

Procedure Guide

COMMENT

When looking at the instrument, some of the mechanical procedures may seem intuitively obvious. There are, however, some hidden problems. We strongly recommend that you read through an entire procedure before performing any of the steps in these mechanical procedures.

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8-1. INTRODUCTION

This section contains mechanical procedures required for service of the HP 8642A/B Synthesized Signal Generator. The instrument should be serviced in an electrostatic discharge protected environment. For your safety, read the warnings and cautions in the General Information section of this manual before performing the assembly/disassembly procedures.

NOTE

Unless otherwise noted, the directions "left" and "right" given in the instructions are referenced as though you are looking at the instrument from the front panel.

The first page of this section, **PROCEDURE GUIDE**, is a quick reference for locating the paragraph in which the removal and replacement procedures for each module/assembly can be found.

8-2. TOOLS

Most screws used in instrument are Torxhead screws. They require a torque driver and Torxhead bits for proper removal and installation.

To avoid damage, do not exceed the following torque limits:

Torque limit for 4 mm screws: 2.2 Nm. (Use bit T15)

Torque limit for 3 mm screws: 1.5 Nm. (Use bit T10)

Two bits are located in tool pouch sent with the Operating Manual.

To set torque limit of wrench, remove cover from end of handle. Lift the key to the vertical position and turn clockwise to increase torque setting, or turn counter-clockwise to decrease torque setting. Align hairline on clear bulb of wrench shaft with the desired setting. Push the key back to the flat position (a very slight turn in either direction may be necessary for key to lock into place).

Also included in the tool pouch are two module extender posts.

An RF connector wrench is located above fan on right inner wall of center rear bracket. A fuse extraction/insertion tool is located on top of rear frame under the power supply cover.

3. Loosely secure A5 and insulator to front brace with seven screws. When all seven screws are in place, tighten each one.

CAUTION

Cables W14 and W15 must be properly dressed into notch provided in left controller guide. Improperly dressed cables can be punctured by screws when securing guide and bracket to frame.

4. Dress W14 (08642-60010) and W15 (08642-60011) flush against left side of instrument. Mount left (black) controller guide over the cables with two panhead screws. Mount the left guide metal bracket with two flathead screws.
5. Replace two screws in right (white) controller guide.
6. Reconnect all cables. (Refer to diagram on inside of instrument Top Cover for cable connections.)
7. Position the modulation shield into the front frame and loosely secure with seven screws. When all screws are in place tighten each one.
8. Replace A2 Module. (Refer to paragraph 8-9.)
9. Close front panel. (Refer to paragraph 8-7: Except Option 002, paragraph 8-8: Option 002 only.)
10. Replace A3 and A4 Modules. (Refer to paragraph 8-5 and 8-6.)

The On-Site Service Kit contains many tools needed to service the instrument. (See Table 9-1 for contents of kit.)

Other tools required but not contained in the kit are:

- 2 pt. Pozidrive screwdriver.
- 1 pt. Pozidrive screwdriver
- 6.0 mm open end wrench.
- Small flathead screwdriver.
- Small needlenose pliers
- Small diagonal cutters
- Soldering/Desoldering tools

Tools not included in the kit which are called for in the procedures are printed in italics.

8-3. TOP COVER

Removal Time:	2 min
Replacement Time:	2 min
Tools Required:	<i>Pozidrive screwdriver.</i>

To Remove: Top Cover

1. Remove four rear feet from rear frame of instrument by removing screw in each foot.
2. Loosen screw in middle of rear edge of top cover. This is a captive screw (attached to top cover). Loosening it will cause cover to push away from front frame.
3. Slide top cover toward rear of instrument to disengage and lift and away. The cover has a tight fit and may need to be worked loose.

To Replace: Top Cover

1. Place cover onto top of instrument making sure that the cover fits into the grooves on the top of the side covers. Slide cover toward front of instrument while applying a slight downward pressure to front edge of cover. Guide into slot in top of front frame. The cover has a tight fit and may need to be worked forward.
2. When screw on rear edge of cover is in contact with rear frame tighten it. The cover should move forward as the screw is tightened.
3. Replace four feet on rear frame, one screw in each.

8-25. MODULE: A5

Removal Time:	2 min
Replacement Time:	2 min
Tools Required:	<i>Pozidrive screwdriver, torque driver Torxhead bits</i>

To Remove

1. Remove top cover. (Refer to paragraph 8-3.)
2. Remove A3 and A4 Modules. (Refer to paragraph 8-5 and 8-6.)
3. Open front panel (refer to paragraph 8-7: except Option 002, paragraph 8-8: Option 002 only).
4. Remove A2 Module. (Refer to paragraph 8-9.)
5. Remove seven screws in modulation shield (metal plate behind A2). Pull shield out of instrument.
6. Remove left (black) controller guide metal mounting bracket (two screws).
7. Remove two screws in left (black) controller guide.
8. Turn instrument on its side and remove four screws on rear edge of front bottom cover. Pull cover toward rear panel to disengage from front frame.
9. Remove two screws holding left (black) controller guide to bottom of A5 Module and pull guide out of instrument.
10. Remove two screws on far right side holding right (white) controller guide.
11. Disconnect all cables from A5 Module.
12. Remove seven panhead screws securing board to brace. **DO NOT** remove six flathead screws visible through holes in center section of A5 Module.
13. Pull Module out through bottom of instrument.

To Replace

1. Push A5 Module into instrument through bottom of instrument and align with front brace. Be sure front brace insulator is in place behind A5.
2. Plug HP-IB Cable (W12) into bottom left corner of A5 at A5J20 and A5J21. Red stripe on cable faces front panel. Dress W12 between standoffs on side of frame.

8-4. RF MODULES: A6, A7, A9, A11-14, A16, A19

Removal Time:	4 min
Replacement Time:	8 min
Tools Required:	RF connector wrench

To locate module, refer to drawing on inside of instrument top cover.

To Remove: A6, A7, A9, A11-14, A16, A19

1. Remove top cover (Refer to paragraph 8-3.)
2. Reroute obstructing coax cables around ends of module. (These are cables lying across the top of module that would hinder lifting of module from the instrument.)
3. Use RF connector wrench provided in the instrument to disconnect intermodular cables from the module being removed. (These are cables which connect the module to other parts of the instrument, including ribbon cables.)
 - To avoid damaging semi-rigid coax cables, disconnect both ends of cable.

NOTE

DO NOT disconnect intramodular cables. (These are cables which connect from one point on the module to another point on the same module.) Intramodular cables must remain in place for proper module calibration.

4. Slide L-shaped retaining clip at each end of module toward center of module to release from guide post. See figure 1. RF MODULE MECHANICAL PARTS on the foldout at the end of this section.
5. Using the finger loops on the retaining clips, lift module from instrument.
6. Loosen the black ribbon cable retaining screw on the module slide three turns. Carefully slide ribbon cable from behind retaining screw.

3. Hold switches in place and mount to base with two screws. Each screw takes a washer.
4. Reconnect other cables as follows:

A19W2	A19K2J2 to A19AT1J1 (SR)
A19W3	A19K1J3 to A19A3J1 (SR)
A19W4	A19K2J3 to A19A3U2J2 (SR)

8-24. MODULE FEEDTHROUGH FILTER NETWORK

Removal Time:	2 min
Replacement Time:	2 min
Tools Required:	<i>Pozidrive screwdriver.</i>

To Remove: Filters

1. Remove PC board assembly under which filters are mounted.
2. Remove two screws securing filter to base. Carefully pull filter network out of module.

To Replace: Filters

1. Place filter gasket over feedthrough hole in casting base.
2. Inspect filter network for cracked or broken filter bodies. If filter network is intact, place the network through the feedthrough hole with the longer set of leads through the casting. Be sure gasket remains in place.
3. Secure filter to base with two screws.
4. Replace PC board. (Refer to paragraph 8-22 MODIFICATIONS for the module you are repairing.)

To Replace: A6, A7, A9, A11-14, A16, A19

1. Clear cables from empty module slot.
2. Route ribbon cable behind ribbon cable retaining screw on module slide. Retighten the retaining screw. Pull cable up until bar rests in cable fold. (With a new cable the fold will not be evident. Allow enough slack in the cable to accommodate lowering the module into the instrument.)
3. Align module slide with guide post mounted in instrument. (Modules are designed so slide will not align properly if an attempt is made to install module backwards.)
4. Using finger loops on module slides, lower module into place.
5. Align retaining clips with notch in guide posts and slide clips into notch to lock module in position.
6. Reconnect all cables. Tighten connectors finger tight, then use RF connector wrench to tighten only slightly more (about 1/2 turn: 1 N.m). The RF connectors on the modules are fragile and over-torquing could cause damage. (Refer to inside of instrument top cover for cable connections.)

CAUTION

Make sure that ribbon cable on top of A12 Module (W5) is dressed under the SMC connector of A12W4 (91). If the ribbon cable is allowed to rest on the top of the connector it may be punctured when the top cover is replaced.

To Extend: (A6, A7, A9, A11-14, A16, A19)

1. Remove top cover (Refer to paragraph 8-3.)
2. Reroute any obstructing cables around ends of module.

3. Hold switches in place and mount to base with two screws. Each screw takes a washer.
4. Reconnect other cables as follows:

A19W2	A19K2J2 to A19AT1J1 (SR)
A19W3	A19K1J3 to A19A3J1 (SR)
A19W4	A19K2J3 to A19A3U2J2 (SR)

8-24. MODULE FEEDTHROUGH FILTER NETWORK

Removal Time:	2 min
Replacement Time:	2 min
Tools Required:	<i>Pozidrive screwdriver.</i>

To Remove: Filters

1. Remove PC board assembly under which filters are mounted.
2. Remove two screws securing filter to base. Carefully pull filter network out of module.

To Replace: Filters

1. Place filter gasket over feedthrough hole in casting base.
2. Inspect filter network for cracked or broken filter bodies. If filter network is intact, place the network through the feedthrough hole with the longer set of leads through the casting. Be sure gasket remains in place.
3. Secure filter to base with two screws.
4. Replace PC board. (Refer to paragraph 8-22 **MODIFICATIONS** for the module you are repairing.)

3. Screw extender posts into top of module guide posts.
4. Slide L-shaped retaining clip at each end of module toward center of module to release from guide post.
5. Slide Module to top of extender.
6. Align retaining clip with notch in extender post. Slide clip into locked position.

8-5. CONTROL MODULE: A3

Removal Time:	1 min
Replacement Time:	1 min
Tools Required:	None

To Remove: A3

1. Remove top cover. (Refer to paragraph 8-3.)
2. Disconnect the yellow cable fastener from mounting hole on the A11 module.
3. Raise the black extractor and the white extractor to upright position. The extractors may be difficult to raise. You will feel resistance from the connectors on the bottom of the module as you raise them.
4. Grasp the extractors in the upright position and pull module up, out of instrument.

To Replace: A3

1. Raise the black extractor and the white extractor to upright position.
2. Position module so extractor colors match colors of plastic guides in instrument (component side toward front of instrument).
3. Align board edges with the left and right slots in plastic guides.
4. Push board into instrument holding extractors in upright position.
 - Be sure yellow power meter cable isn't caught between the modules.

A16 ATTENUATORS: A16AT1 and A16AT2 (Option 003 only)**To Replace:**

1. Loosely secure the attenuator to the base with four screws inserted from opposite side of base. These screws must be left slightly loose to facilitate connecting the semi-rigid cable.
2. Reconnect cables as follows:

A16W1	A16AT1J2 to A16AT2J2 (SR)
A16W2	A16AT2J1 to A16A2J1 (SR)
A16W8	A16AT1 to A16A1J1 odd numbered pins (RIBBON CABLE)
	A16AT2 to A16A1J1 even numbered pins (RIBBON CABLE)
3. Tighten screws securing attenuator to base.

A19A1 MODIFICATIONS: 08642-60118**To Replace:**

4. Reconnect cables as follows:

A19W7	A19K1, K2 to A19A1J4 (SR)
A19W8	A19AT1 to A19A1J1 odd numbered pins (RIBBON CABLE)
	A19AT2 to A19A1J1 even numbered pins (RIBBON CABLE)
6. Omit this step.

A19A2 MODIFICATIONS: 08642-60119**To Replace:**

4. Reconnect cables as follows:

A19W6	A19AT2J1 to A19A2J1 (SR)
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6. Omit this step.

A19A3 MODIFICATIONS: 08642-60120**To Replace:**

- 2A. Check feedthrough filter network for cracked bodies or bent pins. If the filter network is damaged replace it. (Refer to paragraph 8-24.)

5. Push extractors down to lock module into notch near top of guides.
6. Push the yellow cable fastener into mounting hole on the A11 module.

8-6. CONTROL MODULE: A4

Removal Time:	1 min
Replacement Time:	4 min
Tools Required:	None

To Remove: A4

1. Remove top cover. (Refer to paragraph 8-3.)
2. Raise the black and the white extractors to upright position. The extractors may be slightly difficult to raise. You will feel some resistance from the connectors on the bottom of the module as you raise them.
3. Grasp the extractors and pull module up, out of instrument.

To Replace: A4

1. Check that ribbon cable shields are in place between ribbon cables on A5 module and A4 slot. Check that ribbon cables and shields are not obstructing connectors into which A4 plugs.
2. Raise the black and the white extractor to the upright position.
3. Position module so extractor colors match colors of plastic guides mounted in instrument (component side toward rear of instrument).
4. Align board edges with the left and right slots in plastic guides.
5. Push board into instrument holding extractors in upright position. As you lower A4 module into instrument, check that ribbon cables on A5 module stay in place.
6. Push extractors down to lock module into notch near top of guide.

A16 ATTENUATORS: A16AT1 and A16AT2 (Option 003 only)**To Replace:**

1. Loosely secure the attenuator to the base with four screws inserted from opposite side of base. These screws must be left slightly loose to facilitate connecting the semi-rigid cable.
2. Reconnect cables as follows:

A16W1	A16AT1J2 to A16AT2J2 (SR)
A16W2	A16AT2J1 to A16A2J1 (SR)
A16W8	A16AT1 to A16A1J1 odd numbered pins (RIBBON CABLE)
	A16AT2 to A16A1J1 even numbered pins (RIBBON CABLE)
3. Tighten screws securing attenuator to base.

A19A1 MODIFICATIONS: 08642-60118**To Replace:**

4. Reconnect cables as follows:

A19W7	A19K1, K2 to A19A1J4 (SR)
A19W8	A19AT1 to A19A1J1 odd numbered pins (RIBBON CABLE)
	A19AT2 to A19A1J1 even numbered pins (RIBBON CABLE)
6. Omit this step.

A19A2 MODIFICATIONS: 08642-60119**To Replace:**

4. Reconnect cables as follows:

A19W6	A19AT2J1 to A19A2J1 (SR)
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6. Omit this step.

A19A3 MODIFICATIONS: 08642-60120**To Replace:**

- 2A. Check feedthrough filter network for cracked bodies or bent pins. If the filter network is damaged replace it. (Refer to paragraph 8-23.)

8-7. FRONT PANEL
(Except Option 002)

Opening Time:	5 min
Closing Time:	4 min
Tools Required:	Torque driver, Torxhead bits, <i>small flathead screwdriver</i>

Front panel assembly is mounted into front frame on a hinge. Hinge mechanism is located on left side of front panel and allows right side to swing open like a door for accessing A1 and A2 Modules. If your instrument is an Option 002, go to paragraph 8-8.

COMMENT

This procedure requires careful attention to each step. Read through the entire procedure before performing any of the steps. If you don't follow the instructions, it's the pits.

To Open: Front Panel

1. Remove any adapters from RF Output connector.
2. Insert a screwdriver into holes in slot in rear edge of top plastic trim strip, and gently pry strip from top of front frame.
3. On top of front frame, remove two countersunk screws (first and thirteenth holes, counting from the right).

On the bottom of front frame, remove three countersunk screws (third, eighth, and twelfth holes, counting from right).
4. Grasp AM/Pulse Input Connector (J1) and Mod Output Connector (J3). Pull outward until entire front panel clears front frame by about 1/2 inch. If it is difficult to pull front panel out, it may be helpful to slightly loosen two screws on bottom of front frame under RF OUTPUT connector (CP1).

CAUTION

DO NOT swing right side open until entire panel is pulled out from front frame. Left (hinged) side of front panel may be damaged if not pulled out from frame before right side is swung open.

5. Slowly swing right side of panel outward while carefully guiding left side of front panel away from left edge of frame. (In other words, don't crunch the left side of the pretty fiberglass front panel into the left side of the frame or you'll ruin it.)

4. Reconnect cables as follows:

A13W1	A13A1J1 to A13A2J5 (936)
A13W2	A13A1J2 to A13A2J2 (924)

A14 MODIFICATIONS: HET SWITCH (A14U1)**To Replace: A14U1**

1. Secure A14U1 to base with two screws (use flat washer and lock washer with each.
2. Plug wiring harness into A14A3J5.
3. Reconnect cables as follows:

A14W2	A14A3J3 to A14U1J1 (912)
A14W3	A14A3J1 to A14U1J4 (914)
A14W4	A14U1 to A14A3J5 (WIRING HARNESS)

Red wire to rear feedthrough filter.
Brown wire to front feedthrough filter.

A14A2 MODIFICATIONS: 08642-60115**To Replace:**

- 2A. Check feedthrough filter network for cracked bodies or bent pins. If the filter network is damaged replace it. (Refer to paragraph 8-24.)
- 2B. Check that gasket is in place under the feedthrough filter network. If it is damaged or missing, replace it.
- 2C. Check that Feedthrough filter network is secured to base.
4. Reconnect cables as follows:

A14W1	A14A2J4 to A14A3J2 (916)
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6. Place cover over PC Board. Replace screws finger tight. Do not tighten yet.
7. Replace round transistor heatsink on outside of casting cover. Heat sink is screwed onto shaft of transistor mounted on A13A1. Do not overtighten.
8. Tighten screws in casting cover starting in the center and working outward.

To Close: Front Panel

1. Using J1 (AM/PULSE INPUT connector) to guide left side of the front panel, slowly swing right side of panel inward until "door" is almost closed (remember don't crunch it).
2. Push left side of panel into front frame, then push right side into frame.
3. Replace screws in first and thirteenth countersunk holes in top of front frame and replace screws in third, eighth and twelfth holes in bottom of front frame (count from right).
4. Tighten two screws under RF OUTPUT connector if they were loosened when front panel was opened (refer to paragraph 8-8, step 4).
5. Press top plastic trim strip into place on top of front frame, slot toward rear of instrument.

**8-8. FRONT PANEL
(Option 002 Only)**

Opening Time:	5 min
Closing Time:	4 min
Tools Required:	Torque driver, Torxhead bits, <i>small flathead screwdriver</i>

Front panel assembly is mounted into front frame on a hinge. Hinge mechanism is located on left side of front panel and allows right side to swing open like a door for accessing A1 and A2 Modules. If your instrument is not an Option 002, go to paragraph 8-7.

COMMENT

This procedure requires careful attention to each step. Read through the entire procedure before performing any of the steps. If you don't follow the instructions, it's the pits.

A12A3 MODIFICATIONS: 08642-60111**To Replace:**

- 2A. Check feedthrough filter network for cracked bodies or bent pins. If the filter network is damaged replace it. (Refer to paragraph 8-24.)
- 2B. Check that gasket is in place under the feedthrough filter network. If it is damaged or missing, replace it.
- 2C. Check that Feedthrough filter network is secured to base.
- 2D. Check that teflon washer is in place on top of feed through filter FL2 (single filter). If it is missing, replace it. This washers prevents feedthrough from shorting to A12A3.
- 4. Reconnect cables as follows:

A12W2	A12A3J2 to A12A2J3 (907)
A12W3	A12A2J1 to A12A3J5 (902)
A12W4	A12A1J1 to A12A3J4 (91)
- 7A. Make sure mixer access covers secured to casting cover.

A13A1 MODIFICATIONS: 08642-60112**To Replace:**

- 4. Reconnect cables as follows:

A13W1	A13A1J1 to A13A2J5 (936)
A13W2	A13A1J2 to A13A2J2 (924)
- 6. Place cover over PC Board. Replace screws finger tight. Do not tighten yet.
- 7. Replace round transistor heatsink on outside of casting cover. Heat sink is screwed onto shaft of transistor mounted on A13A1. Do not overtighten.
- 8. Tighten screws in casting cover starting in the center and working outward.

A13A2 MODIFICATIONS: 08642-60113**To Replace:**

- 2A. Check feedthrough filter network for cracked bodies or bent pins. If the filter network is damaged replace it. (Refer to paragraph 8-24.)
- 2B. Check that gasket is in place under the feedthrough filter network. If it is damaged or missing, replace it.
- 2C. Check that Feedthrough filter network is secured to base.

To Open: Front Panel

1. Insert a screwdriver into the holes in slot in rear edge of top plastic trim strip, and gently pry strip from top of front frame.
2. On top of front frame, remove two countersunk screws (first and thirteenth holes, counting from right).

On bottom of front frame, remove three countersunk screws (third, eighth and twelfth holes, counting from right).
3. Grasp round knob on front panel and pull panel outward about 1/2 inch. If left side of panel is stuck in frame, use a screwdriver to gently pry it out of frame.

CAUTION

DO NOT swing right side open until entire panel is pulled out from front frame. Left (hinged) side of front panel may be damaged if not pulled out from frame before right side is swung open.

4. Slowly swing right side of panel outward while carefully guiding left side of front panel away from left edge of frame. (In other words, don't crunch the left side of the pretty fiberglass front panel into the left side of the frame or you'll ruin it.)

To Close: Front Panel

1. Hold left side of panel out from front frame while swinging right side inward until "door" is almost closed (remember, don't crunch it).
2. Push left side of panel into front frame, then right side.
3. Replace screws in first and thirteenth countersunk holes counting from the right, in top of front frame.
4. Press top plastic trim strip into place on top of front frame, slot toward rear of instrument.

A11A3 MODIFICATIONS: 08642-60108**To Replace:**

- 2A. Place the foam piece onto the areas indicated on the base. The piece is not adhered to the base but is held in place by the board and its mounting hardware.
4. Reconnect cables as follows:
- | | |
|-------|--------------------------|
| A11W1 | A11A1J2 to A11A3J3 (925) |
| A11W3 | A11A2J3 to A11A3J6 (SR) |
6. Check that polyiron strips and sheets are in place on cover. If they are damaged or missing, replace them. Whenever the polyiron is replaced, the module must be recalibrated.
- 7A. Make sure mixer access covers secured to casting cover.
- 7B. Check that screws are mounted in the cover in holes marked "C1" and "C15". If either or both are missing, replace them.

A12A1 MODIFICATIONS: 08642-60109**To Replace:**

4. Reconnect cables as follows:
- | | |
|-------|-------------------------|
| A12W1 | A12A2J4 to A12A1J3 (SR) |
| A12W4 | A12A1J1 to A12A3J4 (91) |
- 7A. Make sure mixer access covers secured to casting cover.
- 7B. Check that screws are mounted in the cover in holes marked "C2", "C3", "C26" and "C27". If any are missing replace them.

A12A2 MODIFICATIONS: 08642-60110**To Replace:**

4. Reconnect cables as follows:
- | | |
|-------|--------------------------|
| A12W1 | A12A2J4 to A12A1J3 (SR) |
| A12W2 | A12A3J2 to A12A2J3 (907) |
| A12W3 | A12A2J1 to A12A3J5 (902) |
- 7A. Make sure mixer access covers secured to casting cover.
- 7B. Check that screws are mounted in the cover in holes marked "C2", "C3", "C26" and "C27". If any are missing, replace them.

8-9. RF MODULE: A2

Removal Time:	10 min
Replacement Time:	15 min
Tools Required:	Torque driver, Torxhead bits, RF connector wrench, <i>diagonal cutters</i> , cable ties.

Front panel assembly is mounted into front frame on a hinge. Hinge mechanism is located on left side of front panel and allows right side to swing open for accessing A1 and A2 Modules. A1 is mounted onto the hinged "door" that swings open. A2 is mounted in the front frame of the instrument.

To Remove: A2

1. Open front panel. (Refer to paragraph 8-7: Standard; paragraph 8-9: Option 002.)
2. Disconnect coax cables using RF connector wrench.
 - Clip cable ties holding cable bundle to module ties. (See figure 4. A2 Cable Ties and Connectors on foldout at the end of this section.)
3. Remove seven screws securing module to instrument.
4. Disconnect ribbon cable from A2J1, then pull the module out of instrument.

To Replace: A2

1. Slip four cable ties under ties on **component** side of module.
2. Position module with component side toward front. Connect ribbon cable at A2J1.
3. Secure module to metal shield. (7 screws, finger tight).
 - When all screws are in place tighten each one.
4. Connect coax cables. See instrument top cover for cable connections. Use cable ties installed in step 1 to secure cables to module.
5. Close front panel. (Refer to paragraph 8-7: Standard; paragraph 8-8: Option 002.)

7. Place cover over PC Board. Replace all screws finger tight, then tighten screws starting in the corners and working inward.

A11A1 MODIFICATIONS: 08642-60106

To Replace:

- 2A. Check feedthrough filter network for cracked bodies or bent pins. If the filter network is damaged replace it. (Refer to paragraph 8-24.)
- 2B. Check that gasket is in place under the feedthrough filter network. If it is damaged or missing, replace it.
- 2C. Check that Feedthrough filter network is secured to base.
- 2D. Check that teflon washers are in place on top of feed through filters FL2 and FL3 (single filters). If either or both are missing, replace them. These washers prevent feedthroughs from shorting to A11A1.
4. Reconnect cables as follows:
- | | |
|-------|--------------------------|
| A11W1 | A11A1J2 to A11A3J3 (925) |
| A11W2 | A11A1J4 to A11A2J1 (923) |
- 7A. Make sure small access cover is secured to casting cover.

A11A2 MODIFICATIONS: 08642-60107

To Replace:

4. Reconnect cables as follows:
- | | |
|-------|--------------------------|
| A11W2 | A11A1J4 to A11A2J1 (923) |
| A11W3 | A11A2J3 to A11A3J6 (SR) |
6. Check that polyiron strips and sheets are in place on cover. If they are damaged or missing, replace them. Whenever the polyiron is replaced, the module must be recalibrated.
- 7A. Make sure small access cover is secured to casting cover.
- 7B. Check that screws are mounted in the cover in holes marked "C1" and "C15". If either or both are missing, replace them.

8-10. CONTROL MODULE: A1

Removal Time:	8 min
Replacement Time:	8 min
Tools Required:	Torque driver, Torxhead bits, 6 mm open end wrench.

Front panel assembly is mounted into front frame on a hinge. Hinge mechanism is located on left side of front panel and allows right side to swing open for accessing A1 and A2 Modules. A1 is mounted onto the hinged "door" that swings open. A2 is mounted in the front frame of the instrument.

A1 module consists of A1A1 Keyboard Assembly and A1A2 LCD Display Assembly. References to A1 refer to the module as a single unit.

CAUTION

When removing A1 Module, the A1A2 LCD Display Assembly can be inadvertently detached from the keyboard. Remove A1 slowly and be sure that the display is firmly in place. It is advisable to wear gloves when handling the LCD display, it is easily soiled and not so easily cleaned.

The A1A2 LCD Display Assembly is extremely static sensitive. Observe handling precautions described in Section 1 of this Manual.

To Remove: A1

1. Open front panel. (Refer to paragraph 8-7: Standard; paragraph 8-8: Option 002.)
2. Remove four screws securing metal shield to back of A1 module. Pull shield off.
3. Remove ten hex nuts securing module to front panel standoffs.

2C. Check that Feedthrough filter network is secured to base.

4. Reconnect cables as follows:

A6A1W1 A6A2J4 to A6A1J3 (94)

6. Omit this step.

A7A1 MODIFICATIONS: 08642-60103

To Replace:

2. Follow directions in step 2, but "CAUTION" does not apply to A7A1.

3. Replace mounting screws finger tight. When all screws are in place tighten each one.

A9A1 MODIFICATIONS: 08642-60104

To Replace:

2A. Check feedthrough filter network for cracked bodies or bent pins. If the filter network is damaged replace it. (Refer to paragraph 8-24.)

2B. Check that gasket is in place under the feedthrough filter network. If it is damaged or missing, replace it.

2C. Check that Feedthrough filter network is secured to base.

4. Reconnect cables as follows:

A9W1 A9A1J1 to A9A2J4 (947)
A9W2 A9A1J3 to A9A2J2 (934)

A9A2 MODIFICATIONS: 08642-60105

To Replace:

2A. Check that foam piece is under A9A2U20. This foam should raise the IC so that it will contact the casting cover for heat sinking purposes. If the foam is damaged or missing, replace it.

4. Reconnect cables as follows:

A9W1 A9A1J1 to A9A2J4 (947)
A9W2 A9A1J3 to A9A2J2 (934)

5A. Apply thermal compound to casting cover where it will come in contact with A9A2U20.

6. Omit this step.

CAUTION

To avoid damage to key caps, and to avoid pulling switches loose, pull A1 rearward slowly, keeping key caps aligned with holes in front panel.

4. Pull module away from front panel far enough to disconnect RPG (knob) wiring harness from A1A1J3. RPG, Rotary Pulse Generator, is round, black assembly attached to front panel visible through cutout in A1A1 assembly.
5. Disconnect the ribbon cable from A1A1J1.
6. Pull module from instrument.

To Replace: A1

1. Position board with component side toward front panel.
2. Connect ribbon cable at A1A1J1.
3. Route RPG (knob) wiring harness through circular hole in A1 Module then back under A1 module to front. Connect at A1A1J3.
4. Align keys with holes in front panel, and mounting holes with standoffs, then push board into place onto standoffs.
5. Place hex nut onto each standoff (qty 10) and tighten finger tight. When each nut is in place tighten each one.
6. Position metal shield with U-shaped cutout over RPG (knob) assembly.
7. Secure shield to front panel with four screws.
8. Close front panel (refer to paragraph 8-7: Standard; paragraph 8-8: Option 002.)

To Replace: Generic

1. Inspect module base for damaged or missing spira shield gasket. If shield is missing or in poor condition (flattened, unwound, or loose), replace it.
2. Inspect PC Board. Clip long leads on circuit side of board that could cause a short circuit to casting. Lower components whose height would prevent proper placement of the module cover.



Feedthrough filter bodies are fragile. Use care when pressing board connector onto filter pins.

3. Position PC Board filter network connector over filter pins and press board into base. Replace mounting screws finger tight, when all screws are in place, tighten each one.
4. Replace all cables. (Refer to MODIFICATIONS for specific cable connections.)
5. Inspect condition of spira shield gasket on module cover; replace if necessary. Replace missing or damaged RF connector or filter gaskets (elastomer).
 - Flat side of RF connector gasket should be flush against board.
6. Check that conductive foam is in place on module cover. If it is missing or damaged replace it.
7. Place cover over PC Board. Replace all screws finger tight, then tighten screws starting in the center and working outward.

A6A1 MODIFICATIONS: 08642-60101**To Replace:**

4. Reconnect cables as follows:

A6A1W1	A6A2J4 to A6A1J3 (94)
--------	-----------------------

A6A2 MODIFICATIONS: 08642-60102**To Replace:**

- 2A. Check feedthrough filter network for cracked bodies or bent pins. If the filter network is damaged replace it. (Refer to paragraph 8-24.)
- 2B. Check that gasket is in place under the feedthrough filter network. If it is damaged or missing, replace it.

8-11. LCD DISPLAY ASSEMBLY A1A2

Removal Time:	2 min
Replacement Time:	2 min
Tools Required:	None

CAUTION

When removing A1 Module, the A1A2 LCD Display can be inadvertently detached from keyboard. Remove A1 slowly and check that the display is firmly in place. It is advisable to wear gloves when handling the LCD display, it is easily soiled and not so easily cleaned.

The A1A2 LCD Display Assembly is extremely static sensitive. Observe handling precautions described in Section I or Section VII general information of this manual.

To Remove: A1A2

1. Open front panel. (Refer to paragraph 8-7: Standard; paragraph 8-8: Option 002.)
2. Remove A1 module. (Refer to paragraph 8-10.)
3. Lay A1 Module flat, component side up.
 - A1A2 assembly plugs into A1 module at A1A1J4 and A1A1J5.
 - Grasp connectors on A1A2 Assembly and pull both upward at the same time. There will be resistance as you pull, **DO NOT** use a twisting action as you pull upward, this may cause damage to components or solder connections.

To Replace: A1A2

1. Carefully align plugs A1A2P1 and A1A2P2 with connector pins of A1A1J4 and A1A1J5.
 - With even pressure at both ends, press display into place.
2. Replace A1 module (refer to paragraph 8-10).

Table 8B-2. Replacement Modifications

ASSEMBLY NUMBER	NO CHANGES	ADD STEP	REPLACE STEP	OMIT STEP
A6A1			4	
A6A2		2A, 2B, 2C	4	6
A7A1			2, 3	
A9A1		2A, 2B, 2C	4	
A9A2		2A, 5A	4, 7	6
A11A1		2A, 2B, 2C, 2D, 7A	4	
A11A2		7A, 7B	4, 6	
A11A3		2A, 7A, 7B	4, 6	
A12A1		7A, 7B	4	
A12A2		7A, 7B	4	
A12A3		2A, 2B, 2C, 2D, 7A	4	
A13A1		8	4, 6, 7	
A13A2		2A, 2B, 2C	4	
A14U1			1-3	4-7
A14A2		2A, 2B, 2C, 8	4, 6, 7	
A14A3		8, 9	4, 6, 7	
A16A1			4	
A16A2			4	6
A16AT1, 2			1-3	4-7
A19A1			4	6
A19A2			4	6
A19A3		2A, 2B, 2C	4	6
A19AT1, 2			1-4	5-7
A19K1, 2			1-4	5-7

8-12. LCD DISPLAY INCANDESCENT LAMPS

Replacement Time:	10 min
Tools Required:	Torque driver, Torxhead bits, <i>Soldering iron, desoldering tool, needlenose pliers, gloves.</i>

CAUTION

When removing A1 Module, the A1A2 LCD Display Assembly can be inadvertently detached from the keyboard. Remove A1 slowly and be sure the display is firmly in place. It is advisable to wear gloves when handling the LCD display, it is easily soiled and not so easily cleaned.

The A1A2 LCD Display Assembly is extremely sensitive. Observe handling precautions described in I of this Manual.

To Replace: Incandescent Lamp

1. Remove A1A2. (Refer to paragraph 8-7 Standard; paragraph 8-8 Option 002.)
2. On end of display on which defective lamp is located, remove two screws securing black end cap of LCD display. The screw on the upper edge of the end cap requires two washers, don't lose them. Remove end cap.
3. Unsolder two leads of incandescent lamp, and remove lamp from mounting holes. To avoid damage to printed circuit traces and plated mounting holes, be sure leads are completely unsoldered before pulling lamp free.
4. Form leads of new lamp to fit spacing of mounting holes. Place leads in mounting holes and solder lamp into place.
5. Replace black end cap over lamp, and secure from circuit side with two screws. Screw on upper edge of end cap requires two washers.
6. Replace A1A2 Assembly. (Refer to paragraph

A19A2 MODIFICATIONS: 08642-60119

None

A19A3 MODIFICATIONS: 08642-60120

None

A19 ATTENUATORS: A19AT1 and A19AT2**To Remove:**

1. Remove A19A1.
2. Remove mounting screws (four per attenuator) on the side of the base from which the A19A1 Assembly was removed.
3. Remove semi-rigid cable from attenuators. To avoid damaging the cable, be sure to disconnect both ends.

Disconnect ribbon cables.

A19 SWITCHES: A19K1 and A19K2**To Remove:**

1. Remove semi-rigid cables from tops of switches.
2. Remove mounting screws (2 per).
3. Disconnect ribbon cable.

8-23. PRINTED CIRCUIT (PC) BOARDS: REPLACEMENT

Replacement Time:	Conditional
Tools Required:	Conditional

The following procedure is a generic assembly procedure. Modifications peculiar to an assembly are listed following the generic procedure. Table 8B-2 lists which steps, are modified or added for a particular module. Substitute the **MODIFICATIONS** into the generic procedure as directed.

8-13. RIGHT SIDE COVER

Removal Time:	2 min
Replacement Time:	2 min
Tools Required:	<i>Pozidrive screwdriver.</i>

To Remove: Right Side Cover

1. Remove the four feet on rear frame by removing screw in each foot.
2. Remove top cover. (Refer to paragraph 8-3.)
3. Loosen screw on rear edge of right cover. This is a captive screw (attached to cover), loosening it will cause cover to push back away from front frame.
4. Being careful not to dislodge foam pieces on cover, pull side cover from chassis after screw is disengaged from frame.

To Replace: Right Side Cover

1. Inspect side cover for loose or damaged foam. Replace if necessary. Foam is critical to proper air flow in the instrument.
2. Place groove on bottom edge of side cover onto edge of bottom cover.
3. Slide cover from rear frontward until captive screw on rear edge of side cover is in contact with rear frame. The screw should be in position to be tightened into frame. Cover will move forward into place as the screw is tightened.
4. Replace top cover. (Refer to paragraph 8-3.)
5. Replace four feet on rear frame.

A14 MODIFICATIONS: HET SWITCH (A14U1)

To Remove: A14U1

1. Remove A14 Module (refer to paragraph 8-4).
2. Remove cables from top of A14U1. To avoid damage to semi-rigid cables disconnect them at both ends.
3. Unplug wiring harness from A14A3J5.
4. Remove two screws securing HET switch to base.

A14A2 MODIFICATIONS: 08642-60115

To Remove:

- 1A. Use large flathead screwdriver to remove round transistor heatsink from the casting cover. Heat sink is screwed onto shaft of transistor mounted on A13A1.

A14A3 MODIFICATIONS: 08642-60116

To Remove:

- 1A. Use large flathead screwdriver to remove round transistor heatsink from the casting cover. Heat sink is screwed onto shaft of transistor mounted on A13A1.

A16A1 MODIFICATIONS: 08642-60145 (Option 003 only)

None

A16A2 MODIFICATIONS: 08642-60119 (Option 003 only)

1. Remove semi-rigid cable from attenuators. To avoid damaging the cable, be sure to disconnect both ends.

Disconnect ribbon cables.
2. Remove mounting screws (two per attenuator) on the opposite side of the base.

A19A1 MODIFICATIONS: 08642-60118

None

8-14. POWER SUPPLY MODULE: A17

Removal Time:	10 min
Replacement Time:	12 min
Tools Required:	Torque driver and Torxhead bits.

WARNING

Left rear portion of the instrument becomes hot during operation; a cooling period may be desired before servicing.

To avoid personal injury, avoid contact with the A17 heatsink when the A17 Module is extended.

To Remove: A17

1. Remove power to instrument.
2. Remove top cover (Refer to paragraph 8-3.)
3. Remove right side cover. (Refer to paragraph 8-13.)
4. Remove power supply cover (one screw).
5. Remove 13 screws on side frame indicated in figure 2. **A17 MODULE MECHANICAL PARTS** on the foldout at the end of this section.
6. Lift module partially out of instrument to expose ribbon cable connectors through gap in side frame. Push levers on ribbon cable connectors apart to release ribbon cables.
7. Disconnect power supply wiring harness (W13) from A17 connector below heatsink.
8. Lift module out of instrument.

COMMENT

You may feel resistance as you pull the board upward. This is caused by one of the foam strips adhered to the circuit side of the board. Use slow but firm upward pressure.

A9A2 MODIFICATIONS: 08642-60105

None

A11A1 MODIFICATIONS: 08642-60106

None

A11A2 MODIFICATIONS: 08642-60107

None

A11A3 MODIFICATIONS: 08642-60108

None

A12A1 MODIFICATIONS: 08642-60109

None

A12A3 MODIFICATIONS: 08642-60110

None

A12A3 MODIFICATIONS: 08642-60111

None

A13A1 MODIFICATIONS: 08642-60112

To Remove:

- 1A. Use large flathead screwdriver to remove round transistor heatsink from the casting cover. Heat sink is screwed onto shaft of transistor mounted on A13A1.

To Replace: A17

1. Position component side of board toward outside of instrument.
2. Connect power supply wiring harness (W13) to A17 connector below heatsink.
3. Lower board into place.

COMMENT

You may feel resistance as you lower the board into place. This is caused by one of the foam strips adhered to the circuit side of the board. Use slow but firm downward pressure.

4. Connect ribbon cable 08642-60013 to A17J3, and 08642-60012 to A17J2. (Ribbon cable part numbers are stamped on the cable.)
5. Foam strip should overlap metal bracket to seal gap between bracket and A17.
6. Align module with screw holes. Replace 13 screws finger tight. When all the screws are in place, tighten each one. (Refer to figure 2. **A17 MODULE MECHANICAL PARTS** on the foldout at the end of this section.)
7. Replace side cover. (Refer to paragraph 8-13.)

To Extend: A17

1. Remove power to instrument.
2. Remove top cover (refer to paragraph 8-3).
3. Remove power supply cover (one screw).
4. Remove screws shown in 2. **A17 MODULE MECHANICAL PARTS** on the foldout at the end of this section.
5. Lift module partially out of instrument to expose ribbon cable connectors through gap in side frame. Push levers on ribbon cable connectors apart to release ribbon cables.
6. Pull module up until lower mounting holes on module are aligned with top row of holes in upper rail of frame.
7. Insert screws through holes in top rail into bottom mounting holes on A17 and tighten finger tight. When all screws are in place, tighten each one.

To Remove: Generic

1. Remove module from instrument. (Refer to paragraph 8-4.)
2. Remove screws in casting cover on side of module board assembly is located (see diagram on inside of instrument's top cover to locate board assembly); lift cover off of module.
3. Disconnect all interboard cables (cables that go from one board or assembly to another) from the board being removed.



PC Board is secured to base by mounting screws and feedthrough filters. Feedthrough filter pins fit snugly into connector on board. Filters may be damaged if board is not lifted straight up off of the pins. There will be some resistance as you pull the board upward.

4. Remove screws securing board to module base.
5. Carefully lift board straight up from base until clear of filter pins.

A6A1 MODIFICATIONS: 08642-60101

None

A6A2 MODIFICATIONS: 08642-60102

None

A7A1 MODIFICATIONS: 08642-60103

To Remove:

4. Remove screws securing board to base.
5. Lift board from base.

A9A1 MODIFICATIONS: 08642-60104

None

8. Connect ribbon cable 08642-60013 to A17J3, and 08642-60012 to A17J2. (Ribbon cable part numbers are stamped on the cable.)
 - Be sure the power supply wiring harness remains connected.
9. Reconnect power.

8-15. REAR BOTTOM COVER

Removal Time:	5 min
Replacement Time:	3 min
Tools Required:	<i>Posidrive screwdriver, small flat head screwdriver, patience.</i>

To access the A18 Module or Option 001 A8 Assembly, only the REAR bottom cover should be removed. All other modules are accessible through the top of the instrument.

CAUTION

Do not remove center bottom cover, it is important to the structural stability of instrument. Any serviceable parts in the center section of instrument are accessible through top of the instrument.

Remove line power cord before removing this cover.

To Remove: Rear Bottom Cover

1. Remove the four feet on the rear frame by removing screw in each foot.
2. Turn instrument on its side and remove the two rear feet on bottom cover.
3. Unscrew four screws on front edge of cover.
4. Slide cover toward rear of instrument and lift cover from instrument. Cover fits snugly and may need to be worked loose. don't give up.

To Replace: Rear Bottom Cover

CAUTION

Remove line power cord before replacing rear bottom cover.

Table 8B-1. Removal Modifications

ASSEMBLY NUMBER	NO CHANGES	ADD STEP	REPLACE STEP	OMIT STEP
A6A1	X			
A6A2	X			
A7A1			4, 5	
A9A1	X			
A9A2	X			
A11A1	X			
A11A2	X			
A11A3	X			
A12A1	X			
A12A2	X			
A12A3	X			
A13A1		1A		
A13A2	X			
A14U1			1, 2	3-7
A14A2		1A		
A14A3		1A		
A16A1	X			
A16A2	X			
A16AT1, 2			1, 2	3-7
A19A1	X			
A19A2	X			
A19A3	X			
A19AT1, 2			1, 3	4-7
A19K1, 2			1, 3	4-7

1. Slide rear bottom cover from rear forward and align holes in front edge with holes rear edge of center bottom cover.
2. Insert and tighten four screws.
3. Replace two rear feet on bottom of instrument.
4. Replace four feet on rear frame.

8-16. POWER SUPPLY MODULE: A18

Removal Time:	10 min
Replacement Time:	10 min
Tools Required:	Torque driver and Torxhead bits, <i>insulated screwdriver</i> .

WARNING

Do not operate the instrument with the A18 Module extended. The screws securing the A18 Power Supply Rectifier and Filter Module to the chassis are an integral part of the protective grounding of the instrument.

The left rear portion of the instrument becomes heated during operation and a cooling period may be desired before servicing.

Capacitors inside the instrument may still be charged even if the instrument has been disconnected from its source of supply.

To Remove: A18

1. Remove power to instrument.
2. Remove top cover. (Refer to paragraph 8-3.)
3. Remove power supply cover (one screw).
4. Remove bottom rear cover (refer to paragraph 8-15.)
5. Using insulated screwdriver, discharge capacitors by shorting mounting screws together.
6. Remove screws on bottom of A18 module shown in figure 4. **A18 MODULE MOUNTING SCREWS** on the foldout at the end of this section.

8-21. MODULE DISASSEMBLY: A6, A7, A9, A11-14, A16, A19

Dissassembly:	Conditional
Assembly:	Conditional
Tools Required:	Conditional

Modules in the center section of the instrument are similar in construction. Printed Circuit (PC) board assemblies are mounted in metal castings to isolate RF circuits from each other and from the outside.

The PC boards are mounted to a casting called the base. The base is generally the center piece of the module. One, two or three boards are mounted to the base. Connections between boards on opposite sides of the base are accomplished with cabling or with feedthrough filters.

The feedthrough filters are mounted to one side of the base. They can be singular filters or they can be arranged in an array. The PC boards have connectors which fit over the filter pins.

The outer castings are called covers and are named after the circuitry on the PC board(s) over which they mount. For example PC Board Assembly, A13A1 is the Low Pass Filter Assembly; the cover mounted over A13A1 is, A13MP1 COVER LOW PASS FILTER.

Module Slides are attached to the end of the module to mount the module to the instrument and to facilitate the removal, replacement or extension of the module.

8-22. PRINTED CIRCUIT (PC) BOARDS: REMOVAL

Removal Time:	Conditional
Tools Required:	Conditional

The following procedure is a generic removal procedure. Modifications peculiar to an assembly are listed following the generic procedure. *Table 8B-1. Removal Modifications* lists which steps, if any, are modified or added for a particular module. Substitute the MODIFICATIONS into the generic procedure as directed.

7. Gently push module from top of instrument, while guiding module out from bottom until wires are extended.
8. Disconnect transformer output cable at A18J1. Disconnect cable to fan at A18J2. Disconnect wiring harness to A17 at A18J3.
 - If instrument is Option 001, disconnect wiring harness at A18J4.

To Replace: A18

1. Connect cables removed in paragraph 8-16, step 8.
2. Guide module into position from the top of the instrument, and hold in place. Be sure air seal foam and rubber strips are inside instrument (should not overlap on outside). Foam and rubber strips are easily torn and can cause difficulty when positioning the module. It may be necessary to re-position the modules several times before a proper seal is accomplished.
3. Align board with screw holes and secure screws finger tight. Use star washers on all screws. When all screws are in place tighten each one. (See figure 4. **A18 MODULE MOUNTING SCREWS** on the foldout at the end of this section.)
4. Replace bottom cover (refer to paragraph 8-15).
5. Replace power supply cover, one screw.

8-17. CALIBRATION MODULE A20

Removal Time:	3 min
Replacement Time:	3 min
Tools Required:	<i>Small flathead screwdriver.</i>

To Remove: A20

1. Pull four plastic fastener plungers outward and remove Calibration Module cover. It is not necessary to pull the fasteners completely out of the mounting holes in the cover. (See figure 3. **A20 and B1 MECHANICAL PARTS** on the foldout at the end of this section.)

7. Lower module into instrument.
8. Tie wrap the retaining bar to the A5 Module to hold all ribbon cables in place.
9. Replace A4 (refer to paragraph 8-6).

To Disconnect: W14, W15

W15 is split between connectors A5J9 and A5J10. W14 is connected to A5J11.

1. Remove A3 and A4. Refer to paragraphs 8-5 and 8-6.)
2. Flip the plastic ribbon cable shield up to expose the ribbon cable connectors under it.
 - The shield is pliable, and can be bowed slightly when raising it.
3. Insert a flat head screwdriver between the plastic retaining clip and the connector body and gently pry clip from A5 connector and cable plug.
4. Pull cable from connector.

To Reconnect: W14, W15

1. Align cable plug with A5 connector and push plug onto connector pins.
2. Insert the notched edge of the retaining clip into the slot on the A5 connector, push the smooth edge of the clip over the end of the cable plug.
3. Replace the ribbon cable shield.

To Remove: W14, W15

These cables can be removed by following the steps outlined for removing A5 Module (paragraph 8-25).

To Replace: W14, W15

These cables can be replaced by following the steps outlined for replacing A5 Module (paragraph 8-25).

2. Four plastic fasteners hold Calibration Module to fan access cover on rear panel. Turn screw heads 1/4 turn (fastener shoulders will close).
3. Pull Calibration Module off of fasteners. Fasteners will stay in place on access cover.

To Replace: A20

1. Check that the 1/4 turn fasteners on the fan access cover are in the unlocked (shoulders closed) position. Push Calibration Module onto fasteners. (See figure 3. A20 and B1 MECHANICAL PARTS on the foldout at the end of this section.)
2. Turn fasteners 1/4 turn (shoulders open) to secure Calibration Module to access cover.
3. Align plastic fasteners on Calibration Module cover with mounting holes in rear panel.
 - Push the fastener socket into the mounting hole. Then push the fastener plunger in.

8-18. A8 OSCILLATOR MODULE (OPTION 001)

Removal Time:	12 min
Replacement Time:	10 min
Tools Required:	Torque driver and Torxhead bits.

To Remove: A8

1. Remove top cover. (Refer to paragraph 8-3.)
2. Remove rear bottom cover. (Refer to paragraph 8-15.)
3. From bottom of instrument, disconnect wiring harness from A18J4.
 - Disconnect coax cable from A8J1.
4. From top of instrument, remove modules A7 and A9. (Refer to paragraph 8-4.)
5. Remove four screws on top of A8 securing it to metal bracket.
6. Pull A8 toward front panel, then out of instrument. A8 has a tight fit between bottom cover and metal bracket. Use a slight downward pressure on the A8 Assembly to ease the removal process.

To Reconnect: W1-W8, W11

1. Remove A4. (Refer to paragraph 8-6)
2. Fold the cable over the top of A5 and curl it under its A5 connector to align the plug with connector pins.
3. Push the plug upward onto the connector.
4. Replace the ribbon cable shields (if necessary).

To Remove: W1-W8, W11

1. Repeat **To Disconnect: W1-8, 11** steps 1-2.
2. Clip cable ties securing retaining bar to A5 Module.
3. Extend module to which cable attaches. (Refer to paragraph 8-4.)
4. On the module slide, loosen the black ribbon cable retaining screw three turns. Slide the cable from behind the retaining screw. (See figure 1. **RF MODULE MECHANICAL PARTS** on the foldout at the end of this section.)
5. Pull cable from module connector.

To Replace: W1-8, W11

1. Extend module to which cable attaches. (Refer to paragraph 8-4.)
2. Plug cable into module connector by matching the arrow on the cable connector with the arrow on the module connector.
3. Slide the cable behind the ribbon cable retaining screw on the module slide and retighten the screw. (See figure 1. **RF MODULE MECHANICAL PARTS** on the foldout at the end of this section.)
4. Remove A4. (Refer to paragraph 8-6)
5. Curl the cable over the top of A5 and under its A5 connector to align the plug with connector pins.
6. Push the plug upward onto the A5 connector.

To Replace: A8

1. Position A8 module with screw holes up and wiring harness toward rear of instrument.
2. Push A8 under metal bracket with slight downward pressure, while guiding the wiring harness through the rectangular hole in the rear of the bracket.
3. Align screw holes with holes in metal frame.
4. Secure with four screws.
5. From bottom of instrument, reconnect wiring harness to A18J4. Be sure all connector pins on A18J4 are properly plugged into in wiring harness connector.
 - Reconnect coax cable to A8.
6. Replace rear bottom cover. (Refer to paragraph 8-15.)
7. From top of instrument, replace A7 and A9 modules. (Refer to paragraph 8-4).
8. Replace top cover. (Refer to paragraph 8-3.)

8-19. FAN (B1)

Removal Time:	6 min
Replacement Time:	8 min
Tools Required:	Torque driver, torxhead bits

To Remove: B1

1. Remove calibration board cover by pulling plastic fastener plungers outward. (See figure 3. A20 and B1 MECHANICAL PARTS on the foldout at the end of this section.)
2. Remove four screws in access cover securing it to rear panel.
3. Fan is mounted to access cover. Pull access cover and attached fan out of instrument.
4. Disconnect wire connector at A18J3.
5. Remove 2 screws that attach fan to rear fan mounting bracket on access cover (one in upper right corner, one in lower left corner).

To Replace: B1

1. Mount fan to rear fan mounting bracket on fan access cover with 2 screws as shown in figure 3. Air directional arrows point down and to right. (See figure 3. A20 and B1 MECHANICAL PARTS on the foldout at the end of this section.
2. Route wire through rear panel to connector A18J3. Black (or blue) wire toward large blue capacitors on A18 module.
3. Push fan into access hole in the rear panel. The wire to A18J3 should be routed into the corner of the front sheet metal support bracket with any excess wire looping up. As you push the fan into place, make sure that the wire does not get disconnected.
4. Replace screws securing access cover to rear panel.
5. Replace Cal Board Cover. (Refer to paragraph 8-17 **To Replace:** A20 step 3.)

8-20. A5 RIBBON CABLES (W1-W8, W11, W14, W15)

Removal Time: 3 min per cable
Replacement Time: 5 min per cable
Tools Required: Torque driver, torxhead bits, *small flathead screwdriver.*

To Disconnect: W1-8, W11

1. Remove A4. (Refer to paragraph 8-6)
 - Some of the ribbon cables are protected by the ribbon cable shields. Flip the plastic ribbon cable shield up to expose the ribbon cable connectors under it.
 - The shield is pliable, and can be bowed slightly when raising it.
2. Cable connectors A5J1-8 (upper row of connectors) are positioned so their pins point downward.
 - Push the cable plug downward to free the cable from the connector on A5.