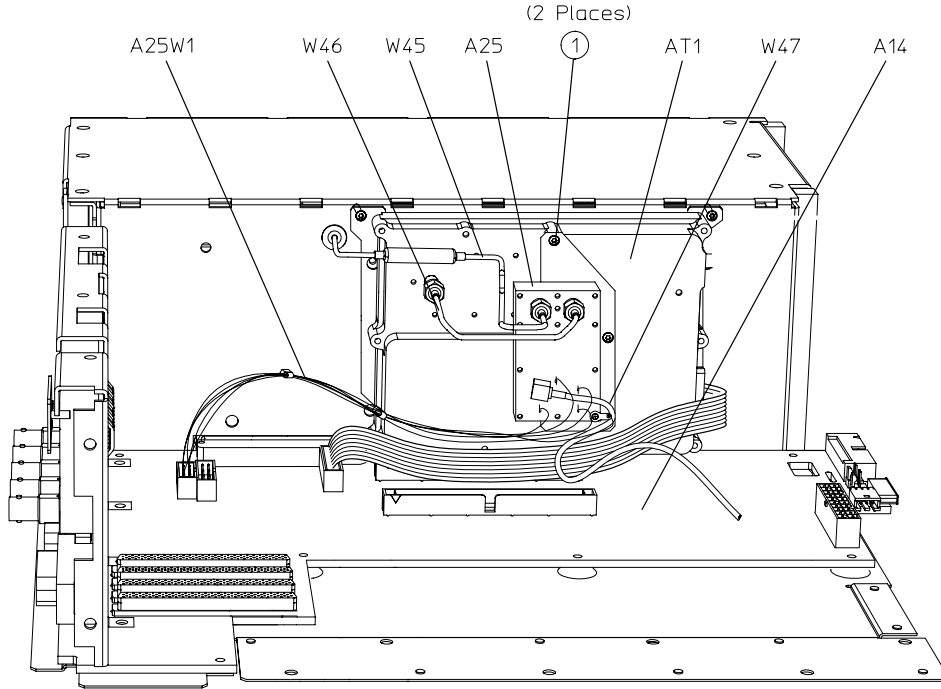
Removal

1. Remove the instrument cover. (Refer to the [“Instrument Cover”](#) replacement procedure on page 5-64.)
2. Remove the top cover by removing the 11 screws that secure it.
3. Disconnect W45, W46, and W47 from the pulse modulator assembly (A25). (See [Figure 5-24](#).)
4. Disconnect A25W1 from the CPU/motherboard (A14).
5. Remove the two screws (item 1) holding the pulse modulator assembly to the electronic attenuator assembly (AT1).
6. Slide the assembly out and up to remove.
7. Remove the two screws (item 2 in [Figure 5-25](#)) that attach the bracket (item 3) to the pulse modulator.

Replacement

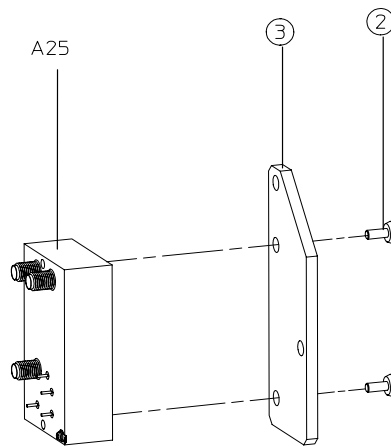
1. Reverse the removal procedure and do the following:
 - Torque all screws to 9 in-lbs.
 - Torque all semi-rigid cables to 9 in-lbs.

Figure 5-24 A25 Pulse Modulator (1 of 2)



sk7142b

Figure 5-25 A25 Pulse Modulator (2 of 2)



sk7155b

A25 Pulse Modulator (with Option UNB)

Tools Required

- T-10 TORX screwdriver
- 5/16" open-end wrench

Removal

1. Remove the instrument cover. (Refer to the [“Instrument Cover”](#) replacement procedure on page 5-64.)
2. Remove the top cover by removing the 11 screws that secure it.
3. Disconnect W45 and W47 from the pulse modulator (A25) and A25W1 from the CPU/motherboard (A14). (See [Figure 5-26](#).)
4. Disconnect A19W1 from the CPU/motherboard.
5. Disconnect W9 from the RPP (A19).
6. Disconnect W13 from the CPU/motherboard.
7. Remove the two screws (item 1) that attach the attenuator/RPP/pulse assembly to the instrument chassis.
8. Tilt the assembly away from the chassis wall, then carefully lift it out of the instrument.

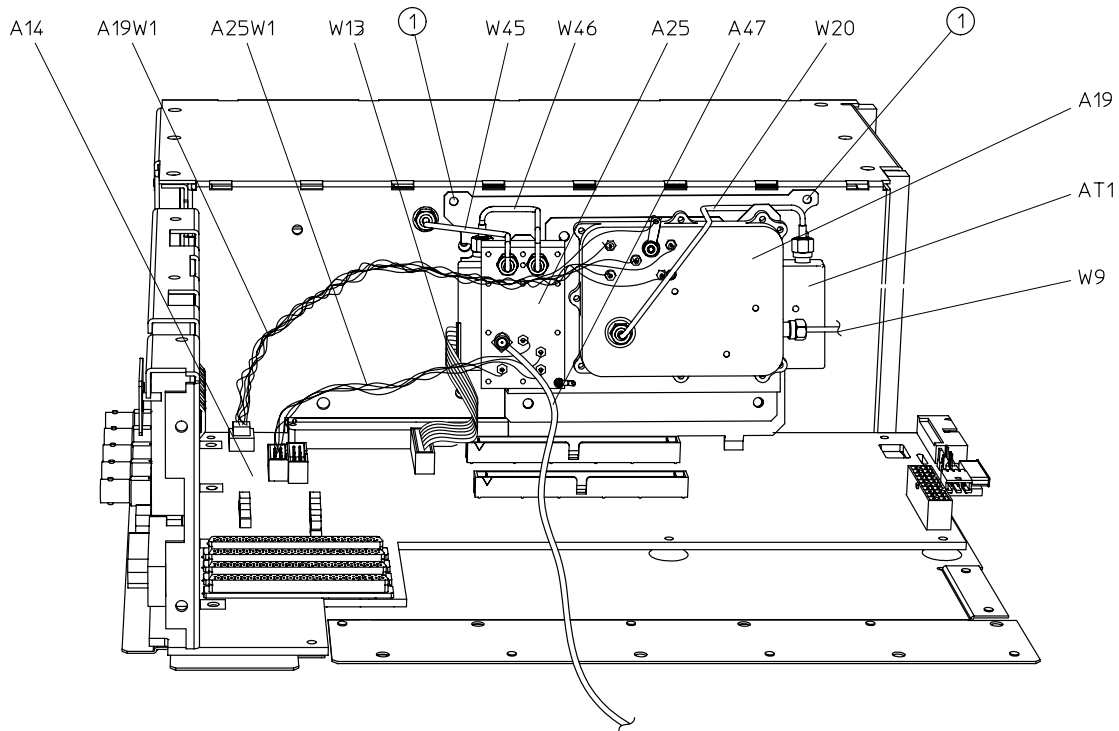
| | |
|-------------|---|
| NOTE | There are two hinged tabs at the bottom of the attenuator/RPP/pulse assembly that fit into slots in the instrument chassis. Therefore, it is necessary to tilt the assembly away from the chassis wall so that the tabs can be guided out of the slots. |
|-------------|---|

9. Disconnect W20 from the RPP and the mechanical attenuator (AT1).
10. Disconnect W46 from the pulse modulator and the mechanical attenuator.
11. Remove the four screws (item 2 in [Figure 5-27](#)) that attach the RPP bracket (item 3) to the attenuator bracket (item 4).
12. Remove the two screws (item 5) that attach the RPP bracket to the pulse modulator.

Replacement

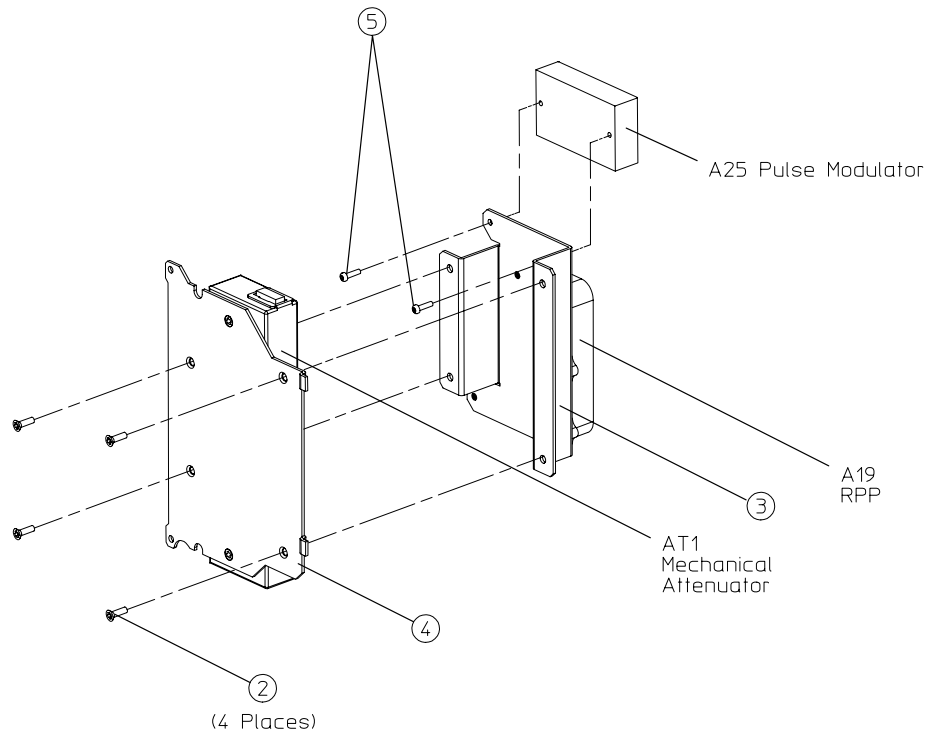
1. Reverse the removal procedure and do the following:
 - When reinstalling the attenuator/RPP/pulse assembly, remember to insert its hinged tabs into the slots located at the base of the chassis wall on which the assembly will be mounted.
 - Torque all semi-rigid cables to 9 in-lbs.
 - Torque all screws to 9 in-lbs.

Figure 5-26 A25 Pulse Modulator (with Option UNB) (1 of 2)



sk7153b

Figure 5-27 A25 Pulse Modulator (with Option UNB) (2 of 2)



sk7154b

AT1 Electronic Attenuator/RPP

Tools Required

- T-10 TORX screwdriver
- 5/16-inch open-end wrench

Removal

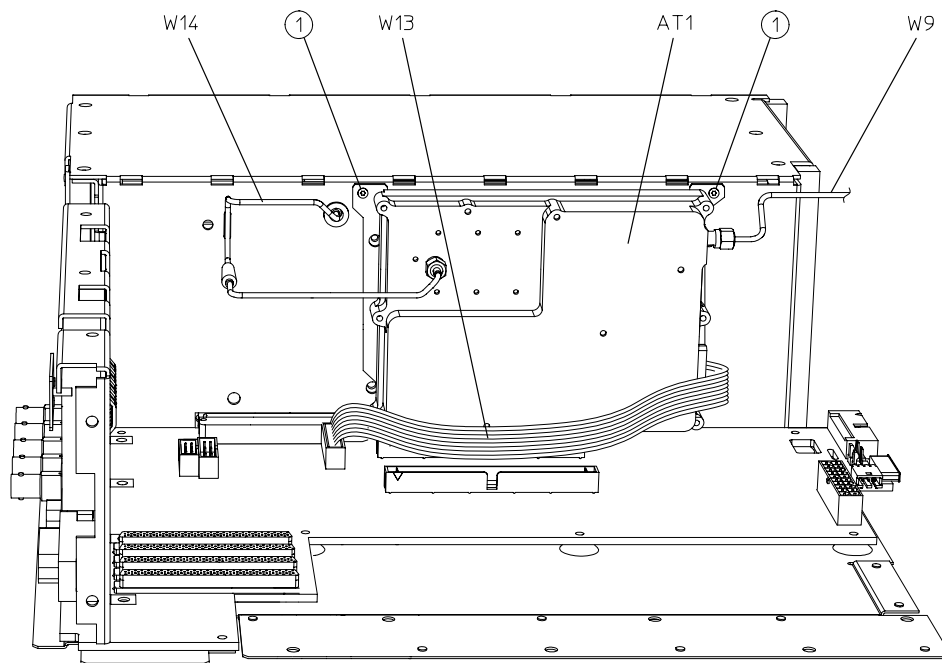
1. Remove the instrument cover. (Refer to the “[Instrument Cover](#)” replacement procedure on page 5-64.)
2. Remove the top cover by removing the 11 screws that secure it.
3. If you have Option 1E6, remove the pulse modulator assembly (A25). (Refer to the “[A25 Pulse Modulator](#)” replacement procedure on page 5-41.)
4. Disconnect W9, W13, and W14 from the electronic attenuator/RPP (AT1). (See [Figure 5-28](#).)
5. Remove the two screws (item 1) that attach the attenuator/RPP to the instrument chassis.
6. Tilt the attenuator/RPP away from the chassis wall, then carefully lift it out of the instrument.

| | |
|-------------|--|
| NOTE | There are two hinged tabs at the bottom of the attenuator/RPP that fit into slots in the instrument chassis. Therefore, it is necessary to tilt the attenuator/RPP away from the chassis wall so that the tabs can be guided out of the slots. |
|-------------|--|

Replacement

1. Reverse the removal procedure and do the following:
 - When reinstalling the electronic attenuator/RPP (AT1), remember to insert its hinged tabs into the slots located at the base of the chassis wall on which the attenuator/RPP will be mounted.
 - Torque W9 and W14 to 9 in-lbs.
 - Torque the two T-10 TORX screws to 9 in-lbs.

Figure 5-28 AT1 Electronic Attenuator/RPP



sk741b

AT1 Mechanical Attenuator

Tools Required

- T-10 TORX screwdriver
- 5/16-inch open-end wrench

Removal

1. Remove the instrument cover. (Refer to the “[Instrument Cover](#)” replacement procedure on page 5-64.)
2. Remove the top cover by removing the 11 screws that secure it.
3. If you have Option 1E6, disconnect W45 and W47 from the pulse modulator (A25) and A25W1 from the CPU/motherboard (A14). (See [Figure 5-29](#).)

If you *do not* have Option 1E6, disconnect W14 from the mechanical attenuator (AT1). (See [Figure 5-30](#).)

4. Disconnect A19W1 from the CPU/motherboard.
5. Disconnect W9 from the RPP (A19).
6. Disconnect W13 from the CPU/motherboard.
7. Remove the two screws (item 1) that attach the attenuator/RPP assembly to the instrument chassis.
8. Tilt the assembly away from the chassis wall, then carefully lift it out of the instrument.

NOTE There are two hinged tabs at the bottom of the attenuator/RPP assembly that fit into slots in the instrument chassis. Therefore, it is necessary to tilt the assembly away from the chassis wall so that the tabs can be guided out of the slots.

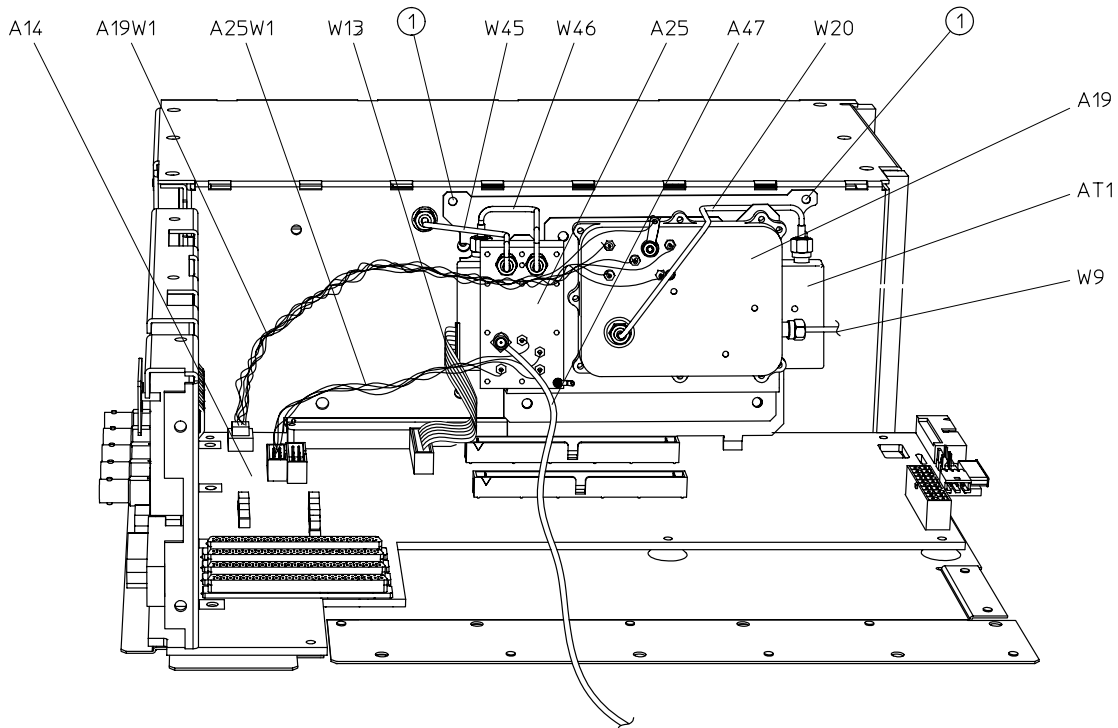
9. Disconnect W20 from the RPP and the mechanical attenuator (AT1).
10. If you have Option 1E6, disconnect W46 from the pulse modulator and the mechanical attenuator. (See [Figure 5-29](#).)
11. Remove the four screws (item 2 in [Figure 5-31](#)) that attach the RPP bracket (item 3) to the attenuator bracket (item 4).
12. Remove the two screws (item 5) that attach the attenuator bracket to the mechanical attenuator (AT1).

Replacement

1. Reverse the removal procedure and do the following:

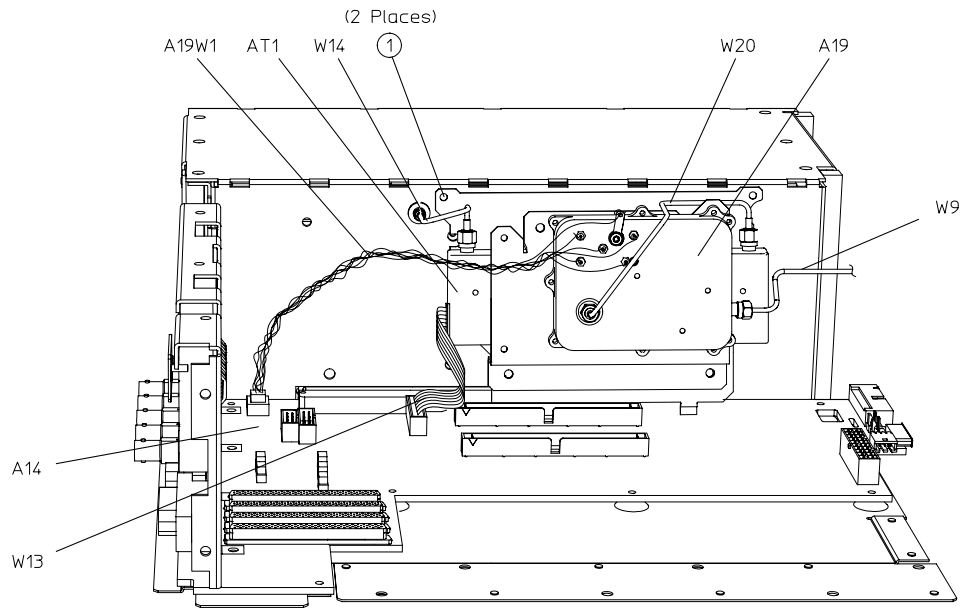
- When reinstalling the electronic attenuator/RPP assembly, remember to insert its hinged tabs into the slots located at the base of the chassis wall on which the assembly will be mounted.
- Torque all semi-rigid cables to 9 in-lbs.
- Torque all screws to 9 in-lbs.

Figure 5-29 AT1 Mechanical Attenuator (1 of 3)



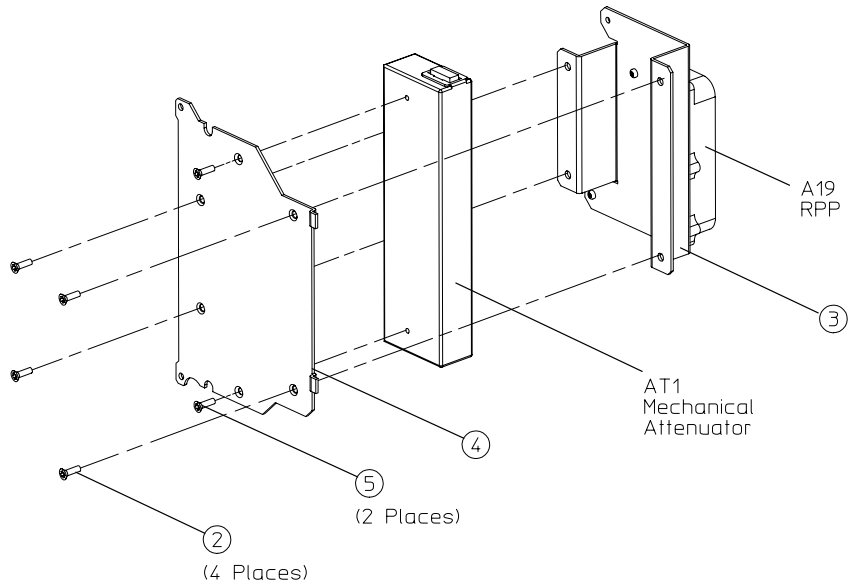
sk7153b

Figure 5-30 AT1 Mechanical Attenuator (2 of 3)



sk738b

Figure 5-31 AT1 Mechanical Attenuator (3 of 3)



sk740b

B1 Small Fan

Tools Required

- knife blade (or equivalent)
- long nose pliers

Removal

NOTE It is best to attempt this procedure without removing the front panel assembly. If the front panel assembly is removed, you will be required to perform time-consuming “Power Level Accuracy” verification tests and adjustments.

1. Remove the instrument cover. (Refer to the “[Instrument Cover](#)” replacement procedure on page 5-64.)
2. Disconnect B1W1 from the CPU/motherboard (A14). (See [Figure 5-32](#).)
3. Remove the four plastic rivets (item 1) that attach the fan assembly (B1) to the instrument chassis. Use a knife blade (or equivalent) to pry up the head of the plunger portion of the rivet. Once the head of the plunger is adequately raised, use a pair of long nose pliers to remove the rivet. Be careful not to damage the rivets with the blade.

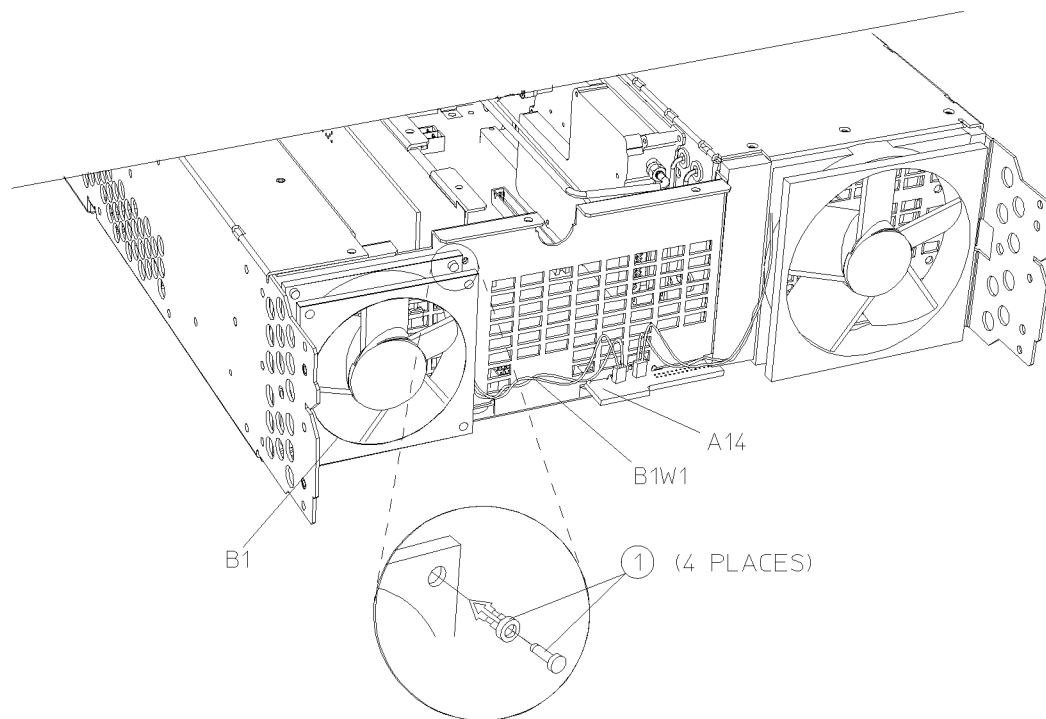
NOTE The plastic rivets consist of two pieces: a plunger and a sheath. Ensure both parts are removed.

4. Remove the fan assembly.

Replacement

1. Reverse the removal procedure. When reinserting the plastic rivets, the sheath must be fully seated in the fan assembly before the plunger can be depressed.

Figure 5-32 B1 Small Fan



sk727c

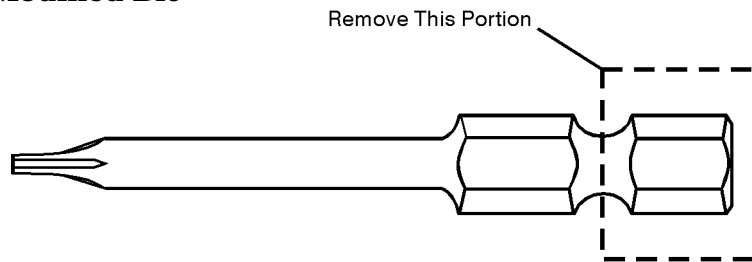
B2 Large Fan

Tools Required

- 1/4-inch open-end wrench
- Modified T-10 TORX bit (part number 8710-1637)

Bit Modification. The hexagonal head at the end of the TORX bit must be removed so that the total length of the bit is approximately 1.5 inches (see [Figure 5-33](#)). A hexagonal portion of the bit will remain for use with a wrench. The shortened bit will now fit between the fan assembly and the front panel assembly.

Figure 5-33 Modified Bit



sk779a

Removal

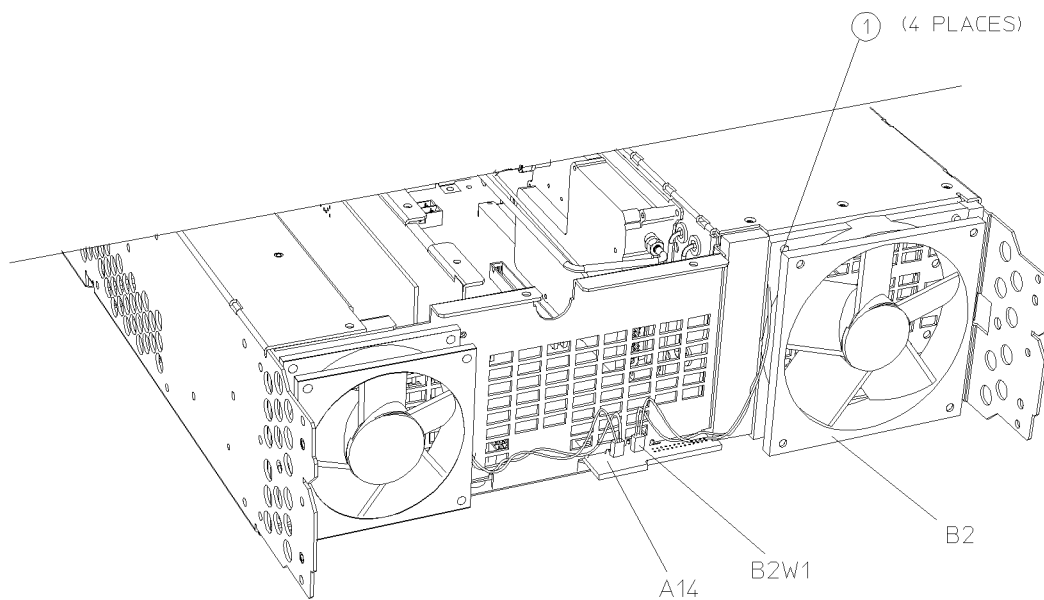
NOTE It is best to attempt this procedure without removing the front panel assembly. If the front panel assembly is removed, you will be required to perform time-consuming “Power Level Accuracy” verification tests and adjustments.

1. Remove the instrument cover. (Refer to the [“Instrument Cover”](#) replacement procedure on page 5-64.)
2. Disconnect B2W1 from the CPU/motherboard (A14). (See [Figure 5-34](#).)
3. Remove the four screws (item 1) that attach the fan assembly (B2) to the instrument chassis.
4. Remove the fan assembly.

Replacement

1. Reverse the removal procedure and torque the T-10 TORX screws to 9 in-lbs.

Figure 5-34 B2 Large Fan



sk726a

Daughterboard Card Cage Boards

Use this procedure to remove any of the following assemblies: (See [Figure 5-35](#).)

- Output Board (A9)
- Reference Board (A11)
- Synthesizer/Doubler Board (A12)
- Sampler Board (A23)
- Frac-N/Divider Board (A24)

Tools Required

- T-8 TORX screwdriver

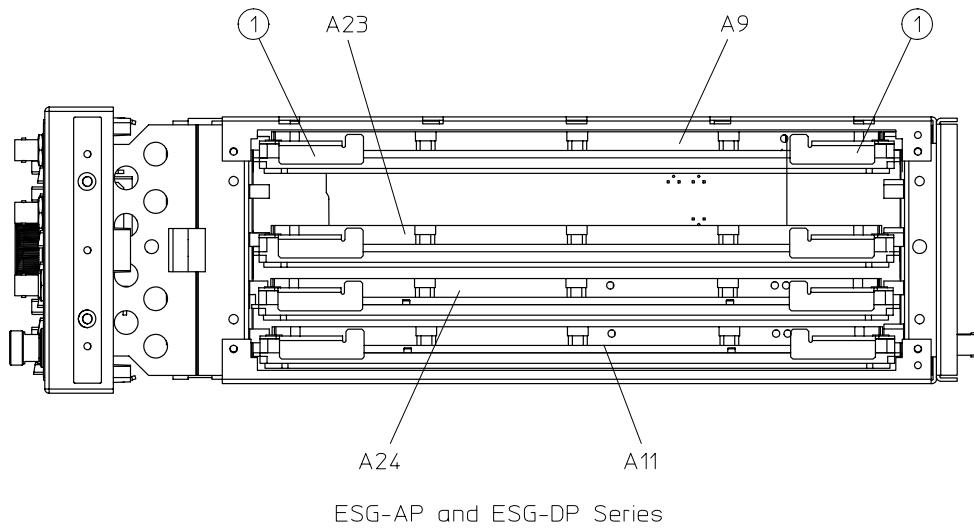
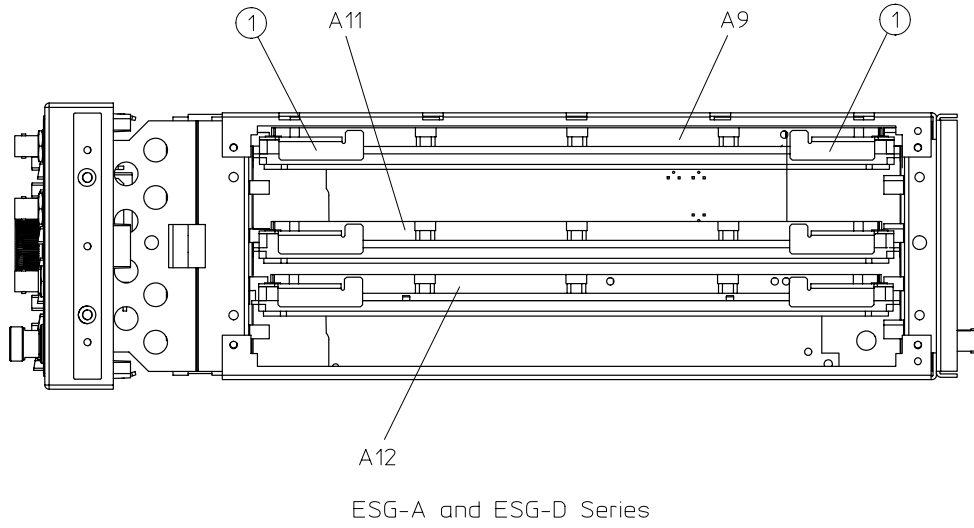
Removal

1. Remove the instrument cover. (Refer to the “[Instrument Cover](#)” replacement procedure on page 5-64.)
2. Remove the right-side cover by removing the four screws that attach it to the instrument chassis.
3. Simultaneously lift the left and right extractors (item 1) on the board you want to remove.
4. Remove the board from the card cage slot.

Replacement

1. Reverse the removal procedure and torque all T-8 TORX screws to 9 in-lbs.

Figure 5-35 Daughterboard Card Cage Boards



sk7118b

Digital Card Cage Boards

Use this procedure to remove any of the following assemblies: (See [Figure 5-36](#).)

- A5 Dual Arbitrary Waveform Generator Board
- A6 Bit Error Rate Test Board
- A7 Baseband Generator Board
- A8 Data Generator Board
- A21 Demodulator Board

Tools Required

- T-10 TORX screwdriver
- long nose pliers

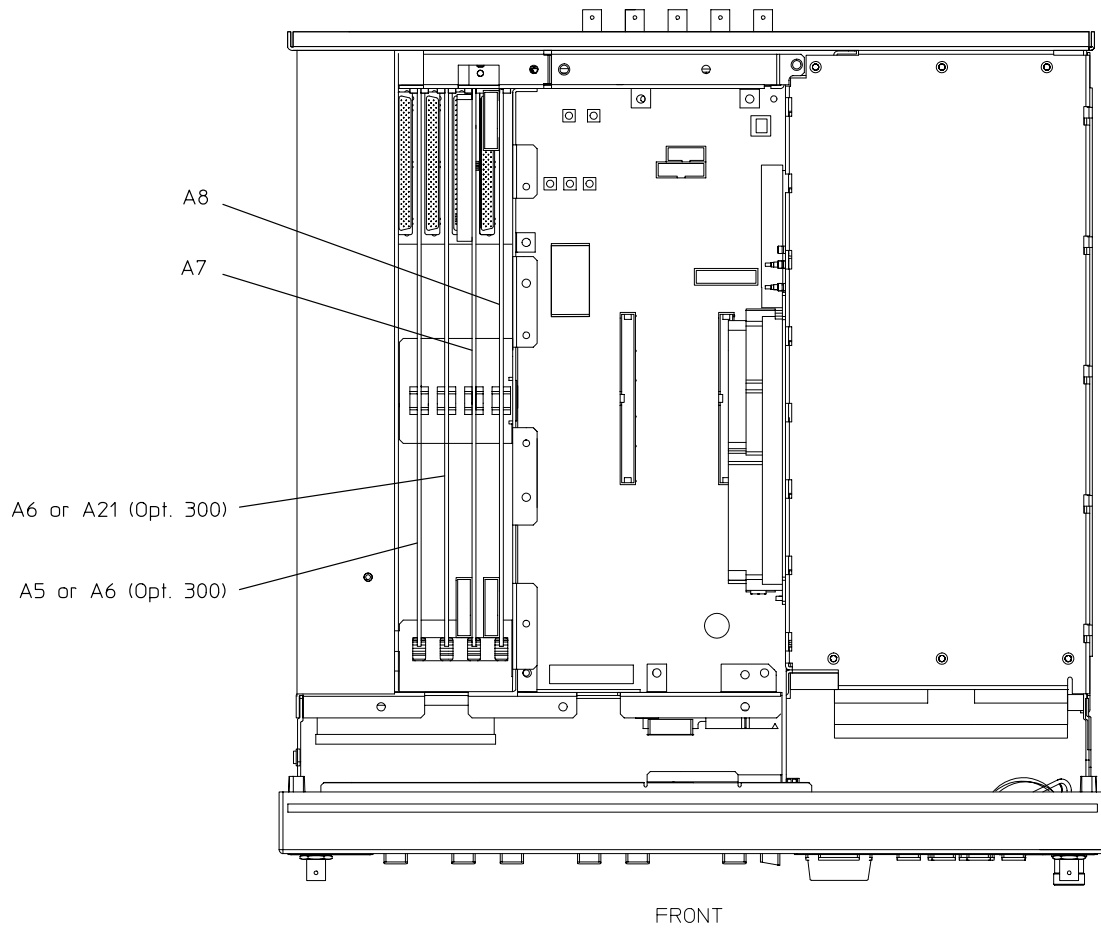
Removal

1. Remove the instrument cover. (Refer to the [“Instrument Cover”](#) replacement procedure on page 5-64.)
2. Remove the top cover by removing the 11 screws that secure it.
3. Disconnect all of the cables and harnesses from the board.
4. Pull up on the board to remove it from the CPU/motherboard connector.

Replacement

1. Reverse the removal procedure and do the following:
 - Refer to replaceable parts chapter for your signal generator model to verify that the cables are reconnected in the correct locations. (Refer to [Chapter 3](#) for the ESG-A and ESG-D series, refer to [Chapter 4](#) for the ESG-AP and ESG-DP series.)
 - Torque all T-10 TORX screws to 9 in-lbs.

Figure 5-36 Digital Card Cage Boards



sk7134b

Front Panel

Tools Required

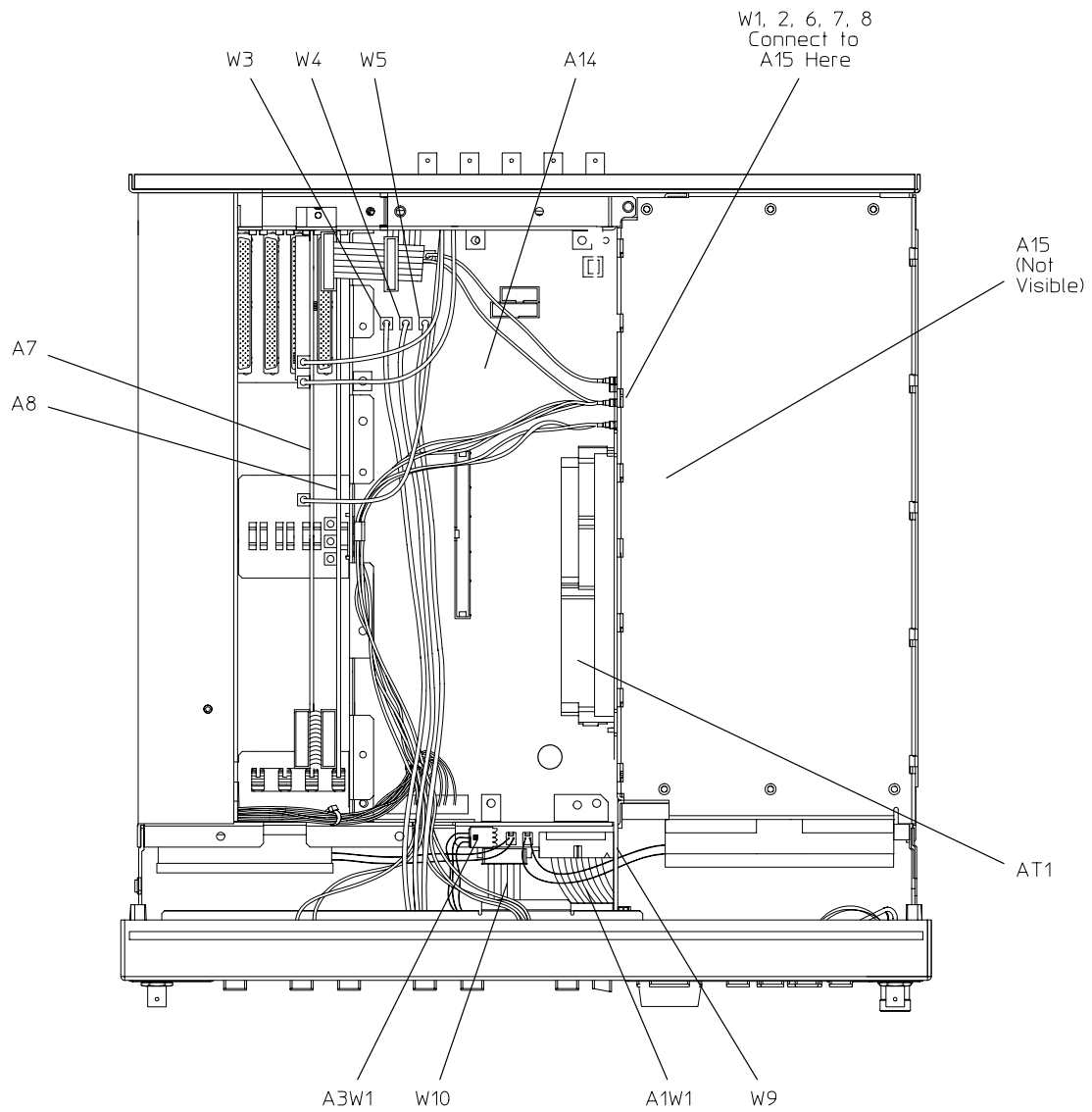
- T-10 TORX screwdriver
- T-15 TORX screwdriver
- 5/16-inch open-end wrench
- long nose pliers (used for disconnecting cables from the daughterboard)

Removal

1. Remove the instrument cover. (Refer to the “[Instrument Cover](#)” replacement procedure on page 5-64.)
2. Remove the top cover by removing the 11 screws that secure it.
3. Disconnect A1W1, A3W1, and W10 from the CPU/motherboard (A14). (See [Figure 5-37](#).) To disconnect W10, you must first unlock the CPU/motherboard connector by pulling out the locking mechanism (much like pulling out a drawer).
4. Disconnect all remaining front panel cables (if any) from the various assemblies within the signal generator.

NOTE [Figure 5-37](#) represents an Option UN3 or UN4.

Figure 5-37 Front Panel (1 of 2)



sk7133b

5. Carefully peel off the side trim (item 1 in [Figure 5-38](#)) from the sides of the front panel assembly (item 2).
6. Remove the four screws (item 3) that attach the front panel assembly to the instrument chassis.
7. Pull the front panel assembly away from the instrument chassis.

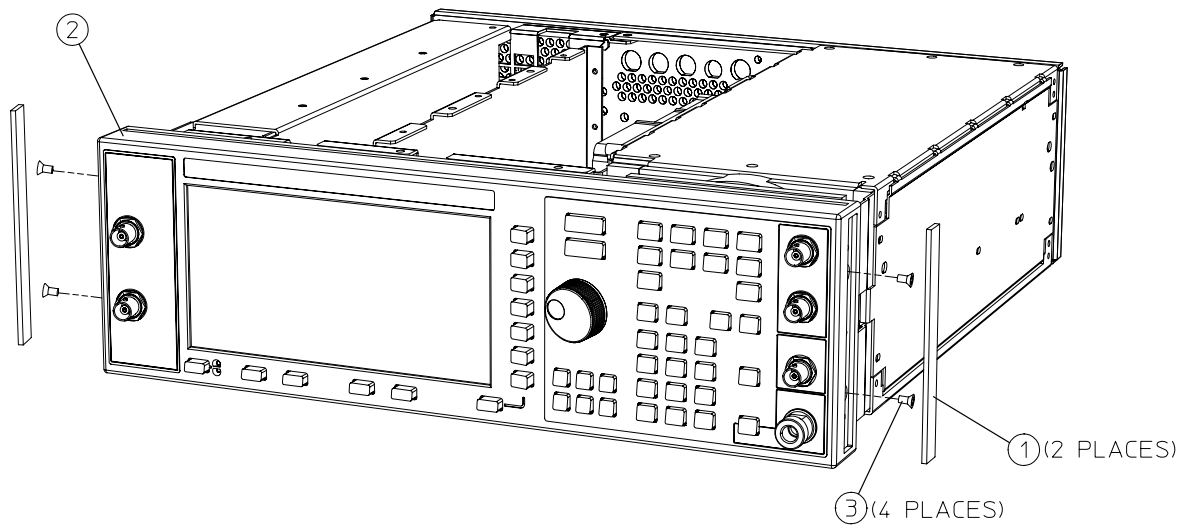
Replacement

1. Reverse the removal procedure and do the following:
 - Refer to replaceable parts chapter for your signal generator model to verify that the cables are reconnected in the correct locations. (Refer to [Chapter 3](#) for the ESG-A and ESG-D series, refer to [Chapter 4](#) for the ESG-AP and ESG-DP series.)
 - To reconnect W10 to its CPU/motherboard connector do the following:
 - a. Ensure the CPU/motherboard connector is unlocked by pulling out the locking mechanism (much like pulling out a drawer).
 - b. Insert W10 into the connector, making sure the conductive contacts are facing up (the blue insulation should be facing down).
 - c. Lock the connector by pushing in on the locking mechanism.

NOTE Intermittent display problems may result if W10 is not connected correctly.

- Torque W9 to 9 in-lbs.
- Torque all T-10 TORX screws to 9 in-lbs.
- Torque all T-15 TORX screws to 21 in-lbs.

Figure 5-38 Front Panel (2 of 2)



sk723b

Instrument Cover

Tools Required

- T-15 TORX screwdriver
- T-20 TORX screwdriver

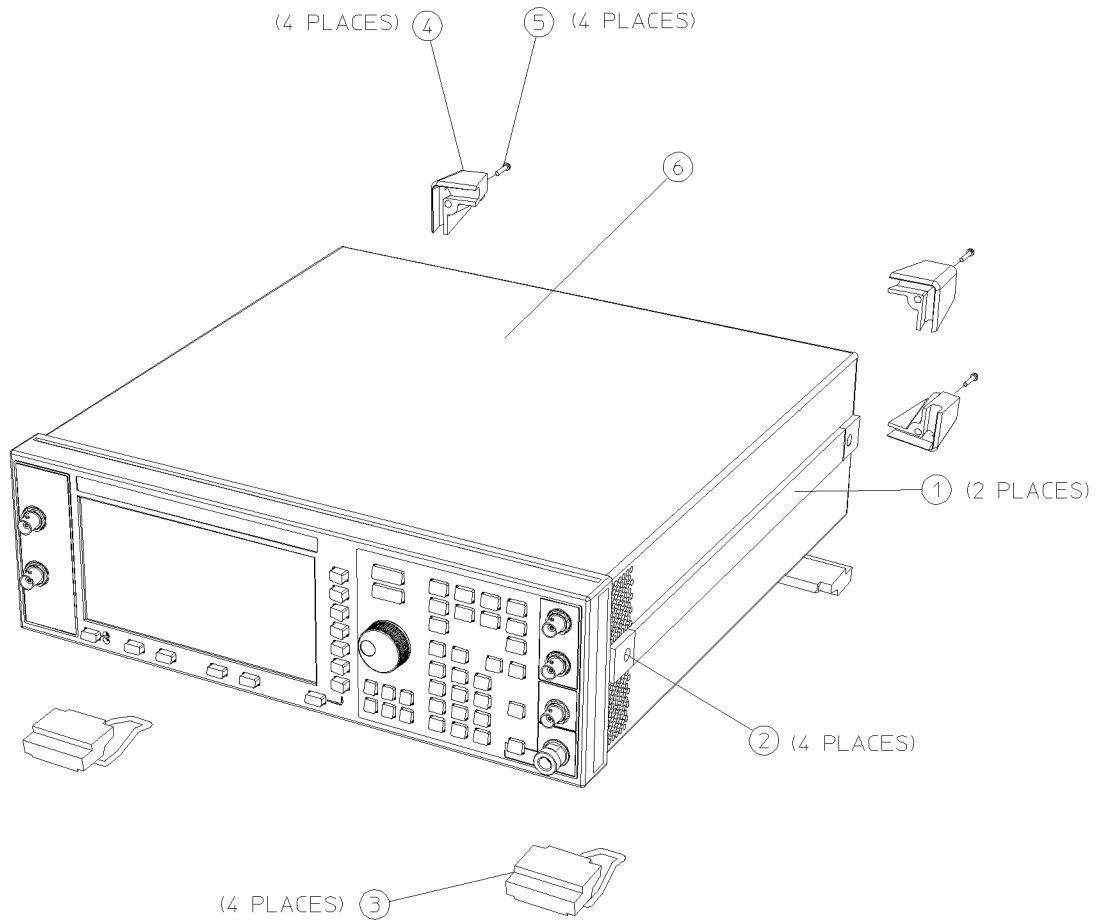
Removal

1. Remove the two strap handles (item 1 in [Figure 5-39](#)) from each side of the signal generator by loosening the two screws (item 2) on each handle.
2. Remove the four bottom feet (item 3).
3. Remove the four rear feet (item 4) from the signal generator by removing the four screws (item 5) that secure them.
4. Slide the instrument cover (item 6) off the back of the signal generator.

Replacement

1. Reverse the removal procedure and do the following:
 - Torque the rear feet screws (item 4) to 21 in-lbs.
 - Torque the strap handle screws (item 2) to 21 in-lbs.

Figure 5-39 Instrument Cover



sk7104a

Rear Panel

Tools Required

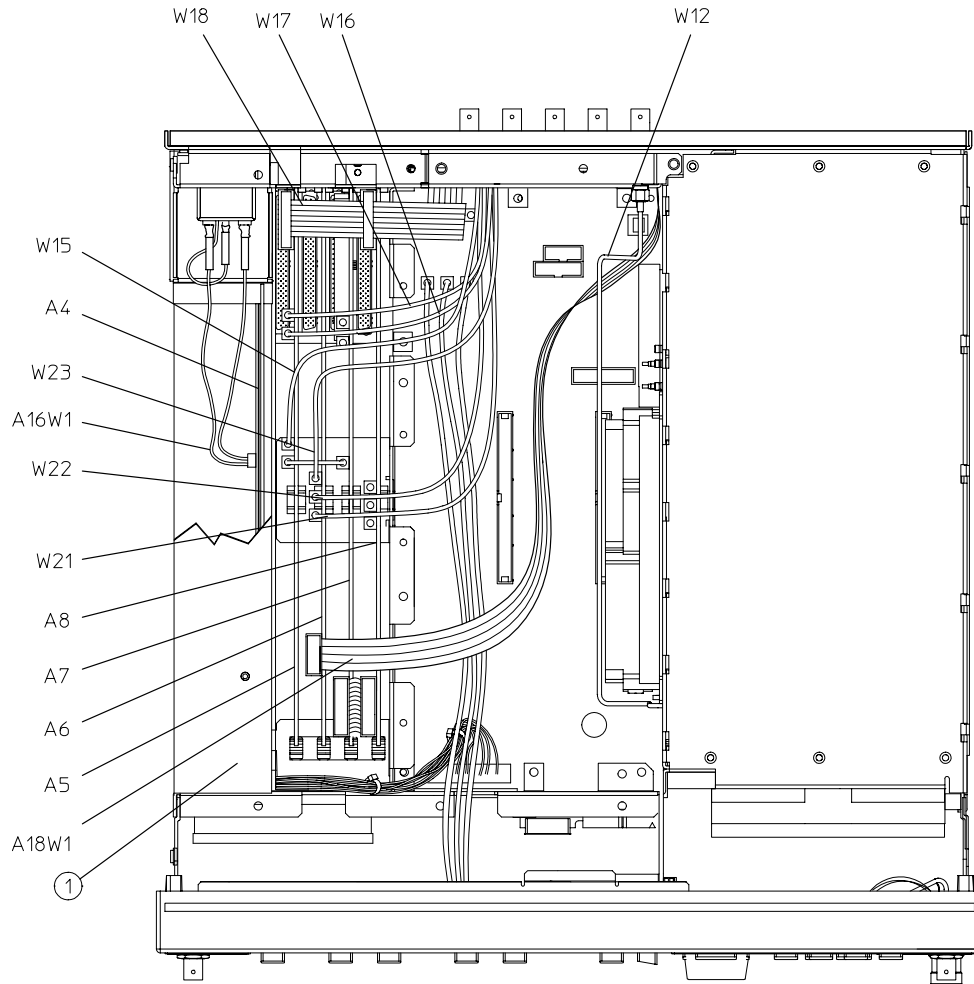
- T-10 TORX screwdriver
- 3/16-inch wrench or nut driver
- 9/32-inch wrench or nut driver
- 5/16-inch open-end wrench
- 5/8-inch wrench or nut driver
- long nose pliers

Removal

1. Remove the instrument cover. (Refer to the “[Instrument Cover](#)” replacement procedure on page 5-64.)
2. Remove the top cover by removing the 11 screws that secure it.
3. Remove the bottom cover by removing the 15 screws that secure it.
4. Disconnect A16W1 from the power supply (A4). (See [Figure 5-40](#).) A16W1 can be accessed through an opening on the bottom of the power supply shield (item 1).
5. Disconnect all remaining rear panel cables (if any) from the various assemblies within the signal generator.

NOTE [Figure 5-40](#) represents an Option UN7/UND.

Figure 5-40 Rear Panel (1 of 2)



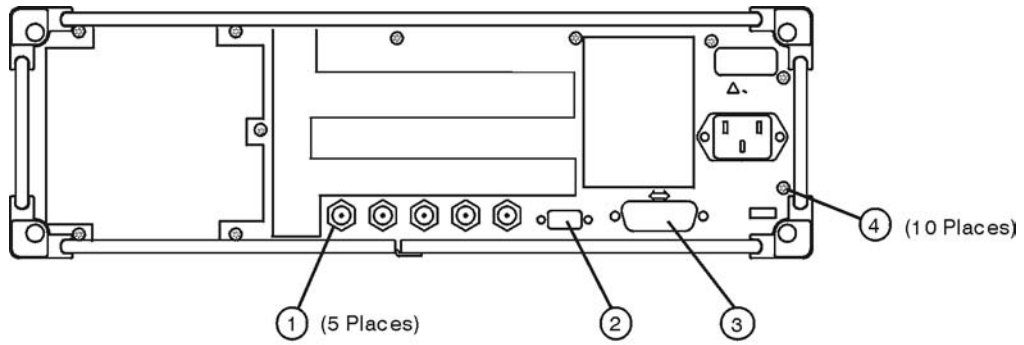
sk7131b

6. Remove the nuts and washers securing the five BNC connectors (item 1 in [Figure 5-41](#)) at the base of the rear panel.
7. Remove the hex screws and washers that secure the AUXILARY INTERFACE (item 2) and the GPIB connector (item 3) to the rear panel.
8. Remove the 10 screws (item 4) that secure the rear panel to the instrument chassis. Do not remove the screw that secures the chain and cap for COHERENT CARRIER connector.
9. Pull the rear panel assembly away from the instrument chassis.

Replacement

1. Reverse the removal procedure and do the following:
 - Torque all T-10 TORX screws to 9 in-lbs.
 - Torque the AUXILARY INTERFACE hex screws to 6 in-lbs.
 - Torque the GPIB hex screws to 9 in-lbs.
 - Torque the five BNC connector nuts to 21 in-lbs.
 - Torque W12 to 9 in-lbs.
 - Refer to replaceable parts chapter for your signal generator model to verify that the cables are reconnected in the correct locations. (Refer to [Chapter 3](#) for the ESG-A and ESG-D series, refer to [Chapter 4](#) for the ESG-AP and ESG-DP series.)

Figure 5-41 Rear Panel (2 of 2)



sk778a

Rear Panel (with Option 1EM)

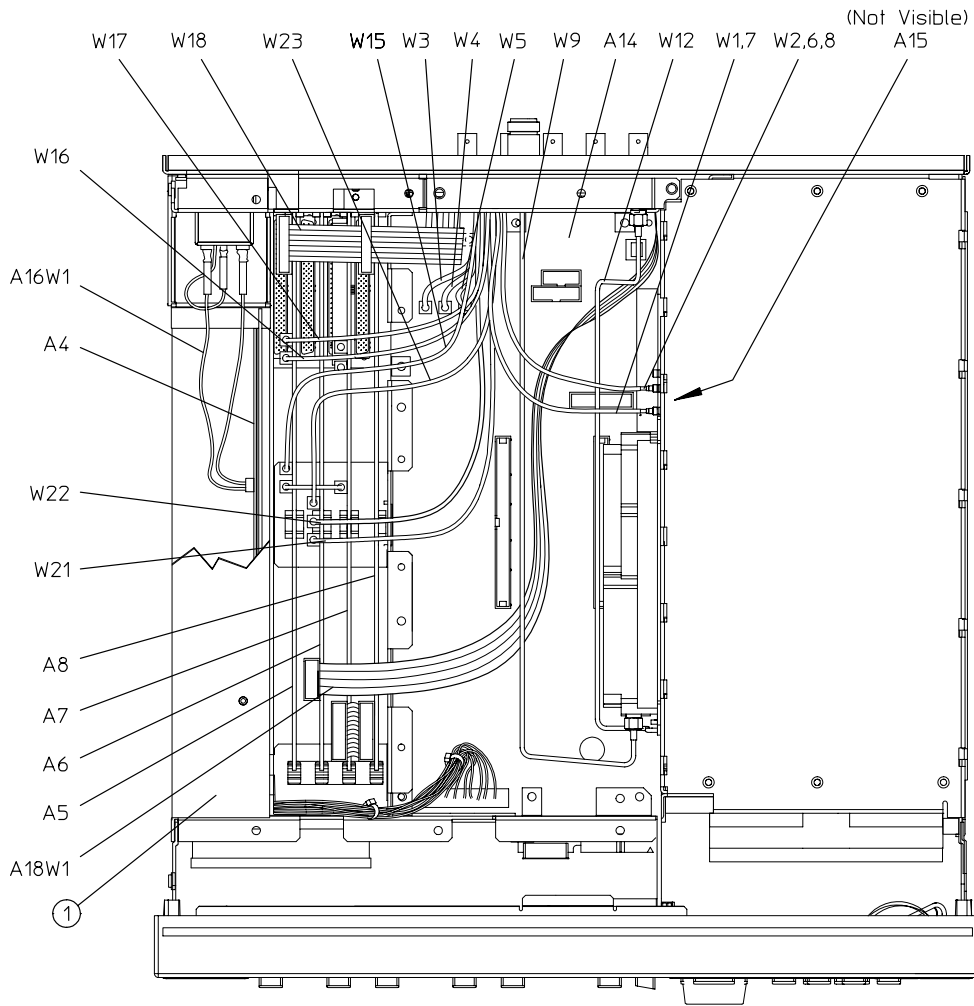
Tools Required

- T-10 TORX screwdriver
- 3/16-inch wrench or nut driver
- 9/32-inch wrench or nut driver
- 5/8-inch wrench or nut driver
- long nose pliers

Removal

1. Remove the instrument cover. (Refer to the “[Instrument Cover](#)” replacement procedure on page 5-64.)
2. Remove the top cover by removing the 11 screws that secure it.
3. Remove the bottom cover by removing the 15 screws that secure it.
4. Disconnect A16W1 from the power supply (A4). (See [Figure 5-42](#).) A16W1 can be accessed through an opening on the bottom of the power supply shield (item 1).
5. Disconnect all remaining rear panel cables from the various assemblies within the signal generator.

Figure 5-42 Rear Panel (with Option 1EM) (1 of 2)



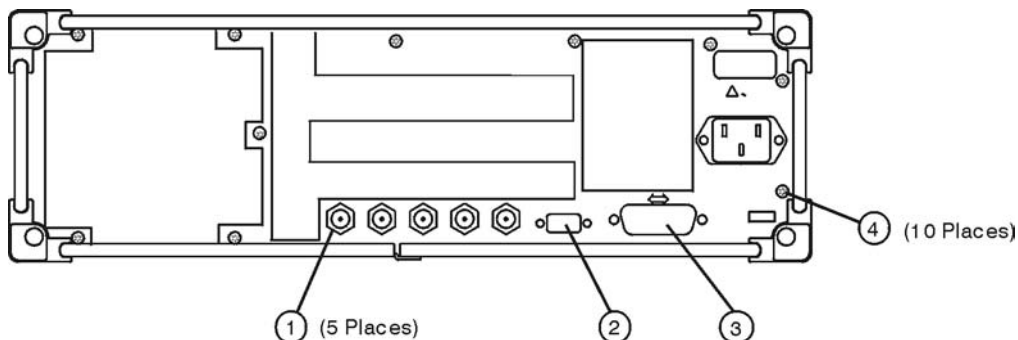
sk7130b

6. Remove the nuts and washers securing the five BNC connectors (item 1 in [Figure 5-43](#)) at the base of the rear panel.
7. Remove the hex screws and washers that secure the AUXILIARY INTERFACE (item 2) and the GPIB connector (item 3) to the rear panel.
8. Remove the 10 screws (item 4) that secure the rear panel to the instrument chassis.
9. Pull the rear panel assembly away from the instrument chassis.

Replacement

1. Reverse the removal procedure and do the following:
 - Torque all T-10 TORX screws to 9 in-lbs.
 - Torque the AUXILIARY INTERFACE hex screws to 6 in-lbs.
 - Torque the GPIB hex screws to 9 in-lbs.
 - Torque the five BNC connector nuts to 21 in-lbs.
 - Torque W9 and W12 to 9 in-lbs.
 - Refer to replaceable parts chapter for your signal generator model to verify that the cables are reconnected in the correct locations. (Refer to [Chapter 3](#) for the ESG-A and ESG-D series, refer to [Chapter 4](#) for the ESG-AP and ESG-DP series.)

Figure 5-43 Rear Panel (with Option 1EM) (2 of 2)



sk778a

Semi-Rigid Cables

Use this procedure to remove and replace semi-rigid cables that attach to the daughterboard card cage. If the cable you are removing/replacing does not attach to the daughterboard card cage, no special instruction is necessary other than step 3 in the “Replacement” section below.

Tools Required

- MILBAR 2R snap-ring pliers (used to remove snap rings from cable retainers)
- 5/16-inch open-end wrench

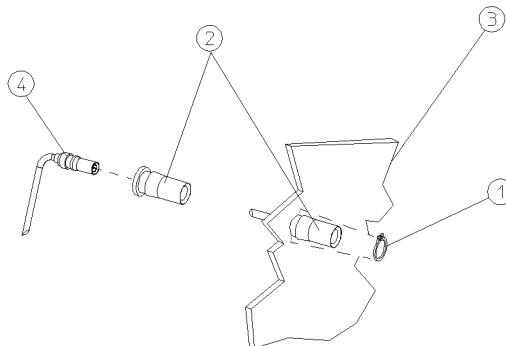
Removal

1. Remove all the daughterboard card cage boards to allow access to the instrument chassis cable connections. (Refer to the “[Daughterboard Card Cage Boards](#)” replacement procedure on page 5-56.)
2. Remove the snap ring (item 1 in [Figure 5-44](#)) from the cable retainer (item 2) of the cable you want to remove. The cable is now disconnected from the instrument chassis (item 3).
3. Disconnect the other end of the cable.

Replacement

1. If you’re installing a new cable, a *new* cable retainer (item 2) must first be attached to the end of the cable (item 4). Verify the cable retainer is correctly attached by listening for an audible “click” as you slide it over the end of the cable.
2. Insert the cable-retainer end of the cable assembly into the opening of the instrument chassis and then secure it with a snap ring.
3. Connect the other end of the cable. All semi-rigid cables should be torqued to 9 in-lbs.
4. Replace the daughterboard card cage boards.

Figure 5-44 Semi-Rigid Cables



sk7129b

6 Post-Repair Procedures

This chapter lists the performance tests and adjustments that must be performed after an assembly has been replaced.

Performance Tests

The tables in this section list the performance tests that must be performed when a specific assembly is repaired or replaced. (Refer to the list below for the table that applies to your signal generator.) Except where noted, all tests are automated using software. For more information on performance tests, refer to the calibration guide.

For the ESG-A Series refer to [Table 6-1](#) on page 6-3.

For the ESG-D Series refer to [Table 6-2](#) on page 6-4.

For the ESG-AP Series refer to [Table 6-3](#) on page 6-5.

For the ESG-DP Series refer to [Table 6-4](#) on page 6-6.

Table 6-1 Performance Tests for the ESG-A Series

| Performance Test | Repaired/Replaced Assembly | | | | | | | | | | | | | | | |
|----------------------------------|----------------------------|----------------|----------------|-------------|-----------------|--------------|------------------|--------------------|-----------------|----------------|-------------------|-----------------|---------|---------------------|--------------------|----------------|
| | A1 Front Panel Bd | A2 Display | A2DS1 Lamp | A3 Inverter | A4 Power Supply | A9 Output Bd | A11 Reference Bd | A12 Synthesizer Bd | A14 Motherboard | A14BT1 Battery | A15 Daughterboard | A16 Line Module | A19 RPP | A25 Pulse Modulator | AT1 Elec Atten/RPP | AT1 Mech Atten |
| AM Frequency Response | | | | | • | • | • | | • | | • | | | | | |
| DCFM Frequency Offset | | | | | • | | • | • | • | • | | | | | | |
| FM Frequency Response | | | | | • | | • | • | • | | • | | | | | |
| Harmonics | | | | | • | • | | • | • | | | | | | | |
| Internal AM Accuracy | | | | | • | • | • | | • | | | | | | | |
| Internal AM Distortion | | | | | • | • | • | | • | | | | | | | |
| Internal FM Accuracy | | | | | • | | • | • | • | | | | | | | |
| Internal FM Distortion | | | | | • | | • | • | • | | | | | | | |
| Nonharmonics | | | | | • | • | • | • | • | | | | | | | |
| Phase Modulation Accuracy | | | | | • | | • | • | • | | | | | | | |
| Phase Modulation Distortion | | | | | • | | • | • | • | | | | | | | |
| PM Frequency Response | | | | | • | | • | • | • | | • | | | | | |
| Power Level Accuracy | • ¹ | • ¹ | • ¹ | • | • | • | | | • | | • | • ² | • | • | • | • |
| Pulse Modulation On/Off Ratio | | | | | • | • | | | • | | | | | | | |
| Residual FM | | | | | • | | • | • | • | | • | | | | | |
| Subharmonics | | | | | • | • | | • | • | | | | | | | |
| Timebase Aging Rate ³ | | | | | • | | • | | • | | | | | | | |
| Pulse Rise/Fall Time (Opt. 1E6) | | | | | | | | | • | | | | | • | | |

1. Perform this test only if you *do not* have Option 1EM.
2. Perform this test only if you have Option 1EM.
3. This test must be performed manually.

Table 6-2 Performance Tests for the ESG-D Series

| Performance Test | Repaired/Replaced Assembly | | | | | | | | | | | | | | | | | | | | | | | |
|---|----------------------------|----------------|----------------|----------------|-----------------|----------------|----------------------|--------------------|----------------|--------------|------------------|--------------------|-----------------|----------------|-------------------|-----------------|-------------------|---------------------|---------|-------------------|--------------------|--------------------|----------------|---|
| | A1 Front Panel Bd | A2 Display | A2DS1 Lamp | A3 Inverter | A4 Power Supply | A5 Dual Arb Bd | A6 Bit Error Rate Bd | A7 Baseband Gen Bd | A8 Data Gen Bd | A9 Output Bd | A11 Reference Bd | A12 Synthesizer Bd | A14 Motherboard | A14BT1 Battery | A15 Daughterboard | A16 Line Module | A17 Rear Panel Bd | A18 BER Rear Pan Bd | A19 RPP | A20 Downconverter | A21 Demodulator Bd | AT1 Elec Atten/RPP | AT1 Mech Atten | |
| AM Frequency Response | | | | | • | | | | | • | • | | • | | • | | | | | | | | | |
| Burst Modulation On/Off Ratio | | | | | • | | | | | • | • | | • | | • | | | | | | | | | |
| DCFM Frequency Offset | | | | | • | | | | | | • | • | • | • | | | | | | | | | | |
| Digital Mod: Power Level Accuracy | | | | | • | | | | | • | | | • | | | | | | | | | | | |
| FM Frequency Response | | | | | • | | | | | | • | • | • | | • | | | | | | | | | |
| Harmonics | | | | | • | | | | | • | | • | • | | | | | | • | | | | | |
| Internal AM Accuracy | | | | | • | | | | | • | • | | • | | | | | | | | | | | |
| Internal AM Distortion | | | | | • | | | | | • | • | | • | | | | | | | | | | | |
| Internal FM Accuracy | | | | | • | | | | | | • | • | • | | | | | | | | | | | |
| Internal FM Distortion | | | | | • | | | | | | • | • | • | | | | | | | | | | | |
| Nonharmonics | | | | | • | | • | • | • | • | • | • | • | | | | | | | | | | | |
| Phase Modulation Accuracy | | | | | • | | | | | | • | • | • | | | | | | | | | | | |
| Phase Modulation Distortion | | | | | • | | | | | | • | • | • | | | | | | | | | | | |
| PM Frequency Response | | | | | • | | | | | | • | • | • | | • | | | | | | | | | |
| Power Level Accuracy | • ¹ | • ¹ | • ¹ | • ¹ | • | | | | | • | | | • | | • | • ² | • ² | • ² | • | | | | • | • |
| Pulse Modulation On/Off Ratio | | | | | • | | | | | • | | | • | | | | | | | | | | | |
| Residual FM | | | | | • | | | | | | • | • | • | | • | | | | | | | | | |
| Subharmonics | | | | | • | | | | | • | | • | • | | | | | | | | | | | |
| Timebase Aging Rate ³ | | | | | • | | | | | | • | | • | | | | | | | | | | | |
| WCDMA (Opt. 100/H99) | | | | | | • | | | | | | | | | | | | | | | | | | |
| CDMA2000 (Opt. 101) | | | | | | • | | | | | | | | | | | | | | | | | | |
| GSM Loopback BER (Opt. 300) | | | | | | | | • | | | | | | | | | | | | • | • | | | |
| WCDMA ACP (Opt. H99 w/ H97 or H98) | | | | | | • | | | | • | | | | | | | | | | | | | | |
| Digital Mod: Internal IQ Quality (Opt. UN3, UN4, UN8) | | | | | • | | • | • | • | | | • | • | | | | | | | | | | | |
| CDMA Adjacent Ch Power (Opt. UN5) | | | | | | • | | | | • | | | | | | | | | | | | | | |
| Verifying Bit Error Rate Test ⁴ (Opt. UN7) | | | | | | | • | | | | | | | | | | | | • | | | | | |
| Custom IQ RF Mod Quality (Opt. UN8) | | | | | | | • | • | • | | | | | | | | | | | | | | | |
| Alternate Timeslot (Opt. UNA) | | | | | | | | • | • | • | | | | | | | | | | | | | • | |
| Dual Arb Check (Opt. UND) | | | | | | • | | | | | | | | | | | | | | | | | | |

1. Perform this test only if you *do not* have Option 1EM.
2. Perform this test only if you have Option 1EM.
3. This test must be performed manually.
4. This is an operator's check, *not* a performance test. Refer to Chapter 1 of the *ESG Family Signal Generators Option UN7 Bit Error Rate Test Users's and Programming Guide* for instruction.

Table 6-3 Performance Tests for the ESG-AP Series

| Performance Test | Repaired/Replaced Assembly | | | | | | | | | | | | | | | | | |
|----------------------------------|----------------------------|----------------|----------------|-------------|-----------------|--------------|------------------|-----------------|----------------|-------------------|-----------------|---------|---------------|----------------|-----------------------|---------------------|--------------------|----------------|
| | A1 Front Panel Bd | A2 Display | A2DS1 Lamp | A3 Inverter | A4 Power Supply | A9 Output Bd | A11 Reference Bd | A14 Motherboard | A14BT1 Battery | A15 Daughterboard | A16 Line Module | A19 RPP | A22 YO Driver | A23 Sampler Bd | A24 Frac-N/Divider Bd | A25 Pulse Modulator | AT1 Elec Atten/RPP | AT1 Mech Atten |
| AM Frequency Response | | | | | • | • | • | • | | • | | | | | | | | |
| DCFM Frequency Offset | | | | | • | | • | • | • | • | | | | | • | | | |
| FM Frequency Response | | | | | • | | • | • | | • | | | • | | • | | | |
| Harmonics | | | | | • | • | | • | | | | | • | | • | | | |
| Internal AM Accuracy | | | | | • | • | • | • | | | | | | | | | | |
| Internal AM Distortion | | | | | • | • | • | • | | | | | | | | | | |
| Internal FM Accuracy | | | | | • | | • | • | | | | | • | | • | | | |
| Internal FM Distortion | | | | | • | | • | • | | | | | • | | • | | | |
| Nonharmonics | | | | | • | • | • | • | | | | | • | • | • | | | |
| Phase Modulation Accuracy | | | | | • | | • | • | | | | | • | | • | | | |
| Phase Modulation Distortion | | | | | • | | • | • | | | | | • | | • | | | |
| Phase Noise ³ | | | | | • | | • | | | | | | • | • | • | | | |
| PM Frequency Response | | | | | • | | • | • | | | | | • | | • | | | |
| Power Level Accuracy | • ¹ | • ¹ | • ¹ | • | • | • | | • | | • | • ² | • | • | | • | • | • | • |
| Pulse Modulation On/Off Ratio | | | | | • | • | | • | | | | | | | | | | |
| Residual FM ³ | | | | | • | • | • | | | | | | • | • | • | | | |
| Timebase Aging Rate ³ | | | | | • | | • | • | | | | | | | | | | |
| Pulse Rise/Fall Time (Opt. 1E6) | | | | | | | | | | | | | | | | • | | |

1. Perform this test only if you *do not* have Option 1EM.
2. Perform this test only if you have Option 1EM.
3. This test must be performed manually.

Table 6-4 Performance Tests for the ESG-DP Series

| Performance Test | Repaired/Replaced Assembly | | | | | | | | | | | | | | | | | | | | | | | |
|---|----------------------------|----------------|----------------|----------------|-----------------|----------------|----------------------|--------------------|----------------|--------------|------------------|-----------------|----------------|-------------------|-----------------|-------------------|---------------------|---------|---------------|----------------|-----------------------|--------------------|----------------|---|
| | A1 Front Panel Bd | A2 Display | A2DS1 Lamp | A3 Inverter | A4 Power Supply | A5 Dual Arb Bd | A6 Bit Error Rate Bd | A7 Baseband Gen Bd | A8 Data Gen Bd | A9 Output Bd | A11 Reference Bd | A14 Motherboard | A14BT1 Battery | A15 Daughterboard | A16 Line Module | A17 Rear Panel Bd | A18 BER Rear Pan Bd | A19 RPP | A22 YO Driver | A23 Sampler Bd | A24 Frac-N/Divider Bd | AT1 Elec Atten/RPP | AT1 Mech Atten | |
| AM Frequency Response | | | | | • | | | | | • | • | • | | • | | | | | | | | | | |
| Burst Modulation On/Off Ratio | | | | | • | | | | | • | • | • | | • | | | | | | | | | | |
| DCFM Frequency Offset | | | | | • | | | | | | • | • | • | | | | | | • | | | • | | |
| Digital Mod: Power Level Accuracy | | | | | • | | | | | • | | • | | | | | | | | | | | | |
| FM Frequency Response | | | | | • | | | | | | • | • | | • | | | | | | • | | • | | |
| Harmonics | | | | | • | | | | | • | | • | | | | | | | | • | | • | | |
| Internal AM Accuracy | | | | | • | | | | | • | • | • | | | | | | | | | | | | |
| Internal AM Distortion | | | | | • | | | | | • | • | • | | | | | | | | | | | | |
| Internal FM Accuracy | | | | | • | | | | | | • | • | | | | | | | | • | | • | | |
| Internal FM Distortion | | | | | • | | | | | | • | • | | | | | | | | • | | • | | |
| Nonharmonics | | | | | • | | | • | • | • | • | • | | | | | | | | • | | • | | |
| Phase Modulation Accuracy | | | | | • | | | | | | • | • | | | | | | | | • | | • | | |
| Phase Modulation Distortion | | | | | • | | | | | | • | • | | | | | | | | • | | • | | |
| Phase Noise ³ | | | | | • | | | | • | • | • | • | | • | | | | | | • | • | • | | |
| PM Frequency Response | | | | | • | | | | | | • | • | | | | | | | | • | | • | | |
| Power Level Accuracy | • ¹ | • ¹ | • ¹ | • ¹ | • | | | | | • | | • | | • | • ² | • ² | • ² | • | • | | • | • | • | • |
| Pulse Modulation On/Off Ratio | | | | | • | | | | | • | | • | | | | | | | | | | | | |
| Residual FM ³ | | | | | • | | | | • | • | • | • | | • | | | | | | • | • | • | | |
| Timebase Aging Rate ³ | | | | | • | | | | | | • | • | | | | | | | | | | | | |
| WCDMA (Opt. 100/H99) | | | | | | • | | | | | | | | | | | | | | | | | | |
| CDMA2000 (Opt. 101) | | | | | | • | | | | | | | | | | | | | | | | | | |
| WCDMA ACP (Opt. H99 w/ H97 or H98)) | | | | | | • | | | | • | | | | | | | | | | | | | | |
| Digital Mod: Internal IQ Quality (Opt. UN3, UN4, UN8) | | | | | • | | | • | • | • | | • | | | | | | | | | | | • | |
| CDMA Adjacent Ch Power (Opt. UN5) | | | | | | • | | | | • | | | | | | | | | | | | | | |
| Verifying Bit Error Rate Test ⁴ (Opt. UN7) | | | | | | | • | | | | | | | | | | • | | | | | | | |
| Custom IQ RF Mod Quality (Opt. UN8) | | | | | | | | • | • | • | | | | | | | | | | | | | | |
| Alternate Timeslot (Opt. UNA) | | | | | | | | • | • | • | | | | | | | | | | | | | • | |
| Dual Arb Check (Opt. UND) | | | | | | • | | | | | | | | | | | | | | | | | | |

1. Perform this test only if you *do not* have Option 1EM.
2. Perform this test only if you have Option 1EM.
3. This test must be performed manually.
4. This is an operator's check, *not* a performance test. Refer to Chapter 1 of the *ESG Family Signal Generators Option UN7 Bit Error Rate Test Users's and Programming Guide* for instruction.

Adjustments

The tables in this section list the adjustments that must be performed when a specific assembly is repaired or replaced. (Refer to the list below for the table that applies to your signal generator.) Except where noted, all adjustments are automated using software. For more information on adjustments, refer to the calibration guide.

For the ESG-A Series refer to [Table 6-5](#) on page 6-8.

For the ESG-D Series refer to [Table 6-6](#) on page 6-9.

For the ESG-AP Series refer to [Table 6-7](#) on page 6-10.

For the ESG-DP Series refer to [Table 6-8](#) on page 6-11.

Table 6-5 Adjustments for the ESG-A Series

| Adjustment | Repaired/Replaced Assembly | | | | | | | | | | | | | | | |
|------------------------------|----------------------------|----------------|----------------|----------------|-----------------|--------------|------------------|--------------------|-----------------|----------------|-------------------|-----------------|---------|---------------------|--------------------|----------------|
| | A1 Front Panel Bd | A2 Display | A2DS1 Lamp | A3 Inverter | A4 Power Supply | A9 Output Bd | A11 Reference Bd | A12 Synthesizer Bd | A14 Motherboard | A14BT1 Battery | A15 Daughterboard | A16 Line Module | A19 RPP | A25 Pulse Modulator | AT1 Elec Atten/RPP | AT1 Mech Atten |
| ABUS ADC Cal | | | | | • | | | • | | | | | | | | |
| Internal Source Cal | | | | | • | | • | | • | | | | | | | |
| VCO Bias Adjustment | | | | | • | | | • | • | | | | | | | |
| Lock Angle Adjustment | | | | | • | | | • | • | | | | | | | |
| Kv vs Frequency Cal | | | | | • | | | • | • | | | | | | | |
| AM Audio Path Offset | | | | | • | • | • | | • | | | | | | | |
| Timebase DAC Cal | | | | | • | | • | | • | | | | | | | |
| FM Scale DAC Offset Cal | | | | | • | | • | • | • | | | | | | | |
| FM Path Offset Cal | | | | | • | | • | • | • | | | | | | | |
| FM In-band DAC Offset Cal | | | | | • | | • | • | • | | | | | | | |
| FM Invert Amp Offset Cal | | | | | • | | • | • | • | | | | | | | |
| FM1/2 Path Ratio Gain Cal | | | | | • | | • | • | • | | | | | | | |
| Mod Source Relative Gain Cal | | | | | • | | • | • | • | | | | | | | |
| FM Delay Pot Adjustment | | | | | • | | • | • | • | | | | | | | |
| Wide BW PM Cal | | | | | • | | • | • | • | | | | | | | |
| DCFM Cal | | | | | • | | • | • | • | • | | | | | | |
| Peak Detector Cal | | | | | • | | • | • | • | | | | | | | |
| Burst Modulator Cal | | | | | • | • | | | • | | | | | | | |
| FM Out-of Band Cal | | | | | • | | • | • | • | | | | | | | |
| LF Output Cal | | | | | • | | • | | • | | | | | | | |
| Prelevel Cal | | | | | • | • | | | • | | | | | | | |
| VBLO (Mixer Bias Cal) | | | | | • | • | | | • | | | | | | | |
| Gain Adjust | | | | | • | • | | | • | | | | • | | • | • |
| ALC Adjustments | | | | | • | • | | | • | | | | • | | • | • |
| Level Meter Cal | | | | | • | • | | | • | | | | | | | |
| ALC Mod Flatness Cal | | | | | • | • | | | • | | | | | | | |
| ALC Mod Driver Bias Cal | | | | | • | • | | | • | | | | | | | |
| AM Audio Path Gain Cal | | | | | • | • | • | | • | | | | | | | |
| Power Level Accuracy | • ¹ | • ¹ | • ¹ | • ¹ | • | • | | | • | | • | | • | • | • | • |

1. Perform this test only if you *do not* have Option 1EM.

Table 6-6 Adjustments for the ESG-D Series

| Adjustment | Repaired/Replaced Assembly | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------|----------------------------|----------------|----------------|----------------|-----------------|----------------|----------------------|--------------------|----------------|--------------|------------------|--------------------|-----------------|----------------|-------------------|-----------------|-------------------|---------------------|---------|--------------------|--------------------|--------------------|----------------|--|
| | A1 Front Panel Bd | A2 Display | A2DS1 Lamp | A3 Inverter | A4 Power Supply | A5 Dual Arb Bd | A6 Bit Error Rate Bd | A7 Baseband Gen Bd | A8 Data Gen Bd | A9 Output Bd | A11 Reference Bd | A12 Synthesizer Bd | A14 Motherboard | A14BT1 Battery | A15 Daughterboard | A16 Line Module | A17 Rear Panel Bd | A18 BER Rear Pan Bd | A19 RPP | A20 Down Convertor | A21 Demodulator Bd | AT1 Elec Atten/RPP | AT1 Mech Atten | |
| ABUS ADC Cal | | | | | • | | | | | | | | • | | | | | | | | | | | |
| Internal Source Cal | | | | | • | | | | | | • | | • | | | | | | | | | | | |
| VCO Bias Adjustment | | | | | • | | | | | | | • | • | | | | | | | | | | | |
| Lock Angle Adjustment | | | | | • | | | | | | | • | • | | | | | | | | | | | |
| Kv vs Frequency Cal | | | | | • | | | | | | | • | • | | | | | | | | | | | |
| AM Audio Path Offset | | | | | • | | | | | • | • | | • | | | | | | | | | | | |
| Timebase DAC Cal | | | | | • | | | | | | • | | • | | | | | | | | | | | |
| FM Scale DAC Offset Cal | | | | | • | | | | | | • | • | • | | | | | | | | | | | |
| FM Path Offset Cal | | | | | • | | | | | | • | • | • | | | | | | | | | | | |
| FM In-band DAC Offset Cal | | | | | • | | | | | | • | • | • | | | | | | | | | | | |
| FM Invert Amp Offset Cal | | | | | • | | | | | | • | • | • | | | | | | | | | | | |
| FM1/2 Path Ratio Gain Cal | | | | | • | | | | | | • | • | • | | | | | | | | | | | |
| Mod Source Relative Gain Cal | | | | | • | | | | | | • | • | • | | | | | | | | | | | |
| FM Delay Pot Adjustment | | | | | • | | | | | | • | • | • | | | | | | | | | | | |
| Wide BW PM Cal | | | | | • | | | | | | • | • | • | | | | | | | | | | | |
| DCFM Cal | | | | | • | | | | | | • | • | • | • | | | | | | | | | | |
| Peak Detector Cal | | | | | • | | | | | | • | • | • | | | | | | | | | | | |
| Burst Modulator Cal | | | | | • | | | | | • | | | • | | | | | | | | | | | |
| FM Out-of Band Cal | | | | | • | | | | | | • | • | • | | | | | | | | | | | |
| LF Output Cal | | | | | • | | | | | | • | | • | | | | | | | | | | | |
| Burst Audio Path Cal | | | | | • | | | | | • | • | | • | | | | | | | | | | | |
| Prelevel Cal | | | | | • | | | | | • | | | • | | | | | | | | | | | |
| VBLO (Mixer Bias Cal) | | | | | • | | | | | • | | | • | | | | | | | | | | | |
| I/Q Gain/Offset Quadrature | | | | | • | | • | | | • | | • | • | | | | | | | | | | | |
| Gain Adjust | | | | | • | | | | | • | | | • | | | | | | • | | | • | • | |
| ALC Adjustments | | | | | • | | | | | • | | | • | | | | | | • | | | • | • | |
| Level Meter Cal | | | | | • | | | | | • | | | • | | | | | | | | | | | |
| ALC Mod Flatness Cal | | | | | • | | | | | • | | | • | | | | | | | | | | | |
| ALC Mod Driver Bias Cal | | | | | • | | | | | • | | | • | | | | | | | | | | | |
| AM Audio Path Gain Cal | | | | | • | | | | | • | • | | • | | | | | | | | | | | |
| Power Level Accuracy | • ¹ | • ¹ | • ¹ | • ¹ | • | | | | | • | | | • | | • | | • ² | | • | | | • | • | |

1. Perform this test only if you *do not* have Option 1EM.
2. Perform this test only if you have Option 1EM.

Table 6-7 Adjustments for the ESG-AP Series

| Adjustment | Repaired/Replaced Assembly | | | | | | | | | | | | | | | | | |
|-------------------------------------|----------------------------|----------------|----------------|----------------|-----------------|--------------|------------------|-----------------|----------------|-------------------|-----------------|---------|---------------|----------------|-----------------------|---------------------|--------------------|----------------|
| | A1 Front Panel Bd | A2 Display | A2DS1 Lamp | A3 Inverter | A4 Power Supply | A9 Output Bd | A11 Reference Bd | A14 Motherboard | A14BT1 Battery | A15 Daughterboard | A16 Line Module | A19 RPP | A22 YO Driver | A23 Sampler Bd | A24 Frac-N/Divider Bd | A25 Pulse Modulator | AT1 Elec Atten/RPP | AT1 Mech Atten |
| ABUS ADC Cal | | | | | • | | • | | | | | | | | | | | |
| Internal Source Cal | | | | | • | | • | • | | | | | | | | | | |
| VCO Bias Adjustment | | | | | • | | | • | | | | | | | • | | | |
| Lock Angle Adjustment | | | | | • | | | • | | | | | | | • | | | |
| Kv vs Frequency Cal | | | | | • | | | • | | | | | | | • | | | |
| AM Audio Path Offset | | | | | • | • | • | • | | | | | | | | | | |
| Timebase DAC Cal | | | | | • | | • | • | | | | | | | | | | |
| FM Scale DAC Offset Cal | | | | | • | | • | • | | | | | | | • | | | |
| FM Path Offset Cal | | | | | • | | • | • | | | | | | | • | | | |
| FM In-band DAC Offset Cal | | | | | • | | • | • | | | | | | | • | | | |
| FM Invert Amp Offset Cal | | | | | • | | • | • | | | | | | | • | | | |
| FM1/2 Path Ratio Gain Cal | | | | | • | | • | • | | | | | | | • | | | |
| Mod Source Relative Gain Cal | | | | | • | | • | • | | | | | | | • | | | |
| FM Delay Pot Adjustment | | | | | • | | • | • | | | | | | | • | | | |
| Wide BW PM Cal | | | | | • | | • | • | | | | | | | • | | | |
| DCFM Cal | | | | | • | | • | • | • | | | | | | • | | | |
| Peak Detector Cal | | | | | • | | • | • | | | | | | | • | | | |
| Burst Modulator Cal | | | | | • | • | | • | | | | | | | | | | |
| FM Out-of Band Cal | | | | | • | | • | • | | | | | | | • | | | |
| LF Output Cal | | | | | • | | • | • | | | | | | | | | | |
| VBLO (Mixer Bias Cal) | | | | | • | • | | • | | | | | | | | | | |
| Gain Adjust | | | | | • | • | | • | | | | • | | | | | • | • |
| ALC Adjustments | | | | | • | • | | • | | | | • | | | | | • | • |
| Level Meter Cal | | | | | • | • | | • | | | | | | | | | | |
| ALC Mod Flatness Cal | | | | | • | • | | • | | | | | | | | | | |
| ALC Mod Driver Bias Cal | | | | | • | • | | • | | | | | | | | | | |
| AM Audio Path Gain Cal | | | | | • | • | • | • | | | | | | | | | | |
| Power Level Accuracy | • ¹ | • ¹ | • ¹ | • ¹ | • | • | | • | | • | | • | • | | • | • | • | • |
| Pretune Calibration | | | | | | | | | | | | | • | | | | | |
| FM/PM YO Frequency Comp Calibration | | | | | | | | | | | | | • | | | | | |
| FM/PM OB Cal & Delay Pot | | | | | | | | | | | | | • | | | | | |
| LNF Gain Adjust | | | | | • | • | | | | | | | | | | | | |

1. Perform this test only if you *do not* have Option 1EM.

Table 6-8 Adjustments for the ESG-DP Series

| Adjustment | Repaired/Replaced Assembly | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------|----------------------------|----------------|----------------|----------------|-----------------|----------------|----------------------|--------------------|----------------|--------------|------------------|-----------------|----------------|-------------------|-----------------|-------------------|---------------------|---------|---------------|----------------|-----------------------|--------------------|----------------|--|
| | A1 Front Panel Bd | A2 Display | A2DS1 Lamp | A3 Inverter | A4 Power Supply | A5 Dual Arb Bd | A6 Bit Error Rate Bd | A7 Baseband Gen Bd | A8 Data Gen Bd | A9 Output Bd | A11 Reference Bd | A14 Motherboard | A14BT1 Battery | A15 Daughterboard | A16 Line Module | A17 Rear Panel Bd | A18 BER Rear Pan Bd | A19 RPP | A22 YO Driver | A23 Sampler Bd | A24 Frac-N/Divider Bd | AT1 Elec Atten/RPP | AT1 Mech Atten | |
| ABUS ADC Cal | | | | | • | | | | | | | • | | | | | | | | | | | | |
| Internal Source Cal | | | | | • | | | | | | • | • | | | | | | | | | | | | |
| VCO Bias Adjustment | | | | | • | | | | | | | • | | | | | | | | | | • | | |
| Kv vs Frequency Cal | | | | | • | | | | | | | • | | | | | | | | | | • | | |
| AM Audio Path Offset | | | | | • | | | | | • | • | • | | | | | | | | | | | | |
| Timebase DAC Cal | | | | | • | | | | | | • | • | | | | | | | | | | | | |
| FM Scale DAC Offset Cal | | | | | • | | | | | | • | • | | | | | | | | | | | | |
| FM Path Offset Cal | | | | | • | | | | | | • | • | | | | | | | | | | | | |
| FM In-band DAC Offset Cal | | | | | • | | | | | | • | • | | | | | | | | | | | | |
| FM Invert Amp Offset Cal | | | | | • | | | | | | • | • | | | | | | | | | | | | |
| FM1/2 Path Ratio Gain Cal | | | | | • | | | | | | • | • | | | | | | | | | | | | |
| Mod Source Relative Gain Cal | | | | | • | | | | | | • | • | | | | | | | | | | | | |
| DCFM Cal | | | | | • | | | | | | • | • | • | | | | | | | | | | | |
| Peak Detector Cal | | | | | • | | | | | | • | • | | | | | | | | | | | | |
| Burst Modulator Cal | | | | | • | | | | | • | • | • | | | | | | | | | | | | |
| LF Output Cal | | | | | • | | | | | | • | • | | | | | | | | | | | | |
| Burst Audio Path Cal | | | | | • | | | | | • | • | • | | | | | | | | | | | | |
| Prelevel Cal | | | | | • | | | | | • | • | • | | | | | | | | | | | | |
| VBLO (Mixer Bias Cal) | | | | | • | | | | | • | • | • | | | | | | | | | | | | |
| I/Q Gain/Offset Quadrature | | | | | • | | • | | | • | • | • | | | | | | | | | | | | |
| Gain Adjust | | | | | • | | | | | • | • | • | | | | | | • | | | | • | • | |
| ALC Adjustments | | | | | • | | | | | • | • | • | | | | | | • | | | | • | • | |
| Level Meter Cal | | | | | • | | | | | • | • | • | | | | | | | | | | | | |
| ALC Mod Flatness Cal | | | | | • | | | | | • | • | • | | | | | | | | | | | | |
| ALC Mod Driver Bias Cal | | | | | • | | | | | • | • | • | | | | | | | | | | | | |
| AM Audio Path Gain Cal | | | | | • | | | | | • | • | • | | | | | | | | | | | | |
| Power Level Accuracy | • ¹ | • ¹ | • ¹ | • ¹ | • | | | | | • | • | • | | • | | • ² | • | • | | | | • | • | |
| Pretune Calibration | | | | | | | | | | | | | | | | | | | • | | | | | |
| FM/PM YO Frequency Calibration | | | | | | | | | | | | | | | | | | | • | • | • | | | |
| FM/PM OB Cal | | | | | | | | | | | | | | | | | | | • | | • | | | |
| LNF Gain Adjust | | | | | | | | | • | | | | | | | | | | | | | | | |

1. Perform this test only if you *do not* have Option 1EM.
2. Perform this test only if you have Option 1EM.

7 Safety and Regulatory

This chapter provides information on the following:

- general safety information
- lithium battery disposal
- warranty and legal information

Safety Notes

The following safety notes are used throughout this manual. Familiarize yourself with each of the notes and its meaning before operating this instrument.

CAUTION Caution denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, would result in damage to or destruction of the product. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.

WARNING **Warning denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.**

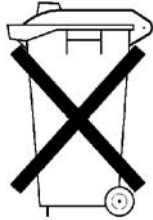
General Safety Considerations

The following safety notes apply specifically to ESG Family Signal Generators. These notes also appear in other chapters of this service guide as required.

-
- | | |
|----------------|--|
| WARNING | These servicing instructions are for use by qualified personal only. To avoid electrical shock, do not perform any servicing unless you are qualified to do so. |
|----------------|--|
-
- | | |
|----------------|--|
| WARNING | The opening of covers or removal of parts is likely to expose dangerous voltages. Disconnect the product from all voltage sources while it is being opened. |
|----------------|--|
-
- | | |
|----------------|---|
| WARNING | The detachable power cord is the instrument disconnecting device. It disconnects the mains circuits from the mains supply before other parts of the instrument. The front panel switch is only a standby switch and is not a LINE switch (disconnecting device). |
|----------------|---|
-
- | | |
|----------------|--|
| WARNING | The power cord is connected to internal capacitors that may remain live for 5 seconds after disconnecting the plug from its power supply. |
|----------------|--|
-
- | | |
|----------------|--|
| WARNING | 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 product is likely to make the product dangerous. Intentional interruption is prohibited. |
|----------------|--|
-
- | | |
|----------------|--|
| WARNING | Danger of explosion if battery if incorrectly replaced. Replace only with the same or equivalent type recommended. Discard used batteries according to manufacturer's instructions. |
|----------------|--|
-
- | | |
|----------------|---|
| CAUTION | Many of the assemblies in this instrument are very susceptible to damage from ESD (electrostatic discharge). Perform service procedures only at a static-safe workstation and wear a grounding strap. |
|----------------|---|
-

Lithium Battery Disposal

When the battery on the A14 CPU/Motherboard is exhausted and/or ready for disposal, dispose of it according to your country's requirements. You can return the battery to your nearest Agilent Technologies Sales and Service office for disposal, if required. (Refer to [Chapter 1, "Initial Troubleshooting and RF Block Diagrams,"](#) for a list of Agilent Technologies Sales and Service offices.)



DO NOT THROW BATTERIES AWAY BUT
COLLECT AS SMALL CHEMICAL WASTE.

sk780a

Warranty

This Agilent Technologies instrument product is warranted against defects in material and workmanship for a period of three years from date of shipment. During the warranty period, Agilent Technologies will, at its option, either repair or replace products which prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by Agilent Technologies. Buyer shall prepay shipping charges to Agilent Technologies and Agilent Technologies shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to Agilent Technologies from another country.

Agilent Technologies warrants that its software and firmware designated by Agilent Technologies for use with an instrument will execute its programming instructions when properly installed on that instrument. Agilent Technologies does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error-free.

Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

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Exclusive Remedies

THE REMEDIES PROVIDED HEREIN ARE BUYER'S SOLE AND EXCLUSIVE REMEDIES. AGILENT TECHNOLOGIES SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY.

Assistance

Product maintenance agreements and other customer assistance agreements are available for Agilent Technologies products. For any assistance, contact your nearest Agilent Technologies sales and service office. (Refer to [Chapter 1, “Initial Troubleshooting and RF Block Diagrams.”](#))

Notice

The information contained in this document is subject to change without notice.

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Certification

Agilent Technologies Company certifies that this product met its published specifications at the time of shipment from the factory. Agilent Technologies further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, to the extent allowed by the Institute's calibration facility, and to the calibration facilities of other International Standards Organization members.

A

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