

INSTALLATION

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SECTION 1 – GETTING STARTED

Note

This section applies to M1040FF and M1040FK.

1-1 INTRODUCTION

With the release of FMI 60420 (Spectro Power Monitor Upgrade) the RF Cabinet has been changed for 4.X to 5.4 hardware (M1040FF). The FMI 60420 removes hardware from the RF Cabinet and incorporates new Spectro Analog Sense Boards in the Power Monitor Chassis.

With the 5.4 release, the RF Cabinet has been changed. The 5.4 RF Cabinet has a new Analog Processor Board (APB) in the Power Monitor Chassis. A new Signa Advantage Spectroscopy option, M1040FK, is required for all 5.4 hardware release Signa Systems.

Both Signa Advantage Spectroscopy options, as delivered by Catalog M1040FF or M1040FK are installed by this Section. The M1040FF option may be installed on a Signa Advantage System (4.X hardware) or a Signa Advantage 1.5T System (5.3 hardware or lower). The M1040FK option may be installed on a Signa Advantage 1.5T System (5.4 hardware). The installation procedure indicates which option(s) pertains.

Note

This option is not for field installation in Signa Mobile sites.

1-2 PREREQUISITE UPGRADES AND RELATED OPTIONS

Signa Advantage Spectroscopy Option may be added to any Signa fixed site configuration shipped since September 1984 providing prerequisite upgrades are installed. To determine if upgrades and/or options are required, use the procedure below.

1. Refer to Tables 1-1 through 1-3.
2. Determine which configuration is applicable to your site. For Signa Advantage (4.X) Systems, use the flowchart in Illustration 1-1 to inspect model number rating plates (including kit added rating plates) to help determine upgrade status. For Signa Advantage 1.5T (5.X) Systems, use the flowchart in Illustration 1-2 to inspect model number rating plates (including kit added rating plates) to help determine upgrade status.
3. Install prerequisite upgrades.

Note

Signa Advantage (4.X) Systems delivered after November 9, 1990 as Catalog M1000GA or M1000GE do not require prerequisite upgrades.

4. Refer to Table 1-4 to ensure all required related options have been ordered.
5. Plan where the new BroadBand RF Cabinet (MR6) in M1040FF or M1040FK will be placed at the site.
6. Install M1040FF or M1040FK. Refer to installation instructions in the remainder of this Direction. The installation procedure indicates which option(s) pertain.
7. Install required related options. Table 1-4 shows where installation instructions are found for each option.

The system is to be operating at Software Release 4.5.12 or higher. Refer below if the Signa Advantage (4.X) System is not at this software revision. You may have to perform one or more of the following:

- FMI 60277A, Release 4.1 Software Upgrade (includes hardware changes as prerequisite to FMI 60295)
- FMI 60295, Release 4.5 Software Upgrade (includes hardware changes as prerequisite to FMI 60324)
- FMI 60324, Releases 4.5.11 to 4.5.12 Software Upgrade (required previously mentioned FMI's as prerequisites)

1-2 PREREQUISITE UPGRADES AND RELATED OPTIONS (Continued)

TABLE 1-1
REQUIRED UPGRADE SUMMARY (SIGNA)

SYSTEM CAT# DELIVERED	SYSTEM CONFIGURATION AS DELIVERED	PREREQUISITE UPGRADES
Signa M1000AA or M1000AE (0.6, 1.0, 1.6, 1.8, 2.0, or 2.5 Software) (9/84 to 5/87)	Hydraulic Penetration Cabinet (Model 46-244490G1) 8603 Gradient Amplifiers (Model 46-243184G1) Hydraulic Patient Transport (Model 46-243307G1 or G2) Magnet Enclosure with pulley cable take-up and laser Patient Alignment Lights	M1020BB Lightweight Patient Transport Upgrade M1090BL Performance Plus Upgrade M1090BB Quad Head Coil Upgrade for 2nd Table M1040FH, Cable Take-up and Laser Upgrade M1090GD, Signa Advantage Upgrade or (if M1090GD not installed): M1090FA, Signa Advantage Upgrade and M1040FJ Hardware Options Upgrade
Signa M1000BA or M1000BE (3.0 Release Software) (5/87 to 5/88)	Non-hydraulic Penetration Cabinet (Model 46-271669g1) 8604 Gradient Amplifiers (Model 46-271087g1) Lightweight Patient Transport (Model 46-265300g1) Magnet Enclosure With Pulley Cable Take-up And Halogen Patient Alignment Lights	M1090BL Performance Plus Upgrade M1090BB Quad Head Coil Upgrade for 2nd Table M1040FG, Cable Take-up Upgrade M1090GD, Signa Advantage Upgrade or (if M1090GD not installed): M1090FA, Signa Advantage Upgrade and M1040FJ Hardware Options Upgrade
Signa Performance Plus M1000CA or M1000CE (3.2 Release Software) (after 5/88)	Non-hydraulic Penetration Cabinet (Model 46-282417G1) 8604 Gradient Amplifiers (Model 46-271087G2) Lightweight Patient Transport (Model 46-265300G1) Magnet Enclosure with Cable track cable take-up	M1090GD, Signa Advantage Upgrade or (if M1090GD not installed): M1090FA, Signa Advantage Upgrade and M1040FJ Hardware Options Upgrade
Signa Performance Plus M1000DA or M1000DE (3.2 or 3.3 Software) (after 9/89)	Non-hydraulic Penetration Cabinet (Model 46-282417G1) 8607 Gradient Amplifiers (Model 46-271087G4) Lightweight Patient Transport (Model 46-265300G1) Magnet Enclosure with Cable track cable take-up	M1090GC, Signa Advantage Upgrade or (if M1090GA not installed): M1090FB, Signa Advantage Upgrade and M1040FJ Hardware Options Upgrade

TABLE 1-2
REQUIRED UPGRADE SUMMARY (SIGNA ADVANTAGE (4.X))

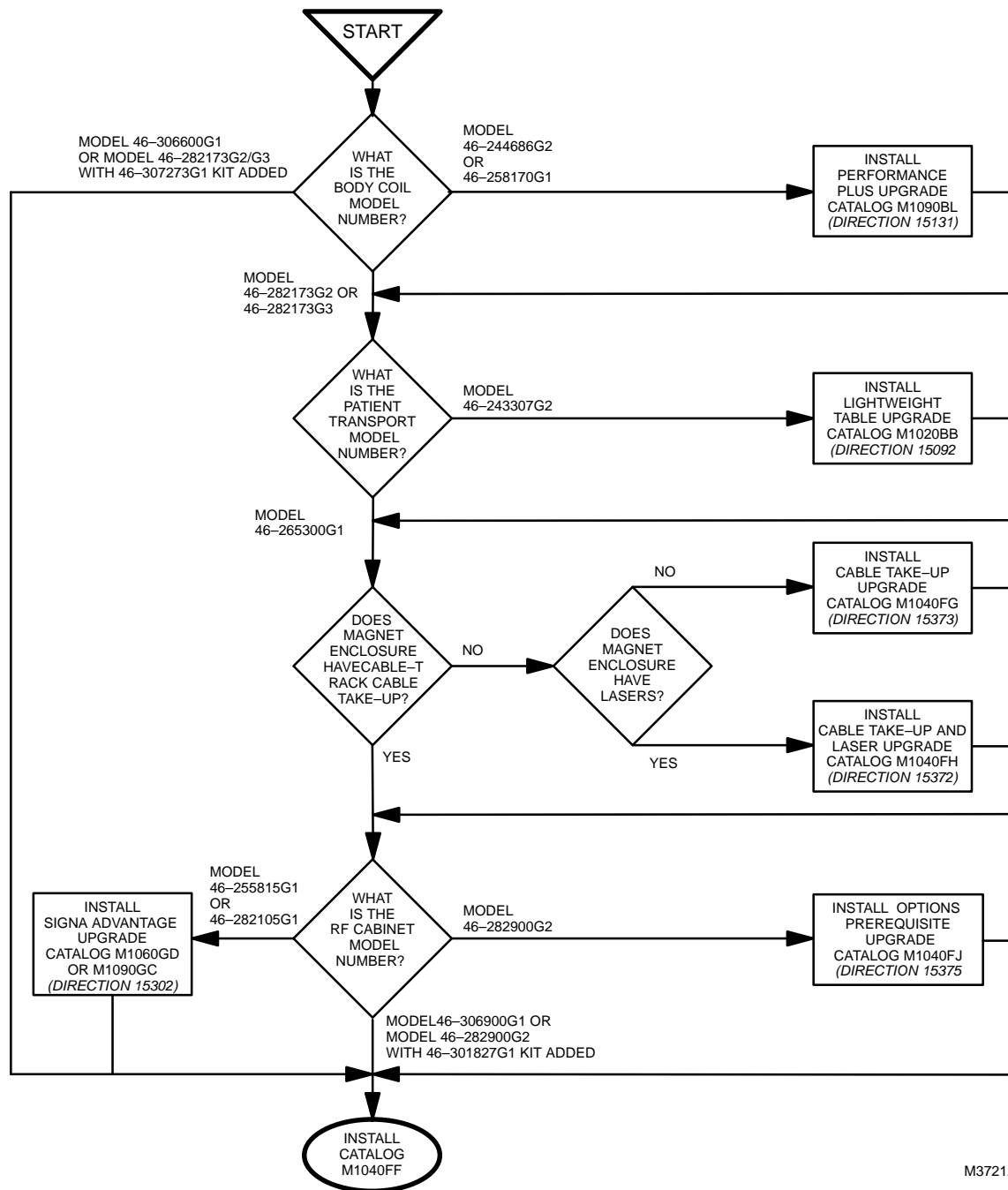
SYSTEM CAT# DELIVERED	SYSTEM CONFIGURATION AS DELIVERED	PREREQUISITE UPGRADES
Signa Advantage M1000FA or M1000FE (4.0, 4.1, or 4.5 Release Software) (after 9/89)	System Cabinet with TPS (Model 46-287433G1 or G2) Erbtec RF Amp Cabinet (Model 46-282900G2) 8607 Gradient Amplifiers (Model 46-271087G5 or 46-306500G1) Lightweight Patient Transport (Model 46-265300G1) Magnet Enclosure with Cable track cable take-up	M1040FJ Hardware Options Upgrade
Signa Advantage M1000GA or M1000GE (4.5 Software) (after 11/90)	System Cabinet with higher output TPS PS (Model 46-287433G3) Erbtec RF Amp Cabinet (Model 46-306900G1) 8607 Gradient Amplifiers (Model 46-306500G1) Lightweight Patient Transport (Model 46-265300G1) Magnet Enclosure with Cable track cable take-up	None (check that if still at 4.5 Release, you are at least at 4.5.12. If not, refer to FMI 60324, 4.5.11 to 4.5.12 SOFTWARE UPGRADE.

1-2 PREREQUISITE UPGRADES AND RELATED OPTIONS (Continued)

TABLE 1-3
 REQUIRED UPGRADE SUMMARY (SIGNA ADVANTAGE 1.5T (5.X))

SYSTEM CAT# DELIVERED	SYSTEM CONFIGURATION AS DELIVERED	PREREQUISITE UPGRADES
Signa Advantage M1000HA or M1000HB	System Cabinet with higher output TPS PS (Model 46-307494G1) Erbtec RF Amp Cabinet (Model 46-306900G2) 8607 Gradient Amplifiers (Model 46-306500G2) Lightweight Patient Transport (Model 46-265300G1) Magnet Enclosure with Cable track cable take-up	M1090MC, Additional Magnetic Disk
Signa Advantage M1000KA (5.4 Software) (after 12/93)	System Cabinet with higher output TPS PS (Model 46-307494G1) Erbtec RF Amp Cabinet (Model 46-328070G1) 8607 Gradient Amplifiers (Model 46-306500G2) Lightweight Patient Transport (Model 46-265300G1) Magnet Enclosure with Cable track cable take-up	M1090MC, Additional Magnetic Disk M1090MF, Additional Magnetic Disk

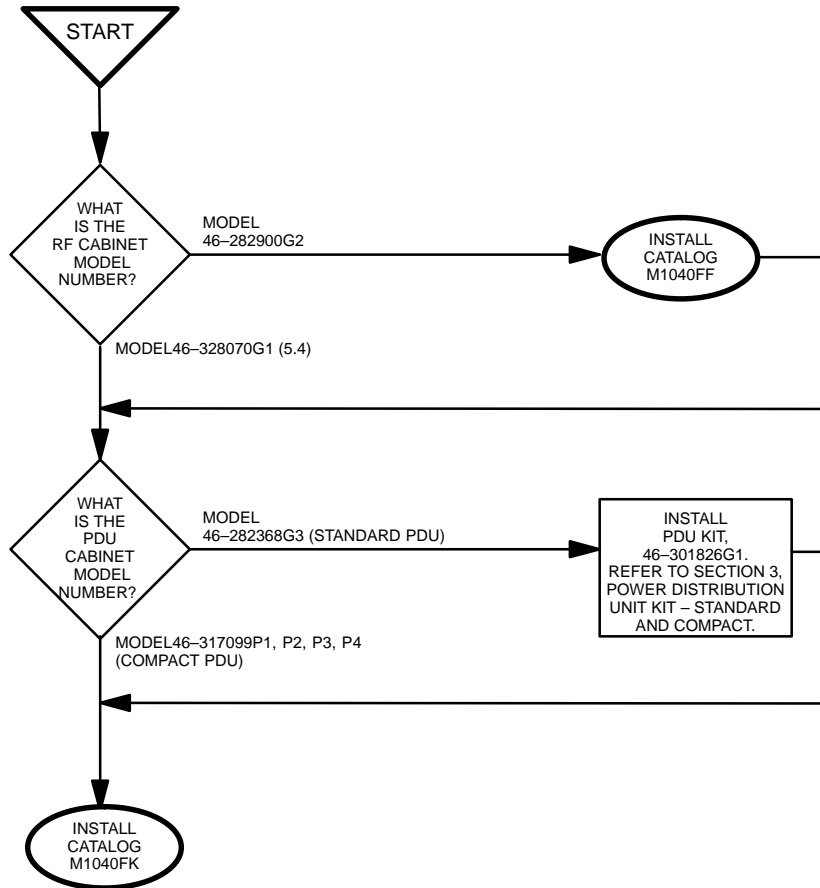
1-2 PREREQUISITE UPGRADES AND RELATED OPTIONS (Continued)



M3721A

PREREQUISITE UPGRADE FLOW CHART (4.X)
ILLUSTRATION 1-1

1-2 PREREQUISITE UPGRADES AND RELATED OPTIONS (Continued)



PREREQUISITE UPGRADE FLOW CHART (5.X)
ILLUSTRATION 1-2

1-2 PREREQUISITE UPGRADES AND RELATED OPTIONS (Continued)

TABLE 1-4
RELATED OPTIONS

CAT #	SIGNA(3.X) AND SIGNA ADVANTAGE (4.X)		SIGNA ADVANTAGE 1.5T (5.X) SYSTEMS	
	NEED?	DOCUMENTED IN:	NEED?	DOCUMENTED IN:
M1040BH Resistive Shim for GE Magnets	Not required	<i>Direction 15144, Resistive Shim Option for S-I, S-II & S-III Magnets</i> (Delivered with Catalog Option)	Not required	<i>Direction 15144, Resistive Shim Option for S-I, S-II & S-III Magnets</i> (Delivered with Catalog Option)
M1040CH Resistive Shim for GE S-IV Magnets	Not required		Not required	<i>Direction 2112362, Resistive Shim Option for S-IV Magnets</i> (Delivered with Catalog Option)
M1040BJ SAGE Software	Maybe	<i>Direction 15309, Analysis Workstation Software</i> (Delivered with Catalog Option) [Alternate outside sources are available]	Maybe	<i>Direction 15309, Analysis Workstation Software</i> (Delivered with Catalog Option) [Alternate outside sources are available]
M1040BK High Speed Ethernet	Yes	<i>Direction 15476, High Speed Ethernet Installation</i>	No	—
M1040CB, CC, CD, CF Surface Coils	Obsolete	Operator Manuals [Alternate outside sources are available]	Obsolete	Operator Manuals [Alternate outside sources are available]
M1040HS Hydrogen Spectro (Pre 5.X)	Yes		No	—
M1040HT 5.X Option Key	No		Yes	<i>Direction 15400, Signa Advantage 1.5T & 0.5T System and this manual Section 9, 5.X RELATED OPTIONS</i>
M1090KT Key Tape (Pre 5.X)	Yes	<i>Direction 15300, Signa Advantage System, Set up and Calibration tab, Section 6-6 Saving Edits and Loading Key Tape</i>	No	
Workstation	Yes, type determined and supplied by customer.		Yes, type determined and supplied by customer.	
Peripherals (printer, etc)	Determined and supplied by customer.		Determined and supplied by customer.	

1-3 CONTENTS OF M1040FF/M1040FK SIGNA ADVANTAGE SPECTROSCOPY OPTION

M1040FF consists of the BroadBand RF Cabinet and kits as listed in Table 1-5. Items 1-7 appear in Illustration 1-3.

M1040FK consists of the BroadBand RF Cabinet and kits as listed in Table 1-6. Items 1-7 appear in Illustration 1-4.

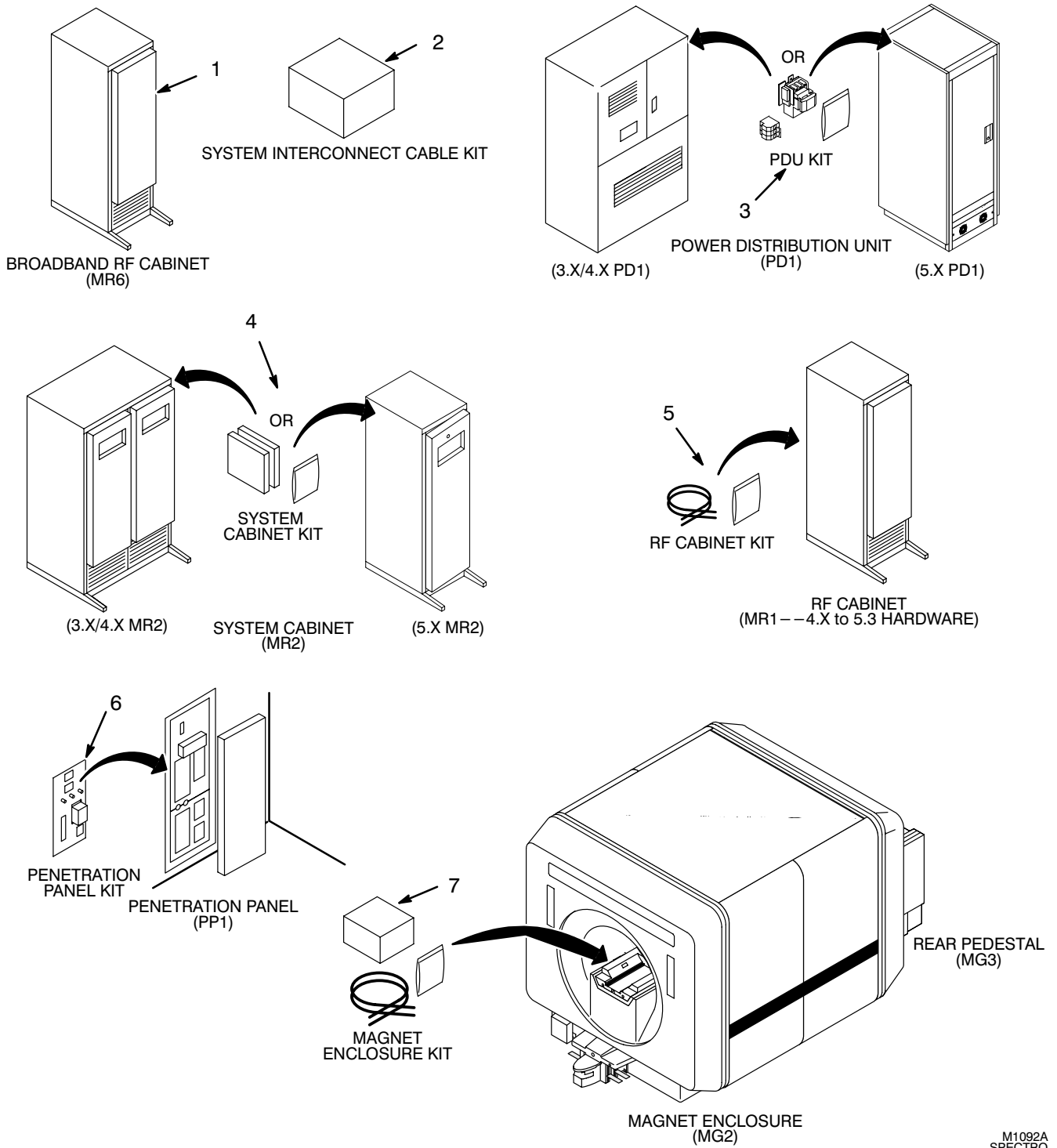
TABLE 1-5
M1040FF SIGNA SPECTROSCOPY CONTENTS

ITEM	PART NUMBER	DESCRIPTION	SECTION INSTALLED
1A	46-301697G2	BroadBand RF Cabinet MR6	Section 4
1B	46-301697G1	BroadBand RF Cabinet MR6 (Alternate)	Section 4
2	46-301824G1	Spectroscopy Subsystem Cables	Section 2
3	46-301826G1	PDU Kit	Section 3
4	46-301825G1	System Cabinet Kit	Section 6
5	46-301924G1	RF Cabinet Kit	Section 5
6	46-307775G1	Penetration Panel Kit	Section 7
7	46-301548G1	Magnet Enclosure Kit	Section 8
8	46-317286G1	Service Coil and Phantom Kit	Not "installed"
9	46-317905G1	5.X RF Cabinet Upgrade Kit	Section 5
10	46-015370	Signa Spectroscopy Subsystem Manual	Not "installed"
11	46-305091	Multi-Nuclear RF Amplifier Operation and Service Manual Amplifier includes Power Line-cord	Not "installed"

TABLE 1-6
M1040FK SIGNA SPECTROSCOPY CONTENTS

ITEM	PART NUMBER	DESCRIPTION	SECTION INSTALLED
1	46-301697G3	BroadBand RF Cabinet MR6	Section 4
2	46-301824G1	Spectroscopy Subsystem Cables	Section 2
3	46-301826G2	PDU Kit	Section 3
4	46-301825G1	System Cabinet Kit	Section 6
5	46-301924G2	RF Cabinet Kit	Section 5
6	46-307775G1	Penetration Panel Kit	Section 7
7	46-301548G1	Magnet Enclosure Kit	Section 8
8	46-317286G1	Service Coil and Phantom Kit	Not "installed"
10	46-015370	Signa Spectroscopy Subsystem Manual	Not "installed"
11	46-305091	Multi-Nuclear RF Amplifier Operation and Service Manual Amplifier includes Power Line-cord	Not "installed"

1-3 CONTENTS OF M1040FF/M1040FK SIGNA ADVANTAGE SPECTROSCOPY OPTION (Continued)

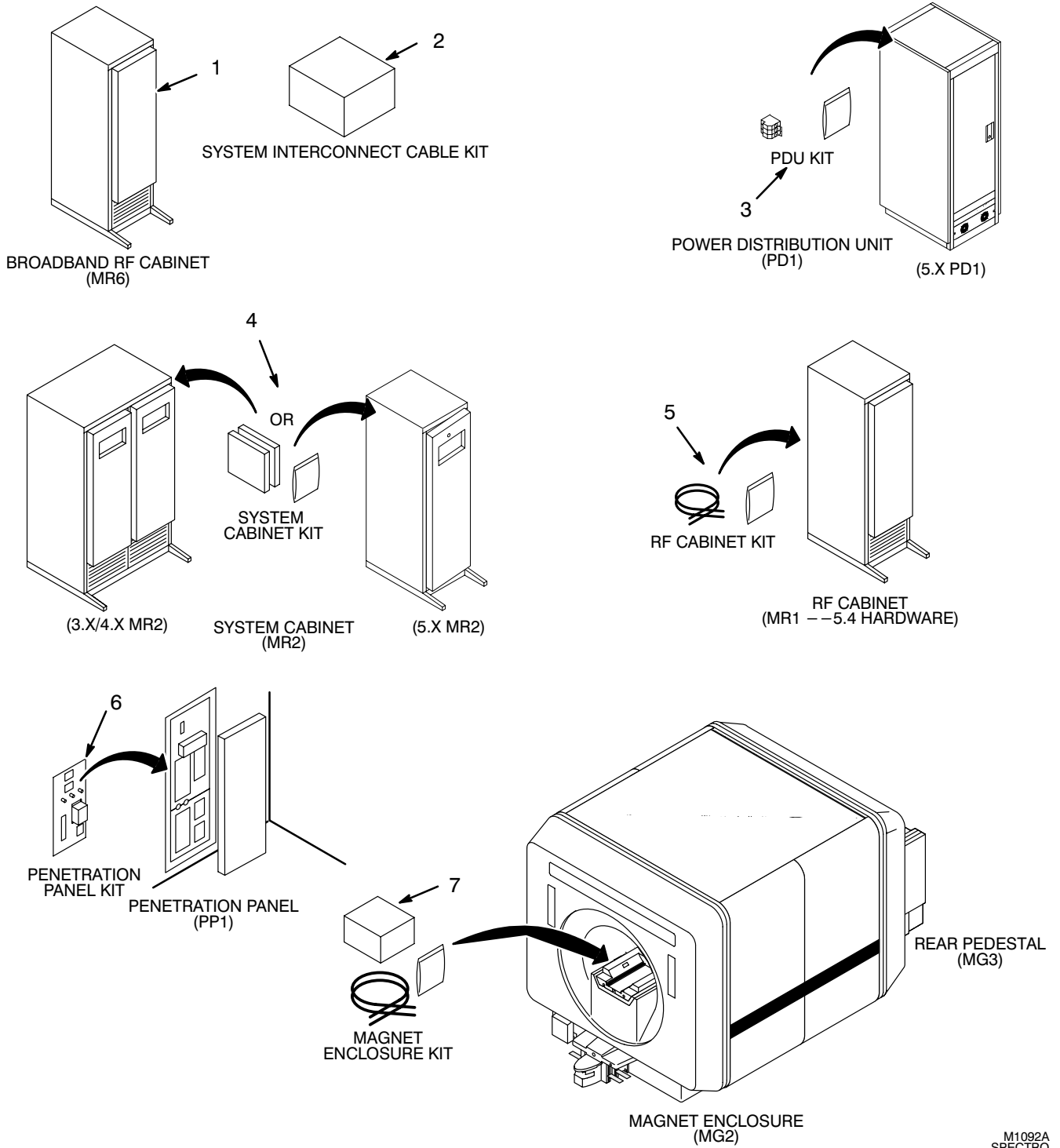


M1092A SPECTRO

SIGNA SPECTROSCOPY SUBSYSTEM COMPONENTS (M1040FF)

ILLUSTRATION 1-3

1-3 CONTENTS OF M1040FF/M1040FK SIGNA ADVANTAGE SPECTROSCOPY OPTION (Continued)



M1092A SPECTRO

SIGNA SPECTROSCOPY SUBSYSTEM COMPONENTS (M1040FK)

ILLUSTRATION 1-4

1-4 M1040FF/M1040FK PRE-INSTALLATION CHECK

The following checks are to be performed at the site to insure that longer cables (if any) are ordered and received prior to Spectroscopy option installation. These items are to be ordered in advance and available prior to starting.

- 1. This option provides 14 new system cables as listed in Table 1-7. Is the length of new cables sufficient for the intended routing at the site?
- 2. This option adds the BroadBand RF Cabinet to the equipment room. Is there a suitable location available for this cabinet that is within reach of the interconnecting cables listed in Table 1-7?

If any of the new system cables have insufficient length and cable(s) can not be re-routed or cabinet(s) can not be relocated, then a SOI (special order inquiry) for longer cables will have to be processed.

TABLE 1-7
NEW SYSTEM CABLES PROVIDED WITH THIS UPGRADE

CABLE ROUTE	RUN(S)	LENGTH	TYPE
Magnet Enclosure (MG3 A17) to Penetration Panel (PP1)	472, 473	80 Feet (28 m)	RG223/U and Heliac
RF Cabinet (MR1) to BroadBand RF Cabinet (MR6)	460, 461, 464, 465	30 Feet (10 m)	RG223/U Coax
RF Cabinet (MR1) to BroadBand RF Cabinet (MR6)	459, 462, 463 (4.X) / 738 (5.X)	30 Feet (10 m)	Multiconductor
BroadBand RF Cabinet (MR6) to Gradient Cabinet (MR3)	467 (4.X) / 737 (5.X)	50 Feet (16 m)	Multiconductor
BroadBand RF Cabinet (MR6) to System Cabinet (MR2)	466	50 Feet (16 m)	RG223/U Coax
System Cabinet (MR2) to Penetration Panel (PP1)	469	50 Feet (16 m)	RG223/U Coax
RF BroadBand Cabinet (MR6) to Penetration Panel (PP1)	468	50 Feet (16 M)	Heliac coax
PDU (PD1) to BroadBand RF Cabinet (MR6)	036	45 Feet (14 M)	5-#8 Power Cable

1-5 REQUIRED TOOLS, SUPPLIES, AND TEST EQUIPMENT

Standard hand tools and non-magnetic tools are used for the hardware installation.

Other service software, tools, and phantoms used during set-up and calibration or system performance testing are listed in the applicable service manuals.

Phantom Kit includes two (2) empty bottles, **Phosphorus solutions must be procured locally.** MSDS #8360515.

1-6 INSTALLATION SCHEDULE CONSIDERATIONS

Manpower needed for heavy lifting during the hardware installation phase includes two persons for moving BroadBand RF Cabinet and removing/installing modules.

System power off during the hardware installation phase can be as short as one long day if two installers are used efficiently. System non-availability during set-up, calibration, and function checks is about 12 total hours.

Performing FMIs, periodic maintenance, installation of prerequisite upgrades etc. will directly add to the man-hour and system down-time total. Be sure that all planned activity is considered when predicting return of system to customer. Also be sure that the GE Application Specialist is available at end of the installation to instruct users on Spectroscopy.

1-7 SHIPPING DOCUMENT, PACKING LISTS, AND PRODUCT DELIVERY INSTRUCTIONS

“Shipping Documents” lists catalog numbers delivered to the site. Review these to confirm that ordered configuration is delivered complete. Packing Lists and “Product Delivery Instructions” (PDI) specify box contents, part numbers, and shipping procedure. The PDI is numbered by catalog number. For example, PDI-M1040FF is for SIGNA Advantage and SIGNA Advantage 1.5T Spectroscopy.

Refer to the delivered PDI to verify box contents and identify shortages that are known at time of shipment and may be shipped later. Refer to Table 1-1 for a summary of box contents as detailed in PDI-M1040FF (packed in Box 1) or PDI-M1040FK (packed in Box 1) for information specific to your shipment.

Note

The packing box numbers and contents are subject to change without notice. Always refer to copy of PDI delivered with shipment.

TABLE 1-8
PDI SUMMARY FOR M1040FF/M1040FK SHIPPING BOXES

BOX #	CONTENTS
1	Service Manuals, System Cabinet Kit, Magnet Enclosure Kit, Penetration Panel Kit, Cable Kit, RF Power Monitor Kit, 5.X RF Upgrade Kit (M1040FF) or Service Manuals, System Cabinet Kit, Magnet Enclosure Kit, Penetration Panel Kit, Cable Kit, RF Cabinet Kit (M1040FK)
2	BroadBand RF Cabinet. (Please NOTE that the Multi-Nuclear RF Amplifier and associated power line-cord are a FRU)
3	PDU Kit.
4	Service Coil and Phantom Kit.

1-8 ICD, SHIPPING, AND INSTALLATION PRODUCT LOCATOR CARDS

The Product Locator System tracks creation, shipment and field location of serialized major models. A set of 3 Product Locator Cards (PLC) are used; the “ICD” (Inspection Control Document) card is completed after the serial number nameplate is attached, the “Shipping Card” is completed when shipped, and the “Installation Card” is attached for shipment according to the PDI.

Kit added rating plates are furnished with the various cabinet modification kits. They signify that the Signa model numbers on the cabinet have changed function and compatibility. These rating plates do not have ICD cards since serial numbers are not assigned.

1-9 BROADBAND RF CABINET RATING PLATE LOCATION

Serial number rating plate location for cabinet shipped with the M1040FF/M1040FK Signa Advantage option is listed in Table 1-9.

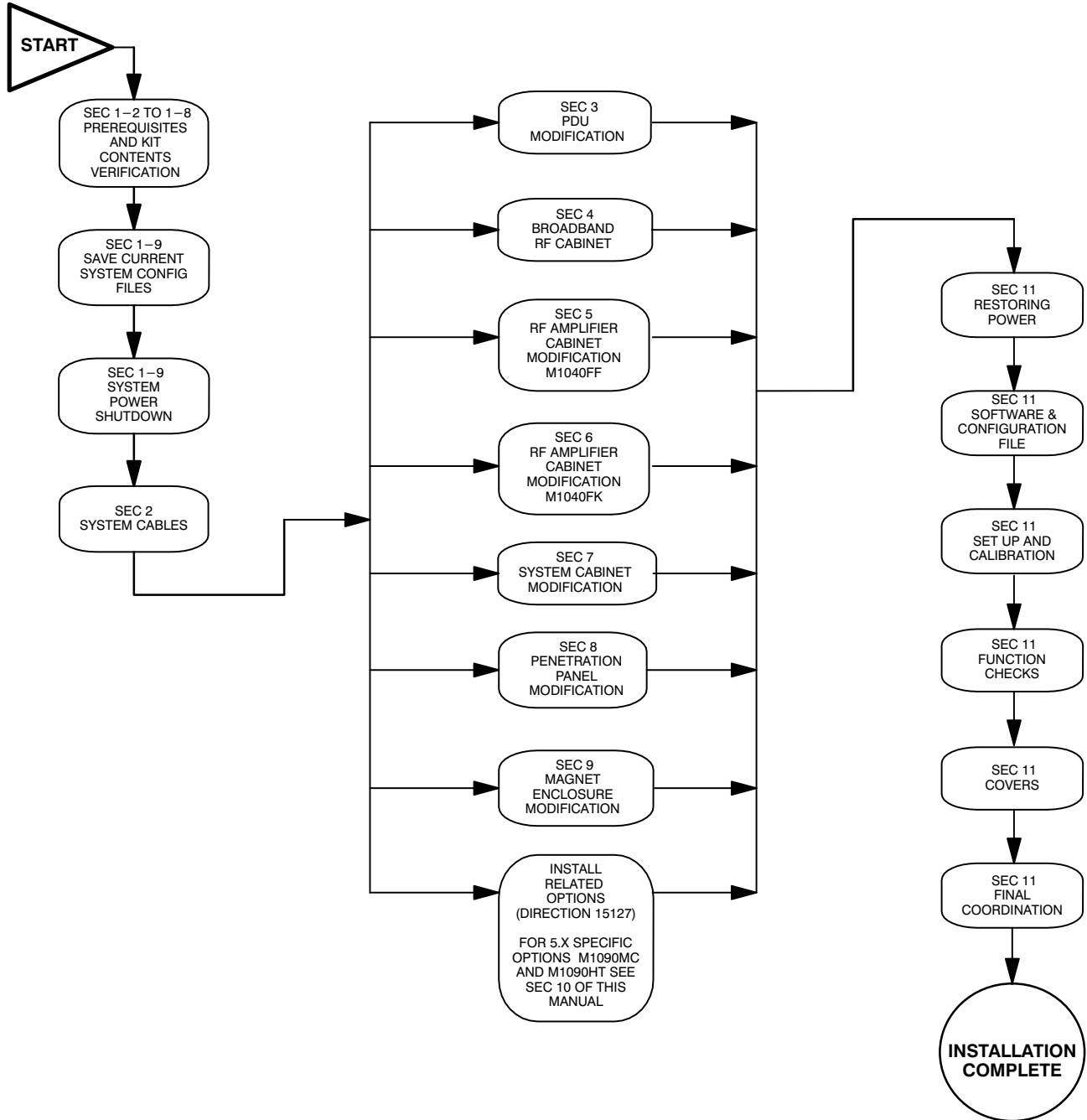
Verify that serial and model numbers on rating plate match the Installation Card before removing card.

TABLE 1-9
RATING PLATES FOR SERIALIZED MODEL NUMBERS SHIPPED WITH CATALOG M1040FF/M1040FK

SERIALIZED UNIT	MODEL NUMBER	RATING PLATE LOCATION
BroadBand RF Cabinet	46-301697G1 or 46-301697G2	Upper corner of frame at rear of BroadBand RF Cabinet

1-10 INSTALLATION FLOW CHART

The flow chart in Illustration 1-5 shows sequence for an orderly and efficient installation of the Spectroscopy Subsystem. Note that many procedures are performed in parallel. All sections referred to in this chart are contained in this Direction.



INSTALLATION FLOW CHART
ILLUSTRATION 1-5

1-11 CONVENTIONS


The following conventions are used in this Direction:

- Front, rear, left, and right are defined as follows: the patient entrance end of the magnet is the front; the opposite end is the rear; left and right are in respect to a person's left and right while facing the patient entrance end of the magnet.
- Fastening hardware (ie. screws, bolts, and nuts) is dimensioned in inches unless otherwise specified.

1-12 SYSTEM POWER SHUTDOWN



FATAL ELECTRIC SHOCK HAZARD!! LETHAL VOLTAGES ARE PRESENT WITHIN THE PDU EVEN IF ALL PDU BREAKERS ARE OFF. TO PREVENT POSSIBLE FATAL ELECTRIC SHOCK, DISCONNECT POWER TO THE PDU BY PERFORMING THE FOLLOWING PROCEDURE.

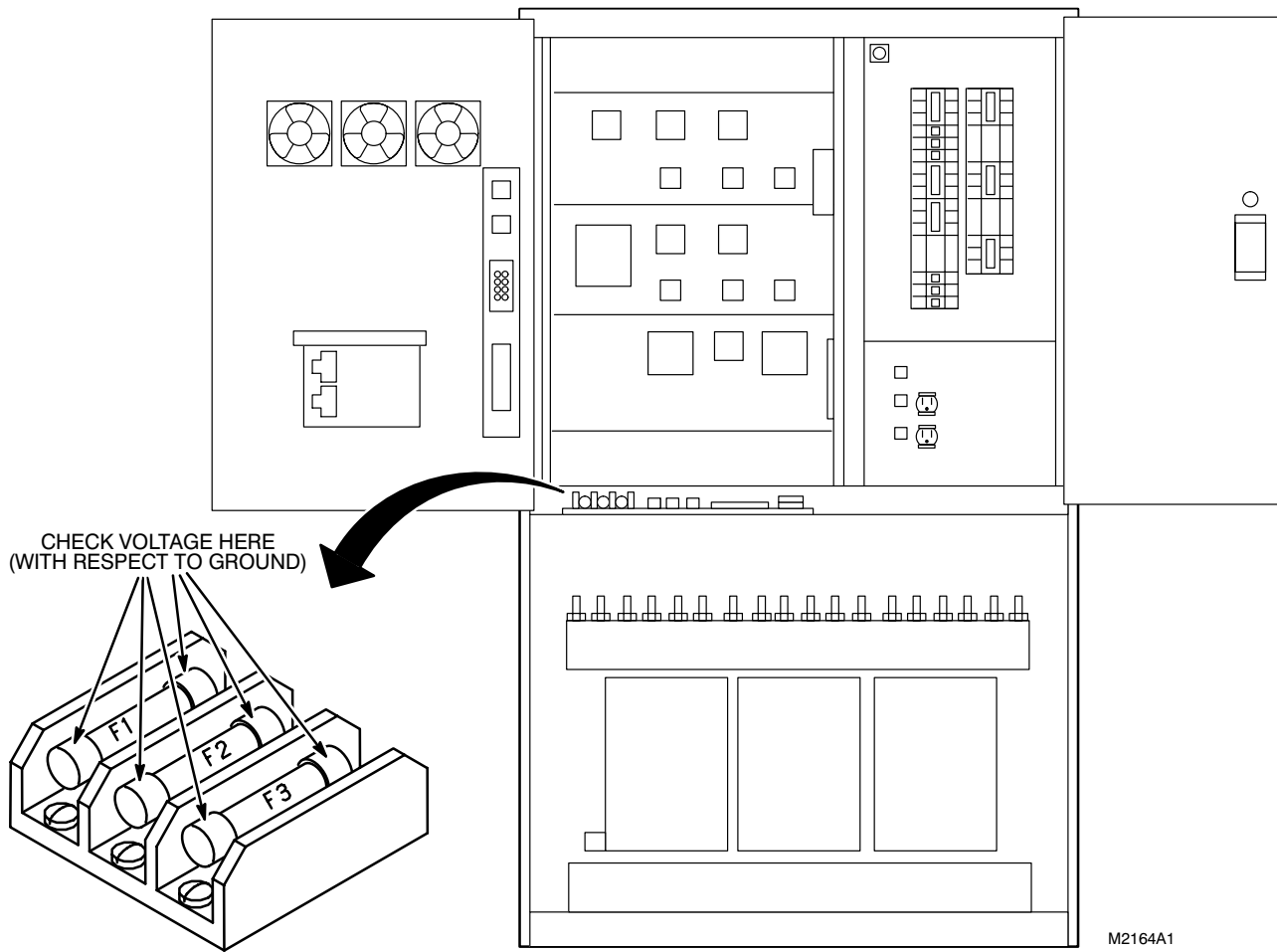
1. If adding this option to an existing 5.X system, remember to save configuration files before powering down the system. Place tape in drive and type **saveINFO**  at the command prompt. Refer to *Direction 15401, Signa Advantage 1.5T, 1.0T, & 0.5T Subsystems*, Computer tab (look for saveINFO command) for details.
2. Notify users, field service and installation personnel that are working on the system that power to the system is to be shut down and locked out.
3. Refer to *Direction 15301, Signa Advantage Subsystems*, Computer: Functional Checks Tab, and perform Section 5-3 or Section 6-3, POWER DOWN PROCEDURE, or *Direction 15401, Signa Advantage 1.5T, 1.0T, & 0.5T Subsystems*, Computer: Set Up & Calibration tab, and perform Section 5, BRINGING THE SYSTEM DOWN to shut down the computer before removing power.
4. For standard PDU, press the FULL OFF button on front control panel of PDU.
For compact PDU, open front panel of PDU, find and press the POWER OFF button inside PDU.
5. Locate and shut off main disconnect supplying power to the PDU.
6. Perform lock out of main disconnect. Tag main disconnect to prevent inadvertent power restoration.

Note

Lock out and tag procedures for GE Service personnel are detailed in *Direction 15300, Signa Advantage System*, Introduction tab, Section 6 SAFETY and *Direction 15400, Signa Advantage 1.5T, 1.0T, & 0.5T System*, Introduction tab, Section 7, SAFETY.

1-12 SYSTEM POWER SHUTDOWN (Continued)

7. Verify power is off in each type of PDU. If not, find source of power and disconnect. Below are suggestions, but not the only possibilities to check that power is removed from either type of PDU.
 - FOR COMPACT PDU
 - Check lights on panel next to POWER OFF button. If these lights are not lit, and they were previously, power has been removed.
 - FOR STANDARD PDU
 - Remove screws from left front door.
 - Swing open left front door.
 - Check for 0 volts, with respect to ground, on both ends of each fuse located inside standard PDU. Refer to Illustration 1-6 for 3.X/4.X PD1. If 120 VAC power is present, find source and disconnect.



POWER OFF VERIFICATION
ILLUSTRATION 1-6

SECTION 2 – MULTI-NUCLEAR SPECTROSCOPY SUBSYSTEM CABLES

Note

This section applies to M1040FF and M1040FK.

2-1 UNPACKING CABLE KIT

The 14 new Multi-Nuclear Spectroscopy Subsystem Cables are shipped in Box 1.

TABLE 2-1
SPECTROSCOPY SUBSYSTEM CABLES

RUN	"FROM"	"TO"	DESCRIPTION	REMARKS
036	MR6-A3-J1	PD1-A2	Power Cable, 45 foot cable	
459	MR1-A7-J6	MR6-A3-J2	9 Conductor, 30 foot Cable	
460	MR1-A7-J14	MR6-A3-J4	RG223 Coax, 30 foot Cable	
461	MR1-A7-J3	MR6-A3-J5	RG223 Coax, 30 foot Cable	
462	MR1-A7-J11	MR6-A3-J7	9 Conductor, 30 foot Cable	
463 or 738	MR1-A7-J9 MR1-A7-J24	MR6-A3-J9	37 Conductor, 30 foot Cable	Use as run 463 for 4.X installation Use as run 738 for 5.X installation
464	MR1-A7-J16	MR6-A3-J10	RG223 Coax, 30 foot Cable	
465	MR1-A7-J15	MR6-A3-J11	RG223 Coax, 30 foot Cable	
466	MR2-A11-J1	MR6-A3-J3	RG223 Coax, 50 foot Cable	
467 or 737	MR3-A9-J5 MR1-A7-J23	MR6-A3-J8	37 Conductor, 50 foot Cable	Use as run 467 for 4.X installation Use as run 737 for 5.X installation
468	PP1-J83	MR6-A3-J15	Heliac Coax, 50 foot Cable	
469	PP1-A13-OUT	MR2-A11-J3	RG223 Coax, 50 foot Cable	
472	MG3-A17-J4	PP1-J79	RG223 Coax, 80 foot Cable	
473	MG3-A17-J3	PP1-J83	Heliac Coax, 80 foot Cable	

2-2 CABLE REMOVAL

If MN Spectroscopy Option is being added to a previously installed system, remove the cables listed in Table 2-2.

TABLE 2-2
INTERCONNECTING CABLES THAT ARE NOT USED

RUN	“FROM”	“TO”	DESCRIPTION	THE IF, WHEN, AND WHY FOR REMOVAL
229	MR2 A11 J1	MR1-A7-J3	RG223/U Coax Cable	Exciter RF Output to be routed via new cables to BroadBand RF Cabinet
The following cable is to be removed from 4.X systems. 5.X systems do <u>not</u> have this cable.				
426	MR3 A9 J5	MR1 A7 J9	37 conductor Sub-D	Bicycle link to be routed via new cables to BroadBand RF Cabinet

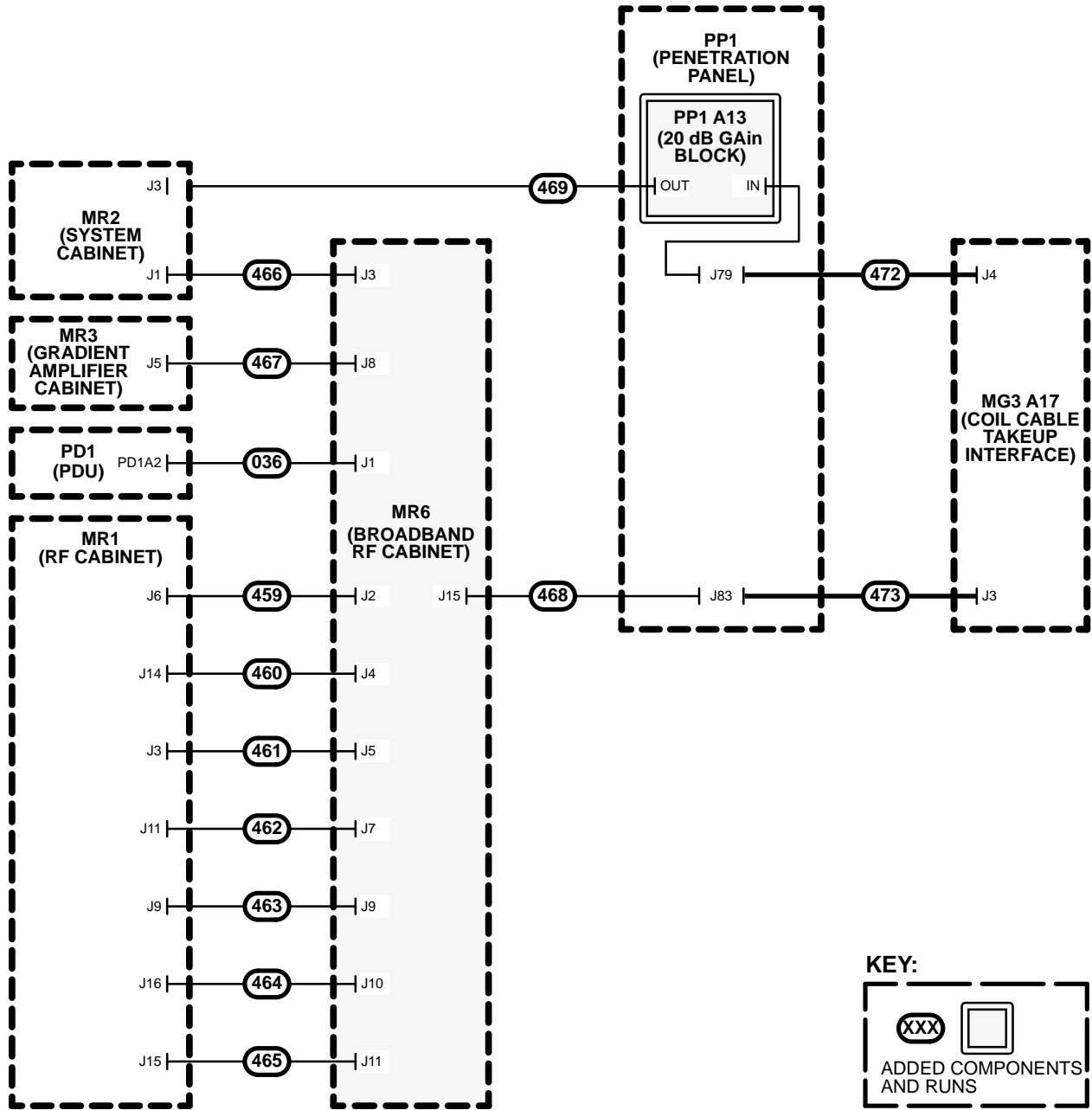
2-3 ROUTE NEW CABLES

TABLE 2-3
ROUTING NEW CABLES

RUN(S)	FROM	TO	LENGTH	TYPE
MAGNET ROOM CABLES				
472	Magnet Enclosure	Penetration Panel	80 Feet (26 m)	RG223 Coax, BNC
473	Magnet Enclosure	Penetration Panel	80 Feet (26 m)	Helix Coax, SC
EQUIPMENT ROOM CABLES				
036	PDU	BroadBand RF Cabinet	45 Feet (14 m)	5-#8 Power Cable
459, 462	RF Cabinet	BroadBand RF Cabinet	30 Feet (10 m)	9 conductor, D
463 (4.X) / 738 (5.X)	RF Cabinet	BroadBand RF Cabinet	30 Feet (10 m)	37 conductor, D
460, 461, 464, 465	RF Cabinet	BroadBand RF Cabinet	30 Feet (10 m)	RG223 Coax, BNC
466	System Cabinet	BroadBand RF Cabinet	50 Feet (16 m)	RG223 Coax, BNC
467 (4.X) or 737 (5.X)	Gradient Cabinet RF Cabinet	BroadBand RF Cabinet	50 Feet (16 m)	37 conductor, D
468	Penetration Panel	BroadBand RF Cabinet	50 Feet (16 m)	Helix Coax, SC & N
469	System Cabinet	Penetration Panel	50 Feet (16 m)	RG223 Coax, BNC

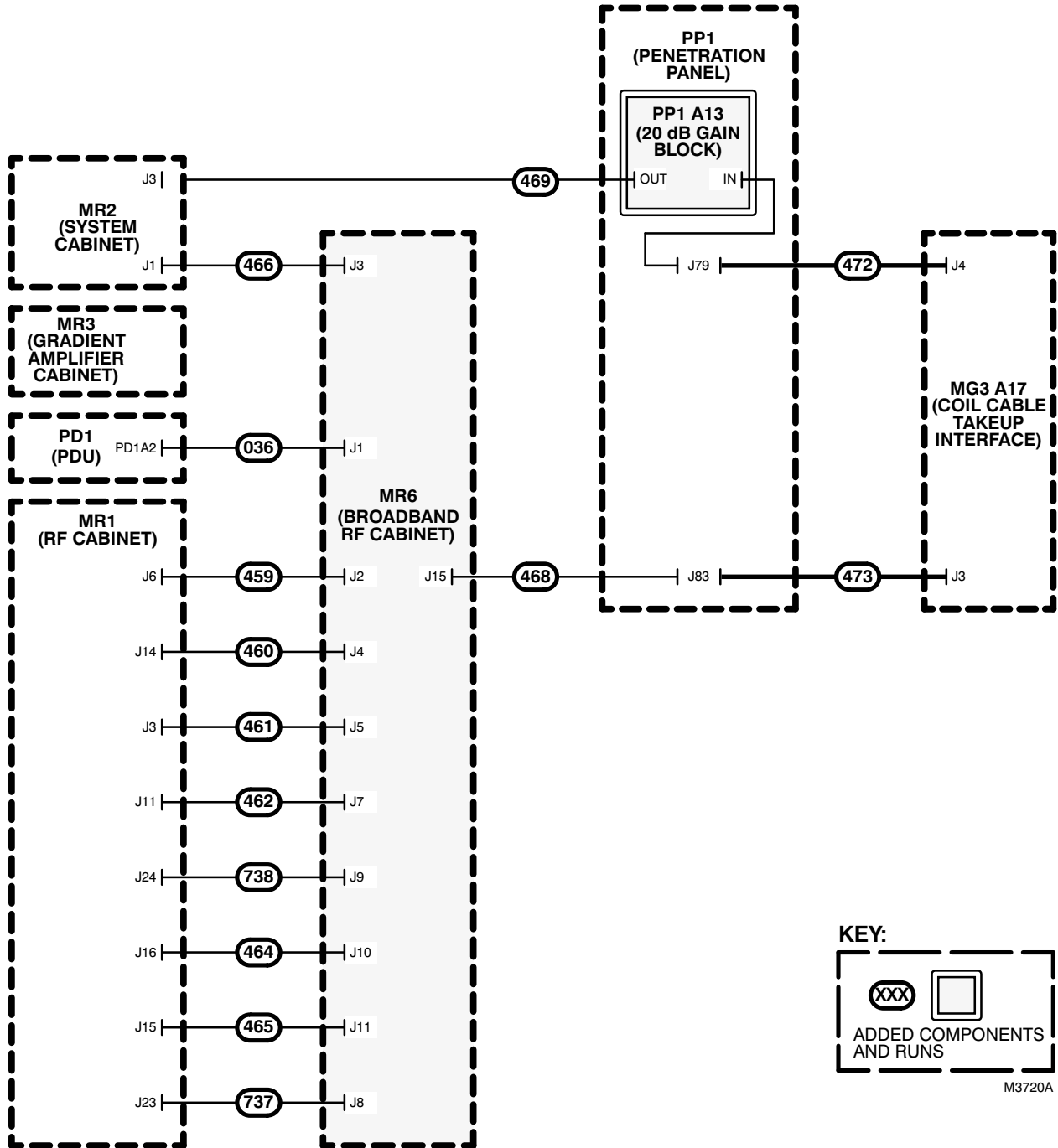
- Route cables listed in Table 2-3. See Illustration 2-1 (4.X) or Illustration 2-2 (5.X).
- Remove twists and kinks from cabling.
- Allow:
 - three feet (one meter) of slack at entrance to Cabinets
 - six feet (two meters) of slack at the Penetration Panel
 - nine feet (three meters) of slack at the PDU
 - sufficient slack to connect to Coil Cable Takeup Interface (MG3 A17)

2-3 ROUTE NEW CABLES (Continued)



NEW CABLE KIT ROUTE MAP (4.X)
ILLUSTRATION 2-1

2-3 ROUTE NEW CABLES (Continued)



NEW CABLE KIT ROUTE MAP (5.X)

ILLUSTRATION 2-2

2-4 4.X Only – Connect Gradient Amp Cabinet Cable

TABLE 2-4
GRADIENT AMP CABINET CABLE CONNECTION

CONNECTOR	TYPE OF CONNECTOR	RUN	REMARKS
MR3 A5 J9	37-Pin Subminiature-D	467	Bicycle link from BroadBand RF Cabinet

5.X systems do not require the above step since new fiber optic links are used. Multi-Nuclear Spectroscopy does not use fiber optics for cabling. Therefore, a new routing was established for Multi-Nuclear Spectroscopy. This new routing will be discussed later in Section 5-8, 5.X ONLY – SPECTRO RF CABINET UPGRADE KIT.

SECTION 3 – POWER DISTRIBUTION UNIT (PDU) KIT STANDARD AND COMPACT

3-1 PDU KIT (M1040FF AND M1040FK)

For M1040FF Only: To provide power for BroadBand RF Cabinet (MR6) from a standard PDU, you will install a conductor and circuit breaker in Feeder 5. If optional Independent Console (IC1) is installed in Signa Advantage Upgrade sites, Feeder 5 can not be used and IC1 is to be powered from facility power with an optional isolation transformer.

Note

For M1040FF Only: If Feeder 5 was previously installed for Independent Console, the coil of K11 has to be rewired to enable “Emergency Off” to shut down power to RF BroadBand Cabinet (MR6). Jumper wires that were installed between coil of K11 and coil of K3 are removed and existing PDU wire harness is connected to K11 coil as instructed in this section. Also the “Independent Console” label is covered by the “RF BroadBand Amp” label furnished with this kit.

For M1040FF and M1040FK: To provide power for BroadBand RF Cabinet (MR6) from a compact PDU, you will install a circuit breaker.

PDU upgrade procedures, tables, and illustrations refer to Item numbers listed in Table 3-1 or Table 3-2.

1. Remove contactor and zip-lock bag marked “PDU KIT BAG” from Box 3. Verify that contents are complete. Refer to PDI delivered with upgrade to locate missing items and verify shortages.
2. If the flow chart (Illustration 1-5) is being followed, power should be shut off to the PDU. Verify that PDU disconnect, lock out, and tag status exists before continuing. Lock out and tag procedures for GE Service personnel are detailed in *Direction 15300, Signa Advantage System*, Introduction tab, Section 6, SAFETY and *Direction 15400, Signa Advantage 1.5T, 1.0T, & 0.5T System*, Introduction tab, Section 7, SAFETY.

TABLE 3-1
PDU KIT (M1040FF) Box 3

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	46-221898P1	Contactor, 120VAC, 60Hz, 90A, Size 3, GE CR305E002	1
2	46-221905P33	Circuit Breaker, 30 Amp, 3 Pole	1
3	46-301192P8	Circuit Breaker Panel Label, “RF Broadband Amp”	1
4	46-251182P240	Rating Plate, “46-301826G1 kit added”	1
5	46-265520G1	AC Coil Filter, RC Network	1
6	46-208758P2	Strap, 1/16 in. to 1-1/4 in. Diameter Wire bundle, Ty-wrap TY24M	1
7	46-208747P2	Cable Tie Mount, Adhesive Backed	1
9	511A590P27	Terminal, #8 Ring, Insulated, Red	2
10	46-220181P6	Lock Washer, 1/4 in. Screw Size	3
11	46-1000904P171	Flat Washer, 1/4 in. Screw size, 1/2 in. Diameter	3
12	46-220203P30	Screw 1/4-20 X 1/2, Round Head Phillips	3
13	46-320337P1	Circuit Bkr (for Compact PDU Installation)	1

TABLE 3-2
PDU KIT (M1040FK) Box 3

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
4	46-251182P615	Rating Plate, “46-301826G2 kit added”	1
13	46-320337P1	Circuit Bkr (for Compact PDU Installation)	1

3-2 STANDARD PDU CONTACTOR INSTALLATION

Note

This section applies to M1040FF only.

Contactors K11 for PDU Feeder 5 was not previously used and has been omitted from later Model PDUs. Refer to Illustration 3-1 for contactor K11 location. Feeder 5 is now used for BroadBand RF Cabinet power cable Run 036.

1. **If a Contactor exists in K11 position and “INDEPENDENT CONSOLE ” label is not present at CB7:**
Proceed to Section 3-3, CIRCUIT BREAKER INSTALLATION.

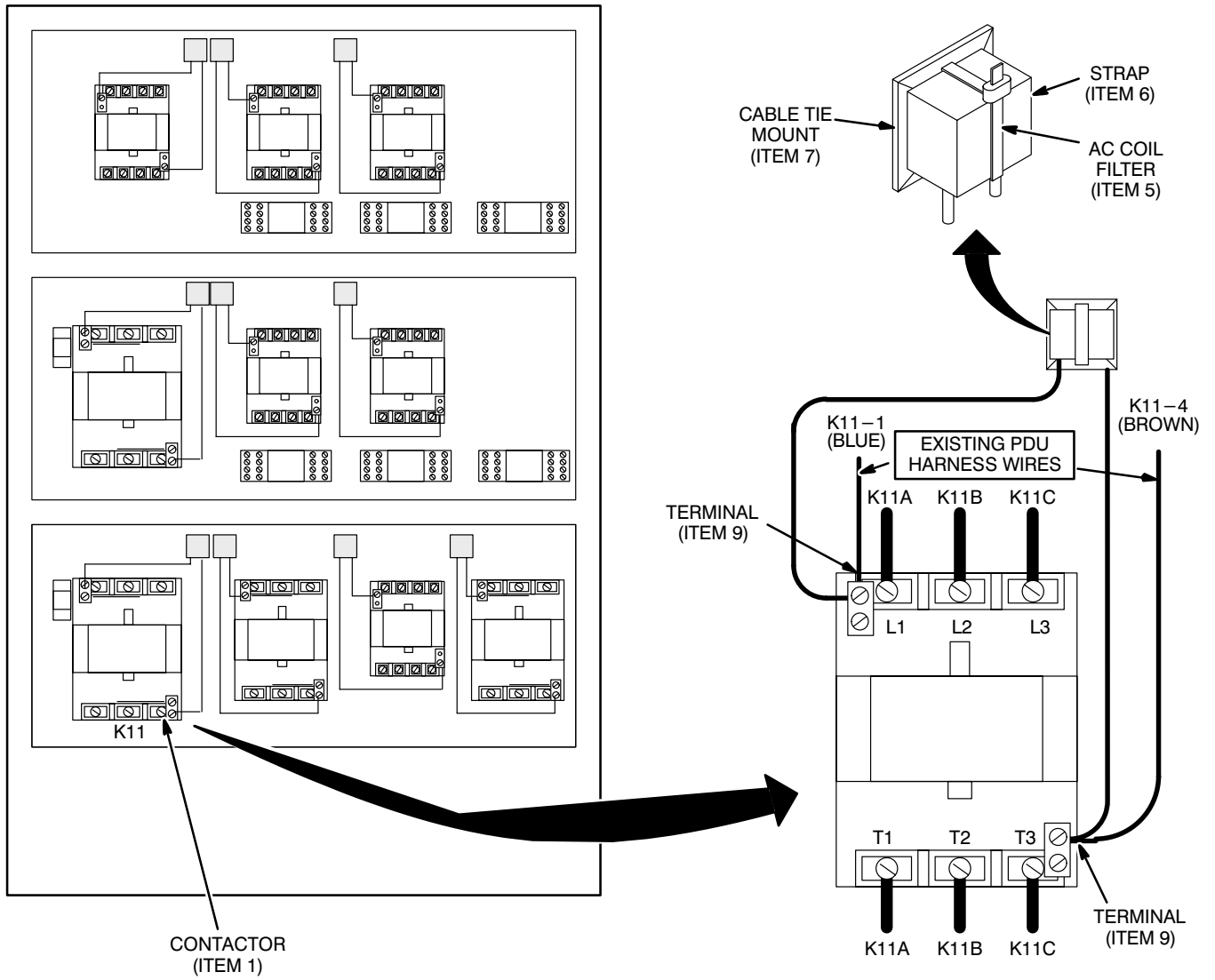
If a Contactor exists in K11 position and “INDEPENDENT CONSOLE ” label is present at CB7:

Remove jumper wires between coil of K11 and coil of K3. Proceed to Section 3-3, CIRCUIT BREAKER INSTALLATION.

If no contactor is in K11 position, proceed as follows:

- a. Remove insulating boots from ends of six black #4 wires near K11 marked K11A, K11B, and K11C.
Aside: These plastic boots are tough and difficult to remove. If sufficient wire slack is present, the end of the wires may be cut off with the boot. Take care to avoid removing the wire end connection marking.
- b. Remove approximately 1/2 inch of insulation from black leads.
- c. Locate loose ends of brown and blue #22 wires marked K11-1 and K11-4.
Aside: It has been reported that these wires may be hard to locate as they are tucked away at a location that is somewhat distant from Contactor K11.
- d. Remove insulating boots from the ends of brown and blue #22 wires located in step c.
Aside: These plastic boots are tough and are difficult to remove without damaging the ring terminal. If sufficient wire slack is present, the end of the wires may be cut off with the boot. Take care to avoid removing connection marking at the wire end. Use new terminals (item 9) on the ends of these wires.
- e. Install new contactor (item 1). Use furnished 1/4-20 screws (item 12) with 1/4" flat washers (item 11) and 1/4" lockwashers (item 10) onto contactor panel assembly. Tighten screws.
- f. Install adhesive backed cable tie mount (item 7) to contactor panel assembly.
- g. Slide strap (item 6) through cable tie mount and secure AC coil filter (item 5) as shown in Illustration 3-1. Cut off excess strap.
- h. Connect #4 black wires to contactor K11 as indicated in Illustration 3-1.
- i. Connect brown and blue wires coil wires to K11 contactor as shown in Illustration 3-1.
- j. Connect AC coil filter wires to K11 contactor as shown in Illustration 3-1.

3-2 STANDARD PDU CONTACTOR INSTALLATION (Continued)



M2170A1

K11 CONTACTOR INTERCONNECTION
ILLUSTRATION 3-1

3-3 STANDARD PDU CIRCUIT BREAKER INSTALLATION

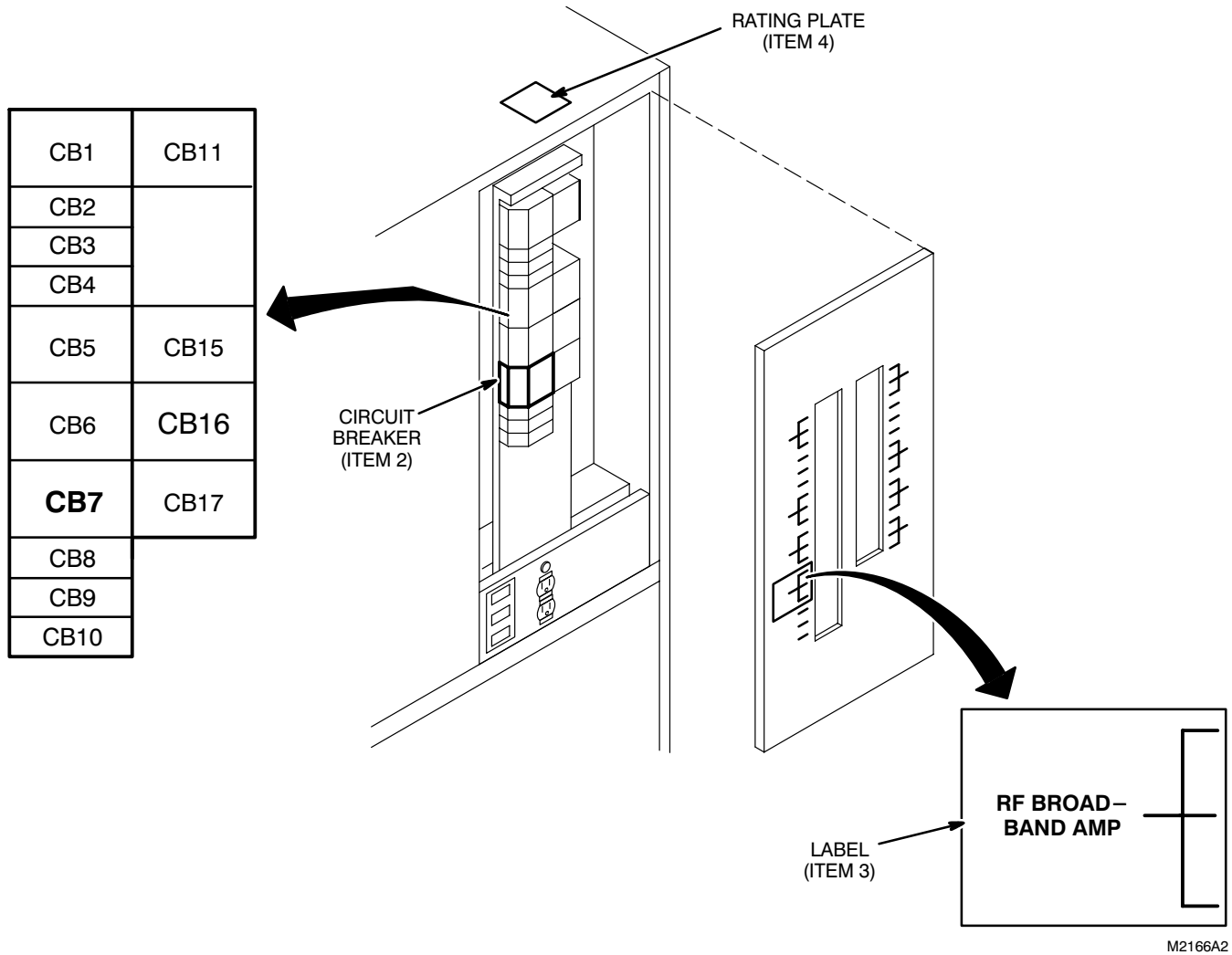
Note

This section applies to M1040FF only.

BroadBand RF Cabinet requires a 30 Amp Circuit Breaker for power cable Run 036. Some early models includes a 60 Amp Circuit Breaker in the feeder used for BroadBand. You may have to remove the 60 Amp Circuit Breaker and replace it with the 30 Amp Breaker. See Illustration 3-2 for Standard PDU CB7 location.

1. Remove two screws, with flat and lockwashers, from top of circuit breaker cover.
2. Remove circuit breaker cover from circuit breaker panel.
3. **If a 30 Amp Circuit Breaker exists in CB7 position:**
Proceed to Step 6.
If a 60 Amp Circuit Breaker exists in CB7 position:
 - a. Remove existing circuit breaker from CB7 position of circuit breaker panel.
 - b. Check wire markings, mark if required, and disconnect wires.**If a blank plate covers CB7 position:**
 - a. Remove four screws and plate from CB7 position on circuit breaker cover.
 - b. Remove insulating boots from wires on harness near CB7.
 - c. Remove approximately 3/16 inch of insulation from ends of each lead.
4. Connect harness wires to new 30 amp, 3-phase circuit breaker (item 2) as marked.
5. Install replacement circuit breaker (item 2) into CB7 position of circuit breaker panel.
6. Install two screws with lockwashers and flat washers into circuit breaker cover and fasten to circuit breaker panel. Tighten screws.
7. Install "RF BROADBAND AMP" label (item 3) adjacent to CB7 circuit breaker. Refer to Illustration 3-2. If "INDEPENDENT CONSOLE" label is present at this location be sure it is covered by new label.

3-3 STANDARD PDU CIRCUIT BREAKER INSTALLATION (Continued)



POSITION OF CIRCUIT BREAKER CB7
ILLUSTRATION 3-2

3-4 STANDARD PDU POWER CABLE INSTALLATION

Note

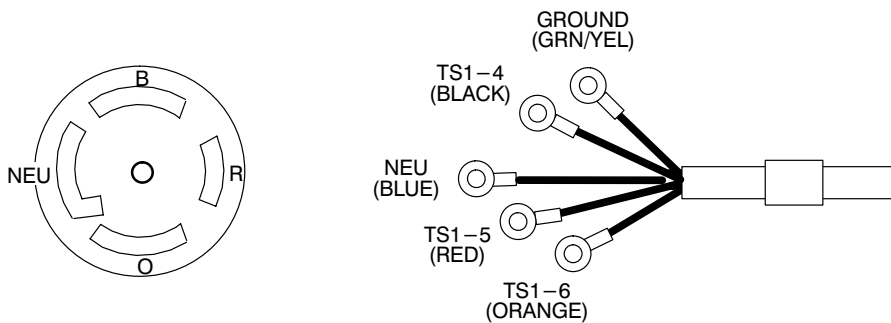
This section applies to M1040FF only.

1. Swing left panel open.
2. Remove three pan head screws from lower panel of PDU.



DO NOT PULL LOWER PANEL TOO FAR FROM CABINET. DAMAGE TO INTERNAL CABLES MAY RESULT IF PULLED TOO HARD.

3. Lift lower panel up and then away from PDU cabinet.
4. Route end of Run 036 cable (furnished with cabling kit) through a cable opening on either side of PDU into cabinet and upward to location of TS1-4, 5, and 6.
5. Connect wire terminals as marked:
 - a. Black to TS1-4.
 - b. Red to TS1-5.
 - c. Orange to TS1-6.
6. Connect terminal of Green/Yellow wire to ground bus bar.
7. Connect terminal of Blue wire to neutral bus bar.
8. Secure cable to clamp blocks provided near cable entrances on either side of PDU.
9. Check cable at plug for continuity to PDU. Verify that there are no opens, shorts, or cross connections. Refer to Illustration 3-3.
10. Install lower panel onto PDU.
11. Install three pan head screws to secure lower panel onto PDU. Tighten screws.
12. Install rating plate next to other rating plates located on top of cabinet. See Illustration 3-2.



M3569A

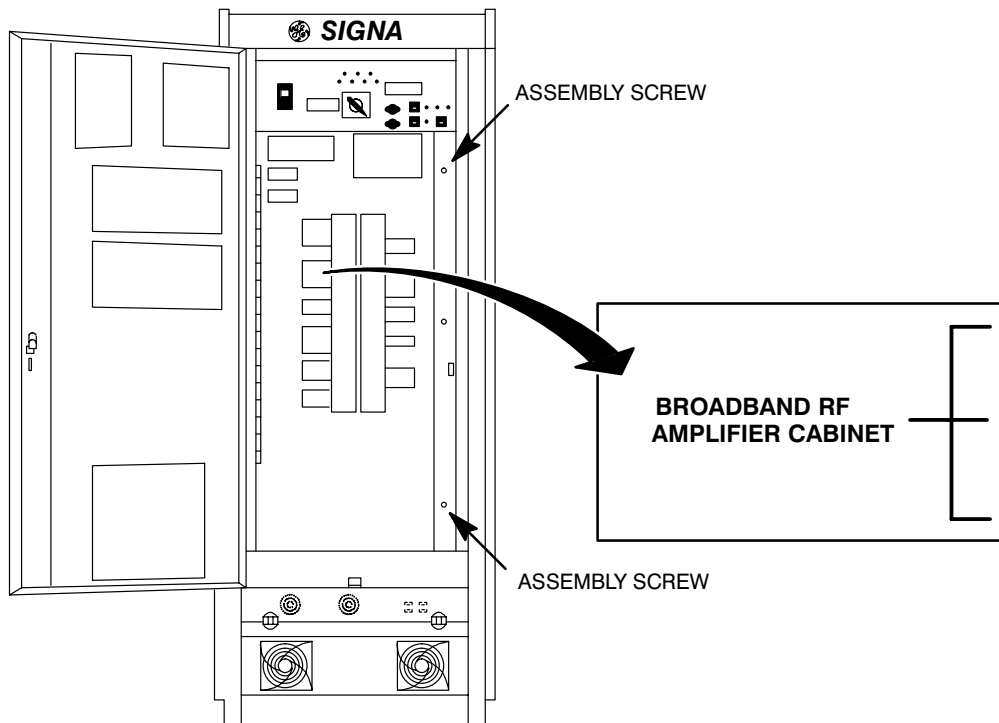
CONTINUITY CHECK POINTS OF CONNECTOR ON RUN 036 – STANDARD
ILLUSTRATION 3-3

3-5 COMPACT PDU CIRCUIT BREAKER INSTALLATION

Note

This section applies to M1040FF and M1040FK.

BroadBand RF Cabinet requires a 30 Amp Circuit Breaker for power cable Run 036. This Circuit Breaker needs to be installed in the position labeled **BroadBand RF Amplifier Cabinet** as shown in Illustration 3-4.



POSITION OF RF BROADBAND CIRCUIT BREAKER IN COMPACT PDU
ILLUSTRATION 3-4



FATAL ELECTRIC SHOCK HAZARD!! TO PREVENT FATAL ELECTRIC SHOCK, DISCONNECT POWER FROM COMPACT PDU AND LOCK OFF BEFORE YOU PERFORM THE FOLLOWING PROCEDURE.

1. Turn facility circuit breaker OFF, lock and tag (this should already be done if following the installation flowchart). Refer to *Direction 15400, Signa Advantage 1.5T & 0.5T System*, Introduction tab, Section 7, SAFETY.
2. Open outer door of Compact PDU.
3. Loosen load panel door with a 90° turn of two assembly screws on right. See Illustration 3-4.
4. Remove ten Phillips screws on cover. Push toward center of panel and pop top cover with screw driver. Remove cover.

3-5 COMPACT PDU CIRCUIT BREAKER INSTALLATION (Continued)

5. Remove chassis plugs for BroadBand RF Power Amp.
6. Connect harness wires (4, 5, and 6) to new 30 amp, 3-phase circuit breaker (46-320337P1).
7. Install circuit breaker position of circuit breaker panel shown in Illustration 3-4.
8. Install circuit breaker cover and fasten to circuit breaker panel. Tighten screws.
9. Install "RF BROADBAND AMP" label (item 3) if needed.
10. Leave breaker door open and locked in place with articulated arm.

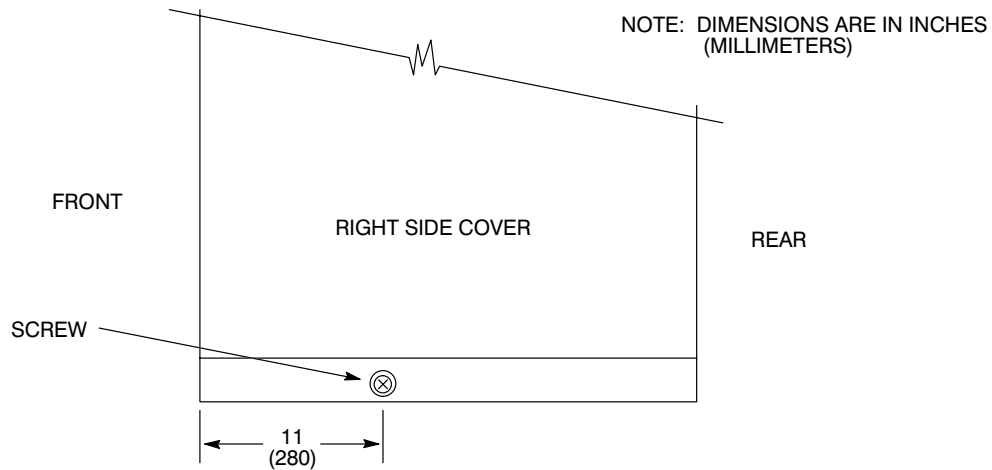
3-6 COMPACT PDU POWER CABLE INSTALLATION

Note

This section applies to M1040FF and M1040FK.

The power cable needs to be installed as follows:

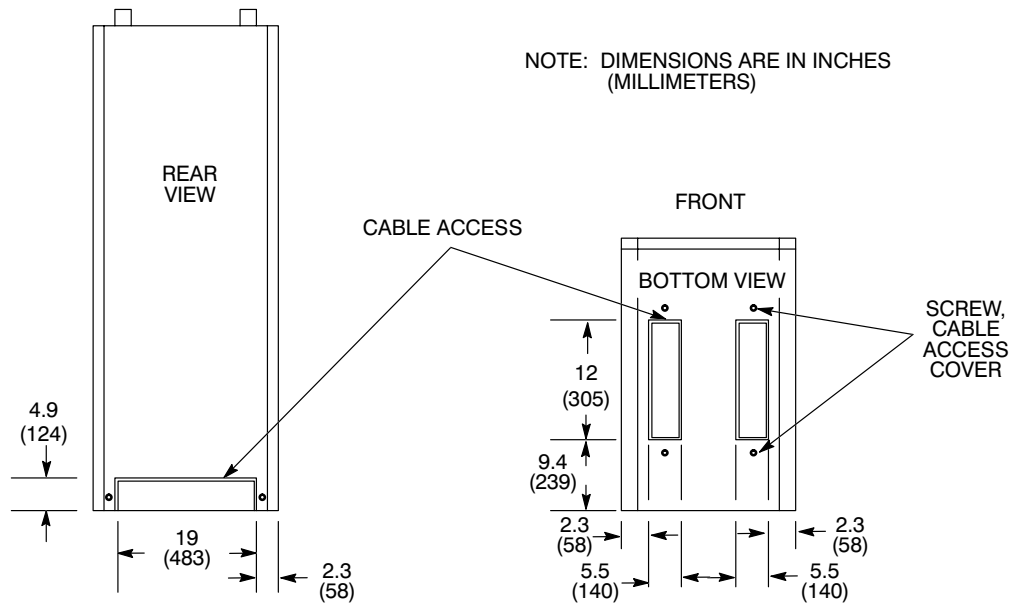
1. Remove a side or back panel as follows:
 - a. For side panel, remove screw under lower lip. See Illustration 3-5. Grasp both sides of panel and lift up firmly to remove.
 - b. For rear panel, remove three screws on each side of panel. Support panel while removing seventh screw, located top center.



REMOVE SIDE PANEL
ILLUSTRATION 3-5

3-6 COMPACT PDU POWER CABLE INSTALLATION (Continued)

- 2. Remove a cable access cover. See Illustration 3-6 for cable access location.
 - a. Cable access from bottom: Loosen screw on each end of cable access cover. Slide cable access cover to right, then swing up.
 - b. Cable access from back: Remove screw on each side of cable access cover. Slide cable access cover down so it clears back cover, and remove.

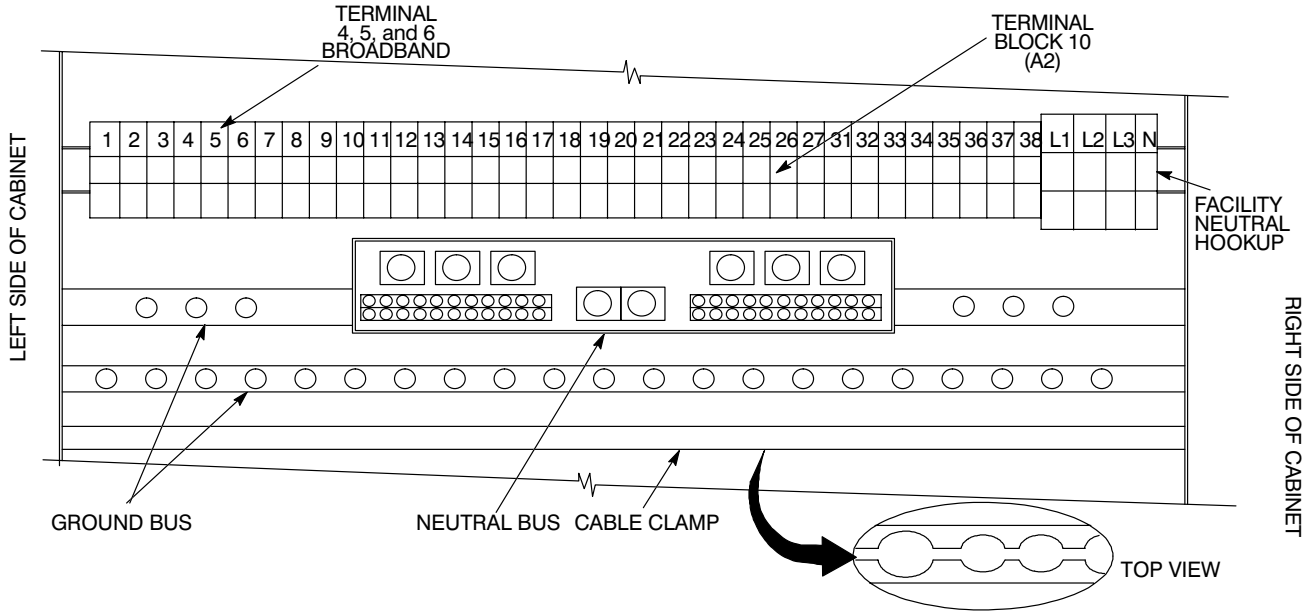


CABLE ACCESS
ILLUSTRATION 3-6

3-6 COMPACT PDU POWER CABLE INSTALLATION (Continued)

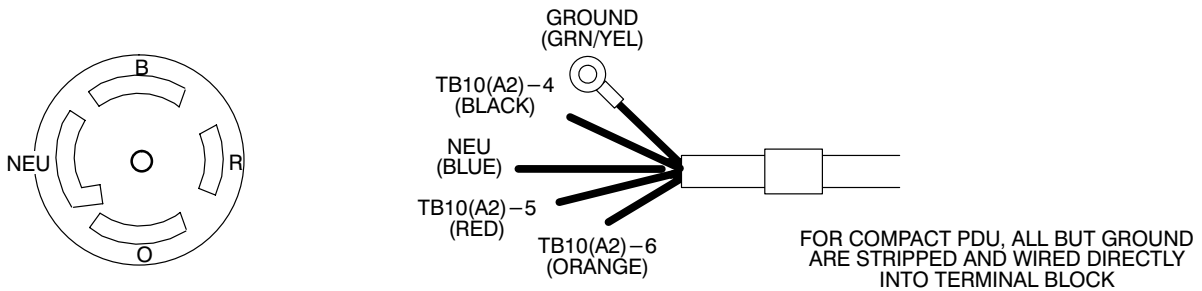
Note

Illustration 3-7 is shown as looking through the cabinet from the front. The left side of the illustration is the left side of the cabinet. The right side of the illustration is the right side of the cabinet. For ease of installation and if rear of cabinet is accessible, go to the back of the cabinet, open the back cover and install cables from the rear of the cabinet.



TB 10 (A2) AND BUS BARS (AS SHOWN FROM FRONT OF CABINET)
ILLUSTRATION 3-7

3. Turn all load panel circuit breakers OFF.
4. Loosen cable clamp. See Illustration 3-7. Routing output wire away from transformer, bring it into Compact PDU through rear or a bottom cable access. Thread output wire through cable clamp to TB 10 (A2).
5. Connect output cable in Illustration 3-8 to terminals of TB10 (A2) as indicated by Table 3-3. All but ground wire needs to be cut, stripped and wired directly into terminal block.
6. Connect each cable safety ground wire to ground bus, below TB10 (A2), and neutral wire to neutral bus. See Illustration 3-7.



CONTINUITY CHECK POINTS OF CONNECTOR ON RUN 036 - COMPACT
ILLUSTRATION 3-8

M3569A

3-6 COMPACT PDU POWER CABLE INSTALLATION (Continued)

TABLE 3-3
COMPACT PDU CONNECTION

FUNCTION	TB10 (A2) TERMINAL	CIRCUIT BREAKER	OUTPUT VOLTAGE	OUTPUT PHASES
BROADBAND RF AMPLIFIER CABINET	4	CB 7 WITH SHUNT	208	3
	5			
	6			



After all connections are made and verified correct, tighten each lug securely. This should be checked a second time, preferably by another person. Be sure all lugs are properly connected and securely tightened. High voltage does not forgive wiring errors or loose connections!

7. Release articulated arm. Close load panel door. Secure load panel door with a 90° turn of two assembly screws.

SECTION 4 – BROADBAND RF CABINET

Note

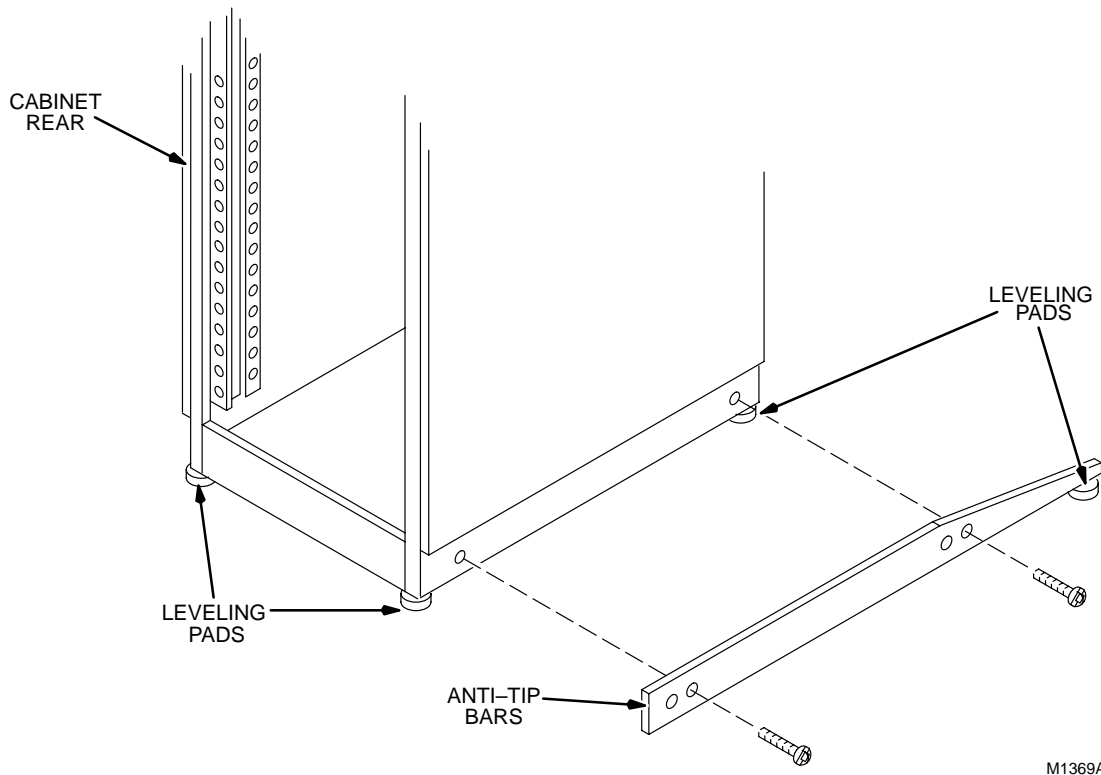
This section applies to M1040FF and M1040FK.

4-1 INSTALL BROADBAND RF CABINET (MR6)

1. Move BroadBand RF Cabinet (Box 2) to installation position.
2. Remove all shipping material from cabinet.
3. Position cabinet into final position so that previously routed cables can be connected.
4. Lower leveling pads of cabinet onto the floor.
5. If seismic anchoring is required by local codes, secure with anchoring hardware and proceed to Section 4-2, BROADBAND RF CABINET CABLE CONNECTION.
6. Open rear door and remove anti-tip bars from inside of cabinet.
7. Install screws and two anti-tip bars to cabinet. Refer to Illustration 4-1. Adjust leveling pads on anti-tip bars and cabinet to remove weight from casters and level cabinet.

Note

Cabinet must be vertical and stable when finished.



CABINET ANTI-TIP BAR ATTACHMENT
ILLUSTRATION 4-1

4-2 BROADBAND RF CABINET CABLE CONNECTION

1. Connect previously routed cables listed in Table 4-1.
2. If required, use the furnished right-angle N adapter for Run 468 at MR6 A3 J15. This 46-221865P3 connector is shipped in a plastic bag attached to inside of cabinet.

TABLE 4-1
CABLES CONNECTED TO NEW BROADBAND RF CABINET

CONNECTOR	TYPE OF CONNECTOR	RUN	REMARKS
MR6 A3 J1	Power cable plug	036	220V AC Power Input
MR6 A3 J2	9-Pin Subminiature-D	459	RF Lock
MR6 A3 J3	RG223 BNC Coax	466	RF IN from Exciter
MR6 A3 J4	RG223 BNC Coax	460	Spectro TR Bias In
MR6 A3 J5	RG223 BNC Coax	461	Proton RF IN from RF Input Board to (MR1) RF Cabinet
MR6 A3 J7	9-Pin Subminiature-D	462	BB Spectro Unblank
MR6 A3 J8	37-Pin Subminiature-D	467 (4.X) or 737 (5.X)	Bicycle link to Gradient Cabinet Link to RF Cabinet
MR6 A3 J9	37-Pin Subminiature-D	463 (4.X) or 738 (5.X)	Bicycle link to RF Cabinet Link to RF Cabinet
MR6 A3 J10	RG223 BNC Coax	464	RF Power Monitor Sense #1
MR6 A3 J11	RG223 BNC Coax	465	RF Power Monitor Sense #2
MR6 A3 J15	Male N - 1/2 in. Helix	468	BroadBand Helix (RF OUT + TR Bias)

SECTION 5 – RF CABINET KIT AND 5.X MN SPECTRO RF CABINET UPGRADE KIT

Note

This section applies to M1040FF.

5-1 RF CABINET KIT

The M1040FF RF Cabinet Kit cables (**bold** items in Table 5-1) are still applicable after the installation of FMI 60420—Spectro Power Monitor Upgrade (**Power Monitor I/F Board and Analog Sense Boards are replaced by Spectroscopy Analog Sense Boards in the MR1 A3 A3/4 slots, Sensor Driver Board is removed, Sensor Elements and Sensor Sleeve are replaced by a Spectroscopy Directional Coupler**).

The M1040FF installation originally required a new Power Monitor Chassis, these directions have been left in this section for reference but are no longer applicable after FMI 60420 has been completed.

The FMI 60420 installation instructions are located in this section.

Installation procedures and illustrations in this section refer to kit item numbers listed in Table 5-1. Refer to Illustration 5-3.

TABLE 5-1
RF CABINET KIT (M1040FF)

ITEM	PART NO	S/C #	DESCRIPTION	QUANT
1	46-208697P47	56295	Bushing, Heyco #1200 SR-6N3-4, Black	1
2	46-307761G1	None	Power Monitor Chassis Asm. with Power Monitor I/F Bd. (obsolete)	1
3	46-243775G747	None	7 foot 9-conductor Cable, MR1-A9-J12 to MR1-A7-J11	1
4	46-243775G748	None	7-1/2 foot Coax Cable, MR1-A9-J2 to MR1-A7-J14	1
5	46-243775G744	None	10 foot Coax Cable, MR1-A3-J10 to MR1-A7-J16	1
6	46-243775G745	None	10 foot Coax Cable, MR1-A3-J11 to MR1-A7-J15	1
7	46-243775G746	None	10 foot 9-Conductor Cable, MR1-A3-J9 to MR1-A7-J6	1
8	46-230194P1	78483	BNC Feed through Connector, Female to Female, Isolated Ground	3
9	46-265067P1	84702	Cable Mount, I/F Panel Cable Interconnect	4
12	46-251182P276	None	Rating Plate, 46-301924G1 Kit Added	1
13	46-170015P10	05322	Screw, 6-32 x 1/4, Binding head, with Captive External Tooth Lock washer	4
14	46-170012P36	15957	Lock Nut, 6-32 x 5/16 Hex	8
15	46-221417P1	34911	Screwlock, Female, Amp Kit #205817-1, 2 per kit	1

The RF Cabinet Kit includes items listed in Table 5-1.

1. Unpack RF Cabinet Kit from Box 1 and verify that contents are complete. Refer to PDI delivered with upgrade to locate missing items and/or verify shortages.

Aside: When kit parts are picked from a manufacturing stockroom, the part bags are marked with the S/C (Stock Code) or the stockroom “pick slip” is included. The part identification number, which is found on the fourth line of this slip, is either the 5-digit stock code or the part number.

5-2 POWER MONITOR REMOVAL

Note

This section applies to M1040FF only.

The RF Power Monitor is removed from the cabinet and moved to a workbench so circuit boards and power supplies can be transferred into the new Power Monitor Chassis assembly (item 2).

Aside: If the M1040FJ Signa Advantage Options Prerequisite Upgrade is also being performed, the RF Power Monitor is removed from its slides **after being moved** to the higher cabinet location.

1. If the flow chart (Illustration 1-5) is being followed, RF Cabinet power should be shut off at the PDU. Verify that PDU disconnect, lock out, and tag status exists before continuing.
2. Unlock and open RF Cabinet back door.
3. Remove two screws securing Envelope Feedback and Sensor Assembly (MR1 A6) to cabinet.
4. Swing out Envelope Feedback and Sensor Assembly for access to rear of RF Power Monitor. Replace screws removed in step 3 into mounting holes to prevent loss as replacements are not provided.
5. Verify cables are marked as listed in Table 5-2 before disconnecting.
6. Disconnect cabinet cables listed in Table 5-2 from rear of RF Power Monitor J1, J2, J3, J4, J5, J6, and J7.

TABLE 5-2
CABLES DISCONNECTED FROM REAR OF POWER MONITOR CHASSIS

CABLE DESCRIPTION	CABLE LABEL MARKING	DISCONNECT FROM
25 Conductor Cable, 9-1/2 ft long	MR1-A3-J1 46-243775G619	MR1 A3 J1
Coax Cable, 5 ft long	MR1-A3-J2 46-243775G610	MR1 A3 J2
Coax Cable, 5 ft long	MR1-A3-J3 46-243775G609	MR1 A3 J3
9 Conductor Cable, 9-1/2 ft long	MR1-A3-J4 46-243775G601	MR1 A3 J4
25 Conductor Cable, 10-1/2 ft long	MR1-A3-J5 46-243775G620	MR1 A3 J5
Coax Cable, 5 ft long	MR1-A3-J6 46-243775G608	MR1 A3 J6
Coax Cable, 5 ft long	MR1-A3-J7 46-243775G607	MR1 A3 J7

7. Remove four #10-32 screws securing RF Power Monitor to front of Cabinet.
8. Slide RF Power Monitor out of cabinet.
9. Remove seven pan head screws from power monitor top cover.
10. Remove and set aside cover.
11. Disconnect power cord wires from inside RF Power Monitor at Terminal Strip TS1 -4 and TS1-5 (may be TS1-8 on older systems). Disconnect green wire from ground stud.
12. Squeeze the split-lock strain relief bushing at Power Monitor plug J8 with pliers and remove the bushing.
13. Pull end of power cord out of chassis. This end (wrapped together with other cables) will remain in place and be reconnected to new RF Power Monitor Chassis. The other end remains connected to Power Module outlet J3.
14. Remove four #6-32 screws and Power Monitor from slides. Put Power Monitor on a workbench.

5-3 POWER MONITOR COMPONENT TRANSFER

Note

This section applies to M1040FF only.

1. Remove four flat head screws and four pan head screws, with lockwashers, from front cover.
2. Disconnect and mark connector J1 of key assembly from connector J4 of Control Board #1 (A1) and connector J2 from connector J4 of Control Board #2 (A2). Remove and set aside front cover of Power Monitor.
3. Refer to Illustration 5-1 and disconnect cables and wires as follows:
 - a. Remove cables listed in Table 5-3 from circuit boards inside of Power Monitor. Leave ends connected at chassis rear as these cables will be discarded along with chassis.

TABLE 5-3
CABLES DISCONNECTED FROM INSIDE OF POWER MONITOR

CABLE DESCRIPTION	END CONNECTED AT CHASSIS REAR	DISCONNECT OTHER END AT:
COAX CABLE	MR1 A3 J2	ANALOG BOARD #2 MR1 A3 A4 J6
COAX CABLE	MR1 A3 J6	ANALOG BOARD #1 MR1 A3 A3 J6
RIBBON CABLE	MR1 A3 J4	CONTROL BOARD #1 MR1 A3 A1 J3

- b. Disconnect cables listed in Table 5-4 from rear of chassis. Leave the other end of cables connected to the circuit boards as they will connect to new Power Monitor chassis. Save panel connection hardware.

TABLE 5-4
CABLES DISCONNECTED FROM INSIDE OF POWER MONITOR CHASSIS REAR

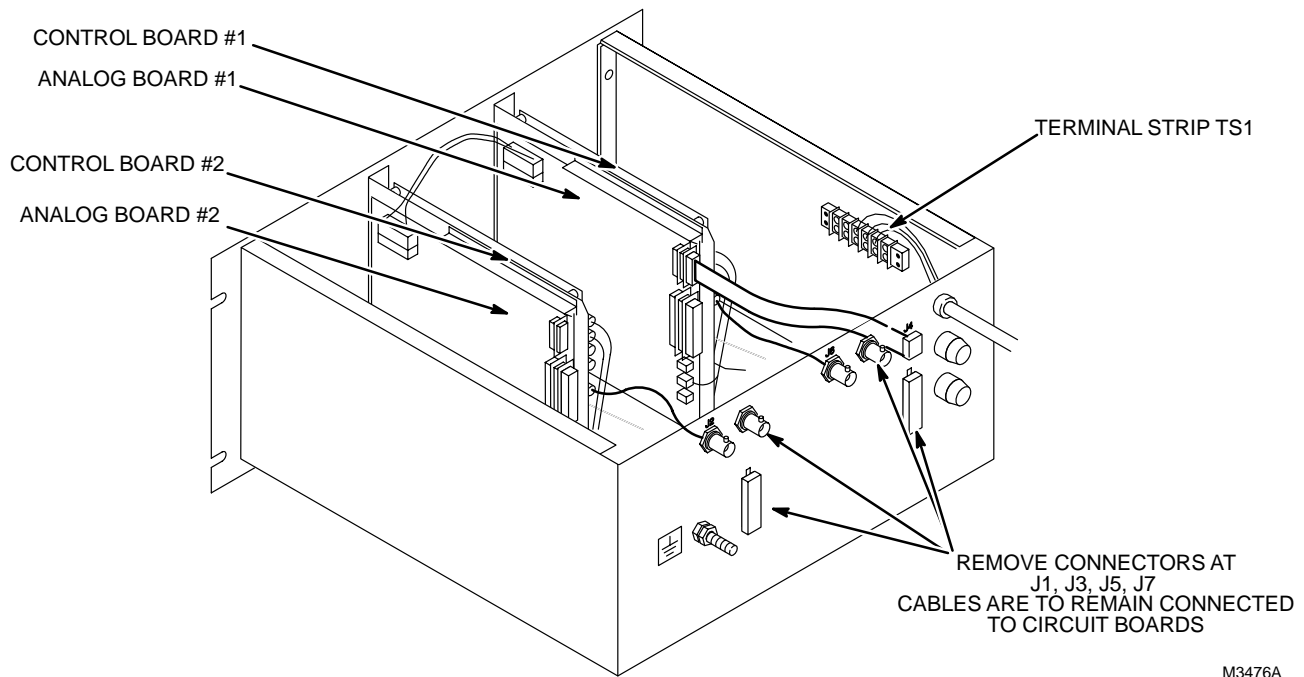
CABLE DESCRIPTION	DISCONNECT AT CHASSIS REAR	CABLE REMAINS CONNECTED TO
MULTI-CONDUCTOR SUBMINATURE-D	MR1 A3 J1	CONTROL BOARD #2 MR1 A3 A2 J5
COAX CABLE	MR1 A3 J3	ANALOG BOARD #2 MR1 A3 A4 J8
MULTI-CONDUCTOR SUBMINATURE-D	MR1 A3 J5	CONTROL BOARD #1 MR1 A3 A1 J5
COAX CABLE	MR1 A3 J7	ANALOG BOARD #1 MR1 A3 A3 J8

- c. Disconnect wires listed in Table 5-5 from Terminal Strip (MR1 A3 TS1) and Fuses F1 and F3. Leave the other end of these wires connected to the power supplies as they will be installed in the new Power Monitor Chassis.

TABLE 5-5
WIRES DISCONNECTED FROM INSIDE OF POWER MONITOR

WIRE DESCRIPTION	DISCONNECT AT	OTHER END REMAINS CONNECTED TO
WHITE WIRE WITH SPADE TERMINAL	MR1 A3 TS1-4	POWER SUPPLY #1 MR1 A3 PS1-AC LOW
WHITE WIRE WITH SPADE TERMINAL	MR1 A3 TS1-4	POWER SUPPLY #2 MR1 A3 PS2-AC LOW
GREEN/YELLOW WIRE WITH SPADE TERMINAL	MR1 A3 TS1-8	POWER SUPPLY #1 MR1 A3 PS1-GND
GREEN/YELLOW WIRE WITH SPADE TERMINAL	MR1 A3 TS1-8	POWER SUPPLY #2 MR1 A3 PS2-GND
BLACK WIRE WITH PUSH-ON TERMINAL	MR1 A3 F1	POWER SUPPLY #1 MR1 A3 PS1-AC HIGH
BLACK WIRE WITH PUSH-ON TERMINAL	MR1 A3 F2	POWER SUPPLY #2 MR1 A3 PS2-AC HIGH

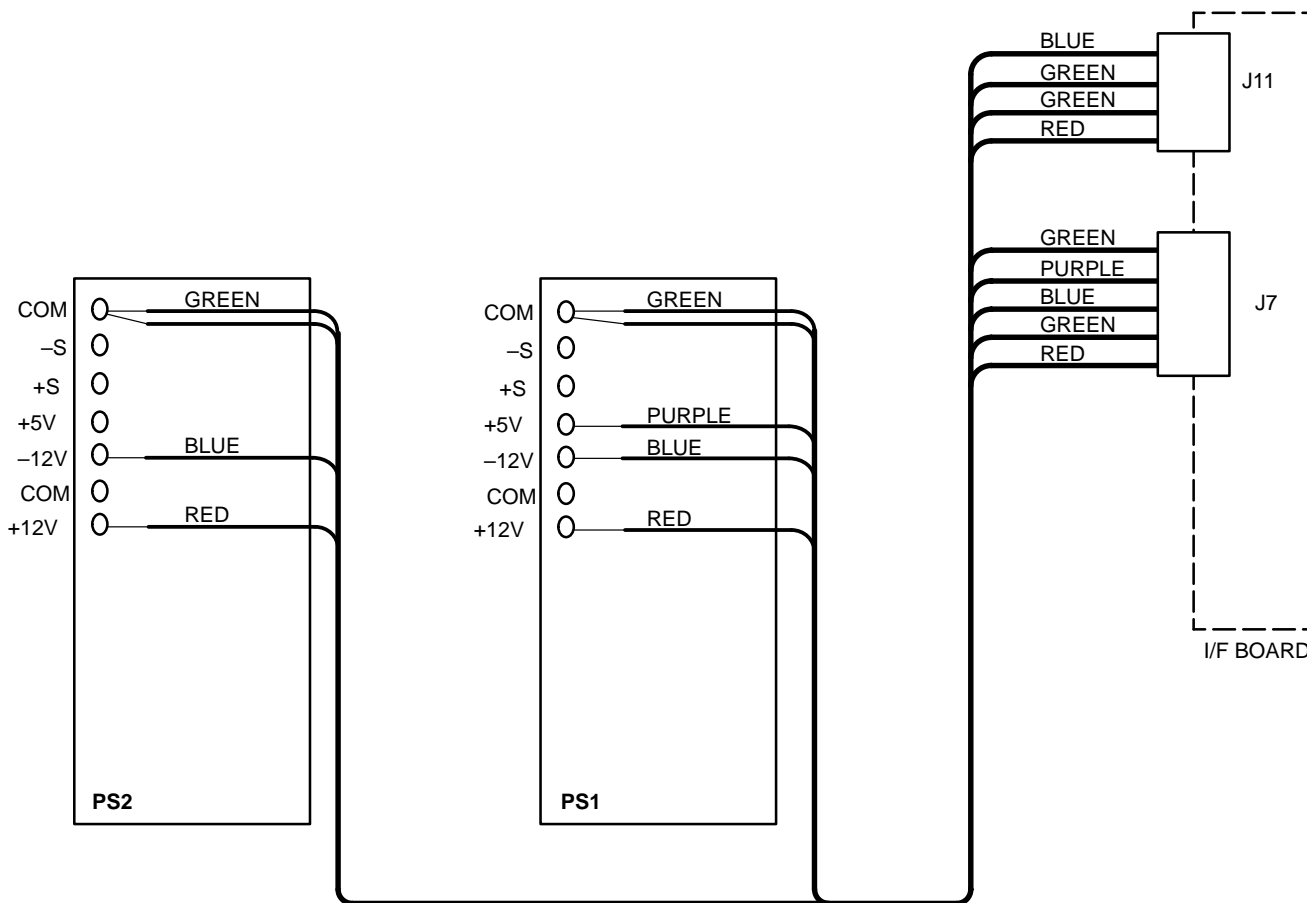
5-3 POWER MONITOR COMPONENT TRANSFER (Continued)



DISCONNECTING POWER MONITOR CABLES AND WIRES
ILLUSTRATION 5-1

4. Disconnect power supply harness from J9 of each Monitor Control Board and from J1 of each Spectroscopy Analog Sense Board.
5. Remove two screws that fasten each of the board assemblies (A1 and A2) from underside the chassis.
6. Remove four nuts that fasten each of the power supply assemblies (A1 and A2) to the chassis.
7. Move the Power supplies and interconnecting cables into the new chassis (item 2). Power supplies should be moved together since they have a common ground. **Do not fasten power supplies in place until harness wires are routed, connected, and soldered. Do not fasten board assemblies in place until interconnecting cables are connected.**
8. Connect ends of harness wires from Power Monitor I/F board J7 and J11 to power supplies. Refer to Illustration 5-2. Note that wires that connect to 12V may be marked "15V". Strip insulation as required, wrap wire around Power Supply terminal, and solder in place as follows:
 - a. Solder open red lead to connector +12V of Power Supply (PS1).
 - b. Solder open blue lead to connector -12V of Power Supply (PS1).
 - c. Solder open purple lead to connector +5V of Power Supply (PS1).
 - d. Solder two open green leads to connector COM of Power Supply (PS1).
 - e. Solder open red lead to connector +12V of Power Supply (PS2).
 - f. Solder open blue lead to connector -12V of Power Supply (PS2).
 - g. Solder two open green leads to connector COM of Power Supply (PS2).

5-3 POWER MONITOR COMPONENT TRANSFER (Continued)



M3489A

POWER MONITOR I/F BOARD WIRE HARNESS CONNECTION POINTS
ILLUSTRATION 5-2

9. Fasten power supplies with eight 6-32 x 5/16 hex lock nuts (item 14). Place 6-32 nuts previously removed on discard pile.
10. Connect Power supply AC wiring to Fuses F1, F2, and Terminal Strip TS1 according to Table 5-6.

TABLE 5-6
WIRES CONNECTED INSIDE POWER MONITOR

WIRE DESCRIPTION	CONNECT TO	OTHER END CONNECTED TO
WHITE WIRE WITH SPADE TERMINAL	MR1 A3 TS1-4	POWER SUPPLY #1 MR1 A3 PS1-AC LOW
WHITE WIRE WITH SPADE TERMINAL	MR1 A3 TS1-4	POWER SUPPLY #2 MR1 A3 PS2-AC LOW
GREEN/YELLOW WIRE WITH SPADE TERMINAL	MR1 A3 TS1-8	POWER SUPPLY #1 MR1 A3 PS1-GND
GREEN/YELLOW WIRE WITH SPADE TERMINAL	MR1 A3 TS1-8	POWER SUPPLY #2 MR1 A3 PS2-GND
BLACK WIRE WITH PUSH-ON TERMINAL	MR1 A3 F1	POWER SUPPLY #1 MR1 A3 PS1-AC HIGH
BLACK WIRE WITH PUSH-ON TERMINAL	MR1 A3 F2	POWER SUPPLY #2 MR1 A3 PS2-AC HIGH

5-3 POWER MONITOR COMPONENT TRANSFER (Continued)

11. Install the board assemblies into the new chassis. Do not tighten screws yet.
12. Connect the power supply harness from each power supply to J1 on each Analog Sense Board and to J9 on each Power Monitor Control Board.
13. Connect loose ends of cables attached to Power Monitor Interface Board (MR1 A3 A7) to circuit boards as marked. Refer to Table 5-7.

TABLE 5-7
CONNECTING CABLES FROM INTERFACE BOARD

CABLE DESCRIPTION	FROM INTERFACE BOARD	CONNECT OTHER END TO
COAX CABLE	MR1 A3 A7 J10	ANALOG BOARD #2 MR1 A3 A4 J6
COAX CABLE	MR1 A3 A7 J6	ANALOG BOARD #1 MR1 A3 A3 J6
COAX CABLE	MR1 A3 A7 J3	CONTROL BOARD #1 MR1 A3 A1 J3

14. Connect cables listed in Table 5-8 to open holes in rear of Power Monitor chassis. Use panel connection hardware previously removed.

TABLE 5-8
CABLES CONNECTED TO REAR OF POWER MONITOR CHASSIS

CABLE DESCRIPTION	CABLE FROM CONNECTION AT	CONNECT TO CHASSIS REAR
MULTI-CONDUCTOR SUBMINATURE-D	CONTROL BOARD #2 MR1 A3 A2 J5	MR1 A3 J1
COAX CABLE	ANALOG BOARD #2 MR1 A3 A4 J8	MR1 A3 J3
MULTI-CONDUCTOR SUBMINATURE-D	CONTROL BOARD #1 MR1 A3 A1 J5	MR1 A3 J5
COAX CABLE	ANALOG BOARD #1 MR1 A3 A3 J8	MR1 A3 J7

15. Fasten board assemblies in place with new 6-32 x 1/4 screws (item 13). Place 6-32 screws previously removed on discard pile.
16. Holding RF Power Monitor front cover in place, install connector J1 from Key Assembly onto connector J4 of Control Board #1 and connector J2 onto connector J4 of Control Board #2.
17. Attach RF Power Monitor front cover to board assemblies with four flat head screws previously removed. Align cover holes with board LEDs. Tighten screws.
18. Attach RF Power Monitor front cover to chassis with four pan head screws and lockwashers previously removed. Tighten screws.
19. Place remains of removed Power Monitor on discard pile.

5-4 POWER MONITOR INSTALLATION

Note

This section applies to M1040FF only.

1. Install RF Power Monitor and four pan head screws onto slides. Tighten screws.
2. Route and install power cord into J8 opening. Secure in place with strain-relief bushing. A new strain relief bushing (item 1) is provided should the bushing removed in Section 5-2, POWER MONITOR REMOVAL, step 12, be damaged by forceful use of a pliers.
3. Connect power cord blue and black wires to TS1-4 and TS1-5 (may be TS1-8 on older systems) as marked. Attach ground wire to ground stud with nut previously removed.
4. Replace power monitor top cover. Fasten with seven pan head screws previously removed.
5. Slide RF Power Monitor into the cabinet.
6. Install four pan head screws to secure RF Power Monitor to the cabinet.

5-5 RF CABINET CABLE INSTALLATION

Note

This section applies to M1040FF.

5-5-1 M1040FF

1. Install three BNC insulated ground feed through connectors (item 8) into Cab. I/F Panel J14, J15, and J16.
2. Install two cable mounts (item 9) into each 9-pin Subminiature D openings J6 and J11 of Cab. I/F Panel.
3. Use Table 5-9 as a checklist and install new cables as follows: See Illustration 5-3.
 - a. Route and connect coax cable 46-243775G744 (item 5) to RF Power Monitor J10 and Cab. I/F Panel J16.
 - b. Route and connect coax cable 46-243775G745 (item 6) to RF Power Monitor J11 and Cob. I/F Panel J15.
 - c. Route and connect cable 46-243775G746 (item 7) to RF Power Monitor J9 and Cab. I/F Panel J6.
 - d. Route and connect cable 46-243775G747 (item 3) to Dynamic Disable Module J12 and Cab. I/F Panel J11.
 - e. Route and connect coax cable 46-243775G748 (item 4) to Dynamic Disable Module J2 and Cab. I/F Panel J14.

TABLE 5-9
NEW CABLE CONNECTIONS

CABLE PART NUMBER	MODULE CONNECTION	I/F PANEL CONNECTION
46-243775G744	MR1 A3 J10	MR1 A7 J16
46-243775G745	MR1 A3 J11	MR1 A7 J15
46-243775G746	MR1 A3 J9	MR1 A7 J6
46-243775G747	MR1 A9 J12	MR1 A7 J11
46-243775G748	MR1 A9 J2	MR1 A7 J14

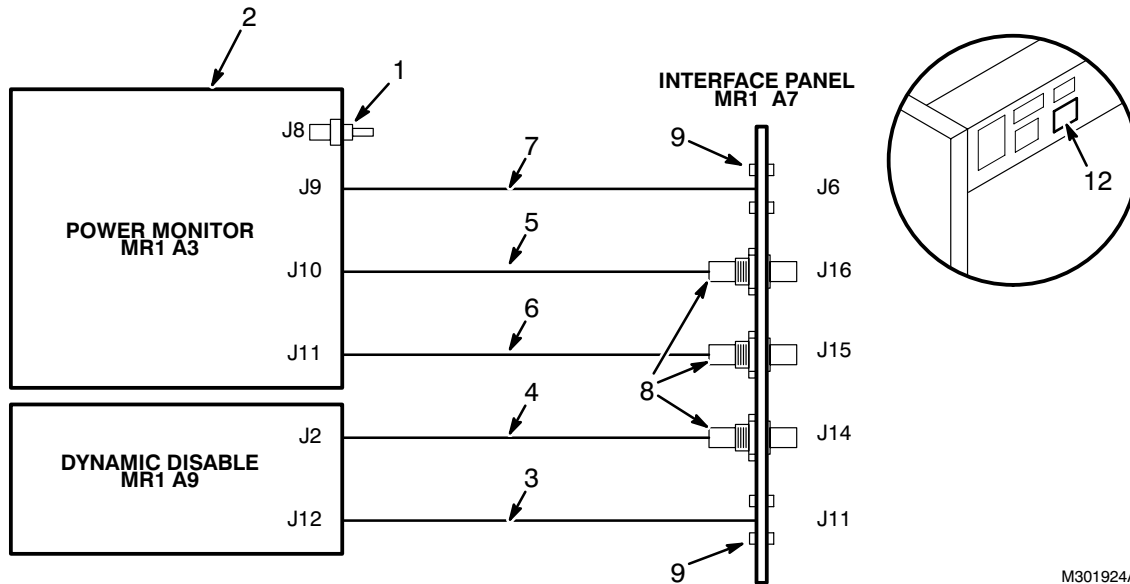
4. Install four pan head screws to secure Power Monitor (A3) to front of cabinet and tighten.

5-6 RATING PLATE INSTALLATION

Note

This section applies to M1040FF.

1. Install rating plate (item 12) onto right-front corner (facing front of cabinet) on top of cabinet. See Illustration 5-3 (M1040FF).
2. Install cover on front of cabinet.



RF CABINET KIT AND NEW CABLE ROUTING (M1040FF)
ILLUSTRATION 5-3

M301924A

5-7 RF CABINET CABLE CONNECTION

Note

This section applies to M1040FF.

1. Connect previously routed system cables listed in Table 5-10 (M1040FF).

TABLE 5-10
NEW CABLES CONNECTED TO RF CABINET (M1040FF)

RUN	CONNECTOR	TYPE OF CONNECTOR	REMARKS
461	MR1 A7 J3	RG223 BNC Coax	Exciter RF from System Cabinet through BroadBand RF Cabinet to Proton RF Amplifier
459	MR1 A7 J6	9-Pin Subminiature-D	RF Lock
463 (4.X) or 738 (5.X)	MR1 A7 J9 or MR1 A7 J24	37-Pin Subminiature-D	Bicycle link from BroadBand RF Cabinet or From BroadBand RF Cabinet
462	MR1 A7 J11	9-Pin Subminiature-D	Unblank
460	MR1 A7 J14	RG223 BNC Coax	BB Spectro TR Bias
465	MR1 A7 J15	RG223 BNC Coax	BB Spectro RF Power Monitor Sensor #2
464	MR1 A7 J16	RG223 BNC Coax	BB Spectro RF Power Monitor Sensor #1

5-8 5.X ONLY – SPECTRO RF CABINET UPGRADE KIT

Note

This section applies to M1040FF only.

5.X Spectroscopy installation includes extra cables to support the new fiber optics in 5.X. This kit is found in Box 1. The 5.X Spectro RF Cabinet Upgrade Kit includes items found in Table 5-11.

TABLE 5-11
5.X SPECTRO RF CABINET UPGRADE KIT

ITEM	PART NO	S/C #	DESCRIPTION	QUANT
2	46-328000g844	None	7 foot 37 cond. cable, MR1-A9-J11 to MR1-A7-J23	1
3	46-243775G843	None	7 foot 37 cond. cable, MR1-A10-P2201 to MR1-A7-J24	1
6	46-251905p209	None	Cable Label; states: Run 463, 4.X MR1-A7-J9, 5.X MR1-A7-J24	1
7	46-251905P210	None	Cable Label; states: Run 463, MR6-A3-J9	1
8	46-251905P211	None	Cable Label; states: Run 737, MR1-A7-J23	1
9	46-221856P13	07763	Cable Tape; Blue	1
10	46-221856P14	07764	Cable Tape; Green	1
12	46-251905P212	None	Cable Label; states: Run 737; MR6-A3-J8	1

Note

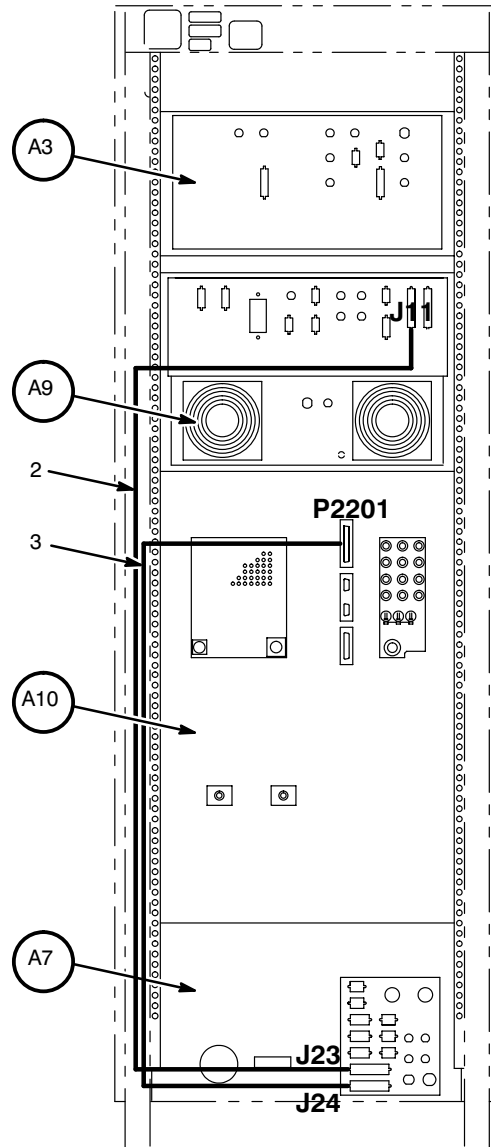
Labels and tapes (items 6 through 12) may be discarded if not needed. New installations should already have cable runs 463/738 and 464/737 labelled.

5-9 5.X ONLY – RF CABINET CABLE RE-ROUTING

Note

This section applies to M1040FF only.

1. Remove the the following cable from the rear of the RF Cabinet and place on the discard pile.
 - MR1 A9 J11 to MR1 A10 P2201
2. Install the following cables as shown in Illustration 5-4.
 - MR1 A9 J11 to MR1 A7 J23 (Item 2, Table 5-11)
 - MR1-A10-P2201 to MR1-A7-J24 (Item 3, Table 5-11)



M317911A

RF CABINET 5.X UPGRADE KIT CABLE CONNECTIONS

ILLUSTRATION 5-4

5-10 SPECTRO EPROM INSTALLATION**Note**

This section applies to M1040FF.

Refer to Section 10-2-2, SPECTRO EPROM INSTALLATION, for the procedure to install the Spectro EPROM into the Erbtec RF Amplifier. This SPECTRO EPROM (used for PROBE to extend the unblank signal) is not part of M1040FF but it is required.

5-11 SPECTRO POWER MONITOR UPGRADE (4.X-5.4 HARDWARE, M1040FF ONLY)

Note

This section applies to M1040FF only.

All Signa MR systems with RF BroadBand Cabinets model numbers 46-301697G1 or 46-301697G2 must perform FMI 60420—SPECTRO POWER MONITOR UPGRADE. These instructions are not a substitute for the FMI documentation.

PURPOSE:

The Power Monitor Control Boards are subject to damage from mis-adjustment of associated BB Spectroscopy hardware, due to thermal drift, and power line interference. The RF Sensor Elements are very susceptible to power line noise thereby creating a number of power monitor nuisance trips.

The solution to these problems is to demodulate the RF feedback signal at the Narrowband RF Cabinet (MR1) and add a high pass filter to remove line frequencies. This FMI replaces the RF Line Sensor Housing and Sensor Elements with a Spectroscopy Directional Coupler at the BroadBand RF Cabinet (MR6). The Sensor Driver Board and the Power Monitor I/F Board is removed. Both RF Analog Sense Boards are replaced with Spectroscopy Analog Sense Boards.

FMI kit 2140074, consisting of the following:

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QTY.</u>
1	2140074FMI	Field Modifications Instructions	1
2	2143715	Spectroscopy Analog Sense Board #1	1
3	2143715-2	Spectroscopy Analog Sense Board #2 with depopulated interface	1
4	2104697-2	Spectroscopy Directional Coupler	1
5	46-282520P13	SMB to SMB Bullet Connector (AMP #228553-1)	2
6	46-170123P6	20 foot roll, yellow vinyl electrical tape	1
7	46-244890P152	18 in. Ribbon Cable, 9 pin Sub-D rec. to 10 pin socket	1
8	46-244890p153	18 in. Ribbon Cables, 9 pin Sub-D plug to to 10 pin socket	2
9	46-208781P6	Write-On Vinyl Labels for cable marking [2.25 high, 1.00 wide (0.75 write-on area)]	16
10	46-015370	Direction 15370, Rev 7, Manual	1

5-12 REMOVE SYSTEM POWER AND LOCKOUT TAGOUT

- 1 Power off the RF Amplifier Cabinet (MR1).
 - f. Switch circuit breaker CB1 (located below the back door) of the RF Amplifier Cabinet to OFF position. See Illustration 5-5.
 - g. At PDU, switch RF Amplifier Cabinet circuit breaker to the OFF position.
- 2 Power off the BroadBand Cabinet (MR6).
 - a. Switch circuit breaker CB1 (located below the back door) of the BroadBand Amplifier Cabinet to OFF position.
 - b. At PDU, switch BroadBand Cabinet circuit breaker to the OFF position.
3. Lock Out and Tag Out the RF and BroadBand circuit breakers at the PDU.

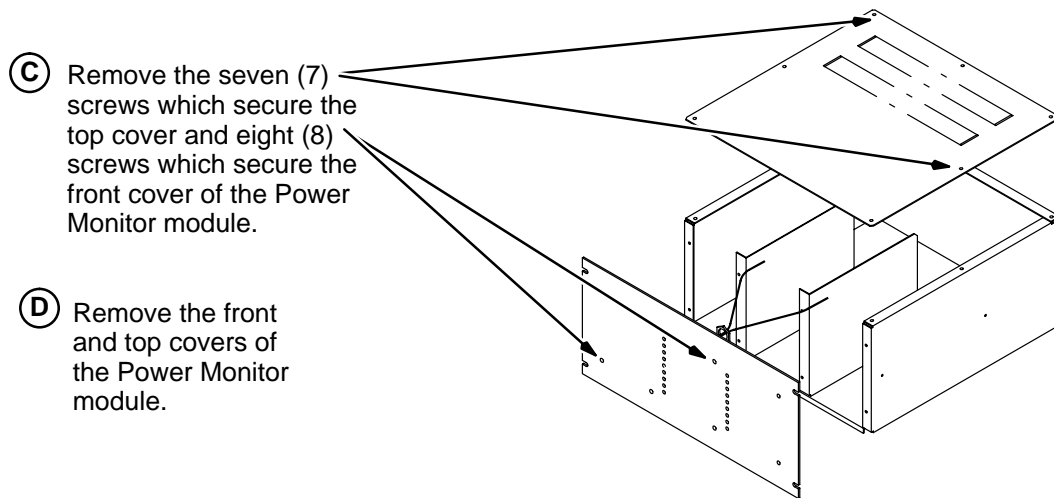
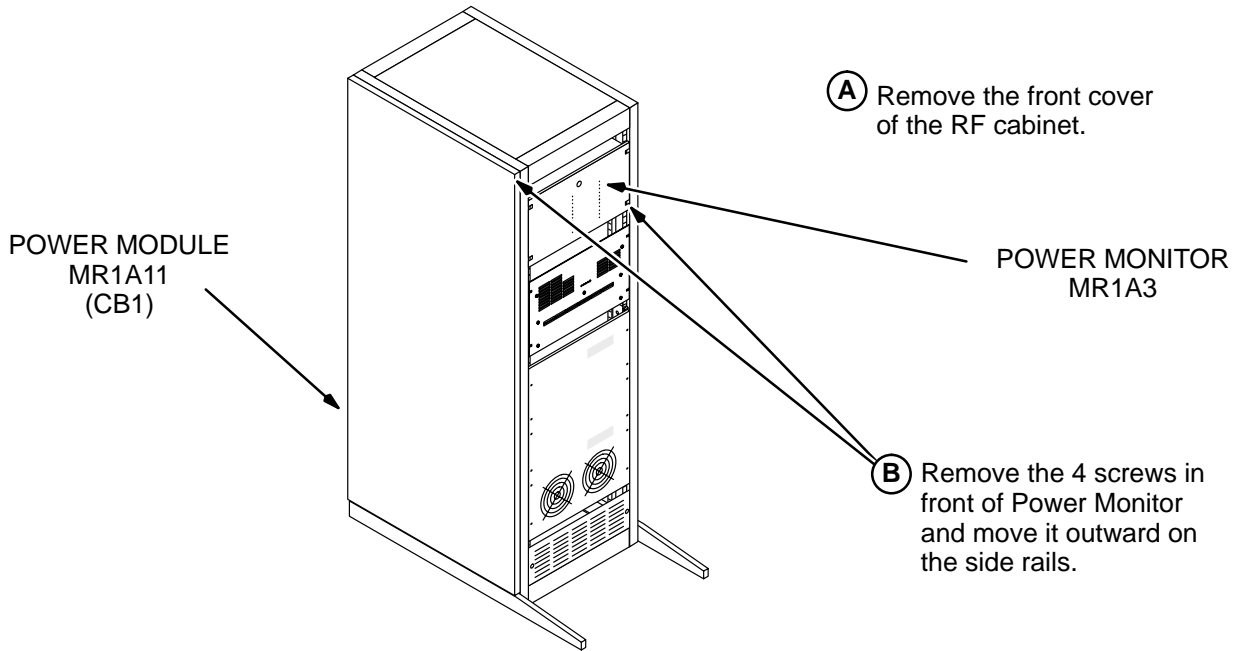


VERIFY THAT POWER IS OFF AND TAGGED PRIOR TO PERFORMING THE REST OF THIS PROCEDURE! VERIFY THAT NO POWER IS APPLIED TO EITHER THE RF CABINET OR BROADBAND CABINET! FAILURE TO OBSERVE THIS WARNING MAY RESULT IN SERIOUS SHOCK OR ELECTROCUTION!

4. Disconnect the cable (J1) supplying power to the RF Amplifier Cabinet (MR1).
5. Disconnect the cable (J1) supplying power to the BroadBand Cabinet (MR6).

5-13 REMOVE PROTECTIVE COVERINGS (MR1)

Perform the following procedure for removing covers:



RF CABINET AND POWER MONITOR COVERS
ILLUSTRATION 5-5

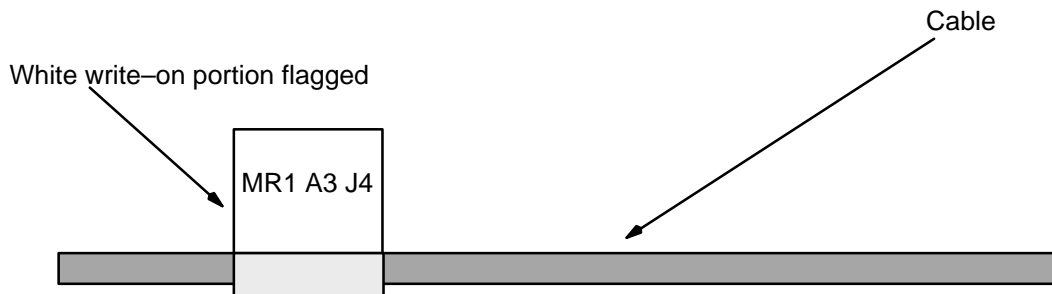
5-14 WRITE-ON CABLE MARKER LIST

Supplied with the FMI kit 2140074 are sixteen (16) vinyl write-on cable label markers (item #9). Each cable label needs to have a cable location written on the white portion of the write-on cable marker. See Table 5-12 below for proper markings. One cable label has already been labeled in the kit and is shown in bold print below. The label shows MR1 A3 J4, however, only J4 is required as MR1 A3 is understood at the Power Monitor Chassis.

**TABLE 5-12
WRITE-ON CABLE LABEL MARKER LIST**

MR1 CABINET	MR1 CABINET	MR6 CABINET
A3A3 J5	A3A3 J7	J3
A3A4 J5	J4	PM #1
A3A3 J6	A3A3 J4	PM #1
A3A4 J6	J9	J4
	A3A3 J9	PM #2
	A3A1 J3	PM #2

1. The white portion of the write-on cable marker should be applied to the cable first. The clear portion of the label is present to protect the marking on the cable label, as well as, to provide an additional safety factor due to the flammability of the white portion of the cable label.
2. When applying the write-on cable marker to a small diameter cable it will be necessary to have the white portion act as a flag. Refer to Illustration 5-6.



**CABLE WRITE-ON MARKER INSTALLATION
ILLUSTRATION 5-6**

5-15 ANALOG SENSE BOARDS AND POWER MONITOR I/F BOARD REMOVAL (MR1)

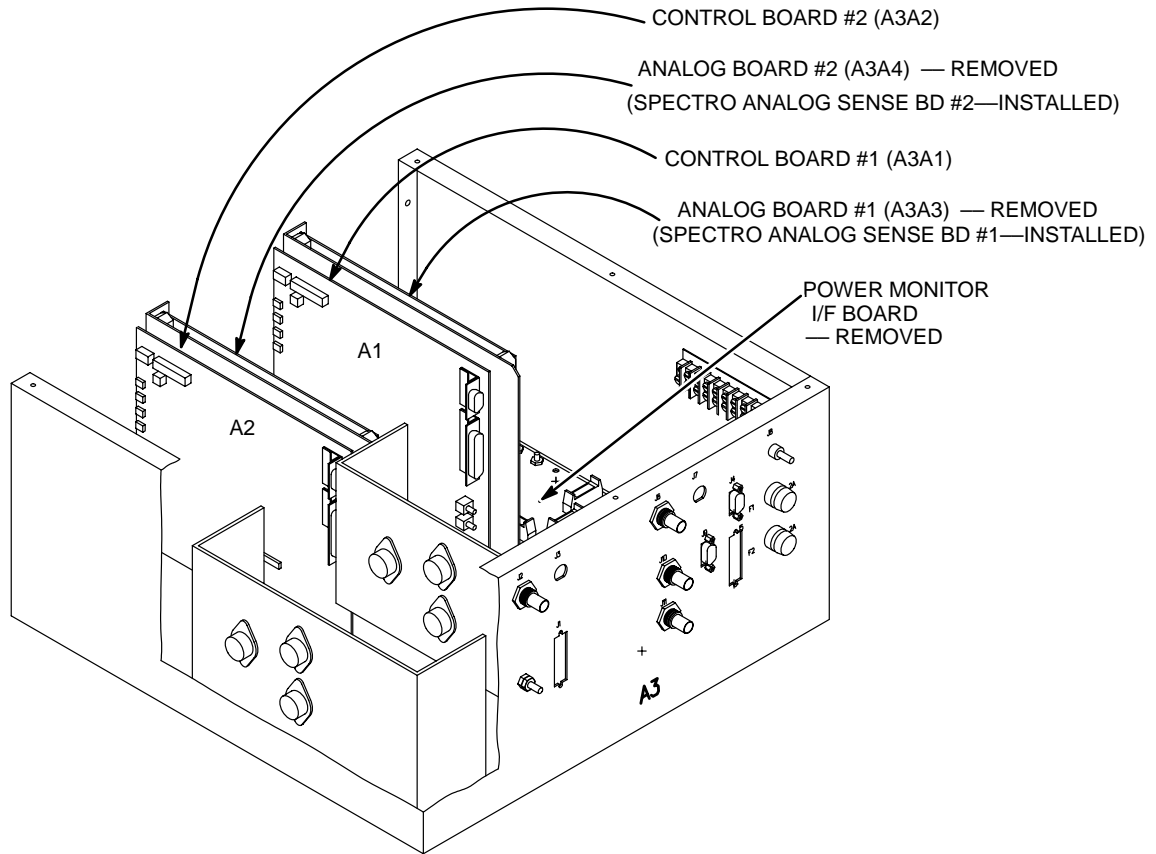
The BroadBand Cabinet circuit boards contain static sensitive components that may be damaged if not handled in a static-free environment. Take appropriate care (such as wearing a wrist strap) when handling these boards or coming in contact with them. Avoid handling or touching any of the circuit board traces.

1. Remove all cables from the following boards, see Illustration 5-7 for board locations.
 - a. Analog Sense Board, (MR1 A3 A3), (46-226746).
 - b. Analog Sense Board, (MR1 A3 A4), (46-226746).
 - c. Power Monitor I/F Board, (46-264820).
Cover with electrical tape the power **cable** connections (J7 and J11) as they will no longer be used.

Note

The Power Monitor I/F Board was referenced as MR1 A3 A7 and MR1 A3 A5 in documentation and on cable labels.

5-15 ANALOG SENSE BOARDS AND POWER MONITOR I/F BOARD REMOVAL (MR1) (Continued)



POWER MONITOR I/F BOARD AND ANALOG SENSE BOARD LOCATIONS
ILLUSTRATION 5-7

2. Remove Analog Sense Boards, (A3A3 & A3A4) from the chassis by unscrewing the nuts at the top of the assembly. Retain all hardware for re-use with the new boards. *Metal shield on each assembly must be removed (if present) and discarded.*
3. Remove and discard the Power Monitor I/F Board, (46-264820G1).

Note

The Power Monitor I/F Board was referenced as MR1 A3 A7 and MR1 A3 A5 in documentation and on cable labels.

5-16 POWER MONITOR RE-CABLING AND SPECTRO ANALOG SENSE BOARD INSTALLATION



The BroadBand Cabinet circuit boards contain static sensitive components that may be damaged if not handled in a static-free environment. Take appropriate care (such as wearing a wrist strap) when handling these boards or coming in contact with them. Avoid handling or touching any of the circuit board traces.

1. Remove and discard the cables listed in Table 5-13.

TABLE 5-13
POWER MONITOR CHASSIS CABLE DISCARD LIST

PART NO.	FROM	TO	DESCRIPTION
46-301909P1	PM I/F Bd. J10	A3A4 J6	RG 174/U SMB
46-301909P2	PM I/F Bd. J6	A3A3 J6	RG 174/U SMB
46-244890P127	Chassis J9	PM I/F Bd. J1	RIBBON CABLE
46-244890P127	Chassis J4	PM I/F Bd. J2	RIBBON CABLE
46-244890P126	PM I/F Bd. J3	A3A1 J3	RIBBON CABLE

2. Re-label cables using supplied labels (item #9) per Table 5-14.

TABLE 5-14
POWER MONITOR CHASSIS CABLE RE-LABEL LIST

REPLACE / (COVER) OLD LABEL (FROM)	NEW LABEL (ITEM #9)	NOTES
PM I/F Bd. J8	A3A3 J5	ONE END OF CABLE ONLY
PM I/F Bd. J4	A3A4 J5	ONE END OF CABLE ONLY
PM I/F Bd. J5	A3A3 J6	ONE END OF CABLE ONLY
PM I/F Bd. J9	A3A4 J6	ONE END OF CABLE ONLY

**5-16 POWER MONITOR RE-CABLING AND SPECTRO ANALOG SENSE BOARD INSTALLATION
(Continued)**

3. Add labels (item #9) to the new ribbon cables per Table 5-15.

**TABLE 5-15
POWER MONITOR CHASSIS NEW CABLE - NEW LABEL LIST**

FROM	TO	PART NUMBER	NOTES
Chassis J4 (metal end)	A3A3 J7	46-244890P153	BOTH ENDS OF CABLE
Chassis J9 (metal end)	A3A3 J4	46-244890P153	BOTH ENDS OF CABLE
A3A3 J9	A3A1 J3 (metal end)	46-244890P152	BOTH ENDS OF CABLE

4. Install new ribbon cables, (item #8, Qty 2, 46-244890P153, Chassis J4 and J9) to back of Power Module Chassis bulkhead. Bulkhead end of ribbon cables have screws. These screws must be removed so that hex head hardware from old ribbon cables can be used for the new ribbon cables
5. Install new Spectroscopy Analog Sense Boards. Use the screws saved from step #2 of prior section.
 - a. In location A3A3 install Spectroscopy Analog Sense Board #1, item #2 (2143715), see Illustration 5-7.
 - b. In location A3A4 install Spectroscopy Analog Sense Board #2, item #3 (2143715-2), see Illustration 5-7.

Note

The Spectroscopy Analog Sense Board #1 (item #2) contains additional circuitry for the unblank function and needs to be installed in location A3A3.

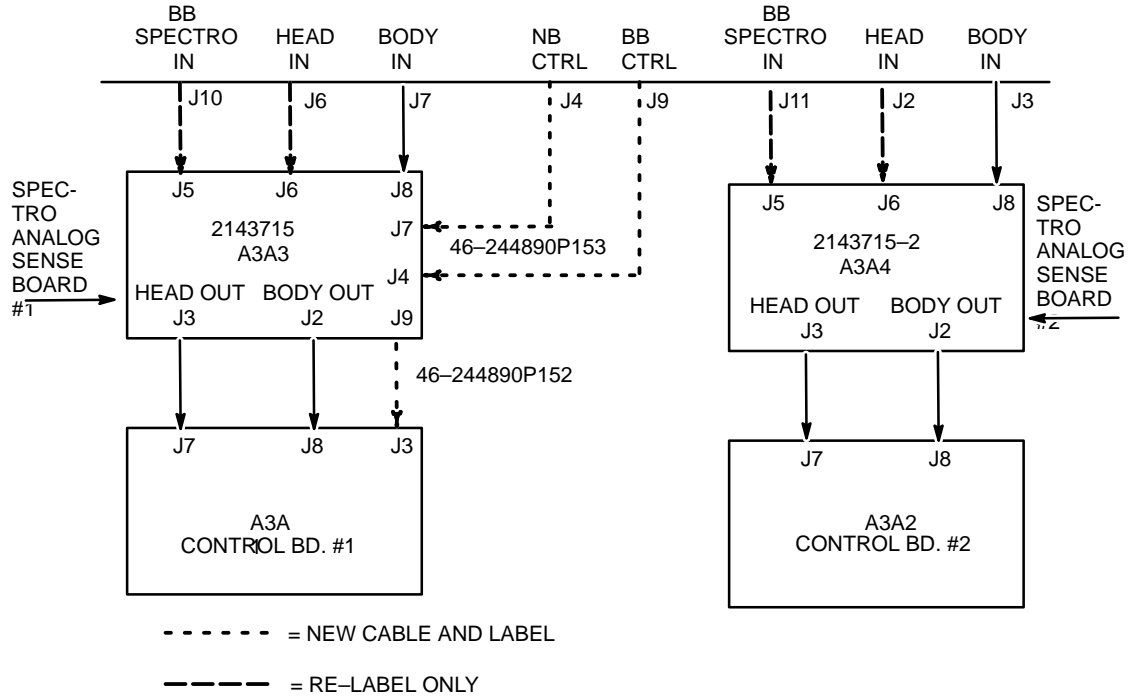
6. Using Table 5-16, connect all cables according to the new labels that were applied in steps 2 & 3.

**TABLE 5-16
POWER MONITOR CHASSIS CABLE CONNECTION LIST**

CABLE TYPE	FROM	TO	SIGNAL NAME
Coax	J2 Chassis	A3A4 J6 Spectro Analog Sense	Head Input #2
Coax	J3 Chassis	A3A4 J8 Spectro Analog Sense	Body Input #2
Coax	J11 Chassis	A3A4 J5 Spectro Analog Sense	BB Spectro Input #2
Coax	J6 Chassis	A3A3 J6 Spectro Analog Sense	Head Input #1
Coax	J7 Chassis	A3A3 J8 Spectro Analog Sense	Body Input #1
Coax	J10 Chassis	A3A3 J5 Spectro Analog Sense	BB Spectro Input #1
Ribbon	J4 Chassis	A3A3 J7 Spectro Analog Sense	NB Lock/Unblank Bus
Ribbon	J9 Chassis	A3A3 J4 Spectro Analog Sense	BB Lock/Unblank Bus
Ribbon	A3A1 J3 Control Bd	A3A3 J9 Spectro Analog Sense	Lock Signal to the Control Board

5-16 POWER MONITOR RE-CABLING AND SPECTRO ANALOG SENSE BOARD INSTALLATION
(Continued)

7. Check wiring, see Illustration 5-8. Reconnect cables from A3A3 (Spectro Analog Sense Bd. #1) to A3A1 (Power Monitor Control Bd. #1). Reconnect cables from A3A4 (Spectro Analog Sense Bd. #2) to A3A2 (Power Monitor Control Bd. #2).



NEW WIRING DIAGRAM
 ILLUSTRATION 5-8

8. Use Table 5-17 to reconnect any remaining cables in the Power Monitor Chassis.

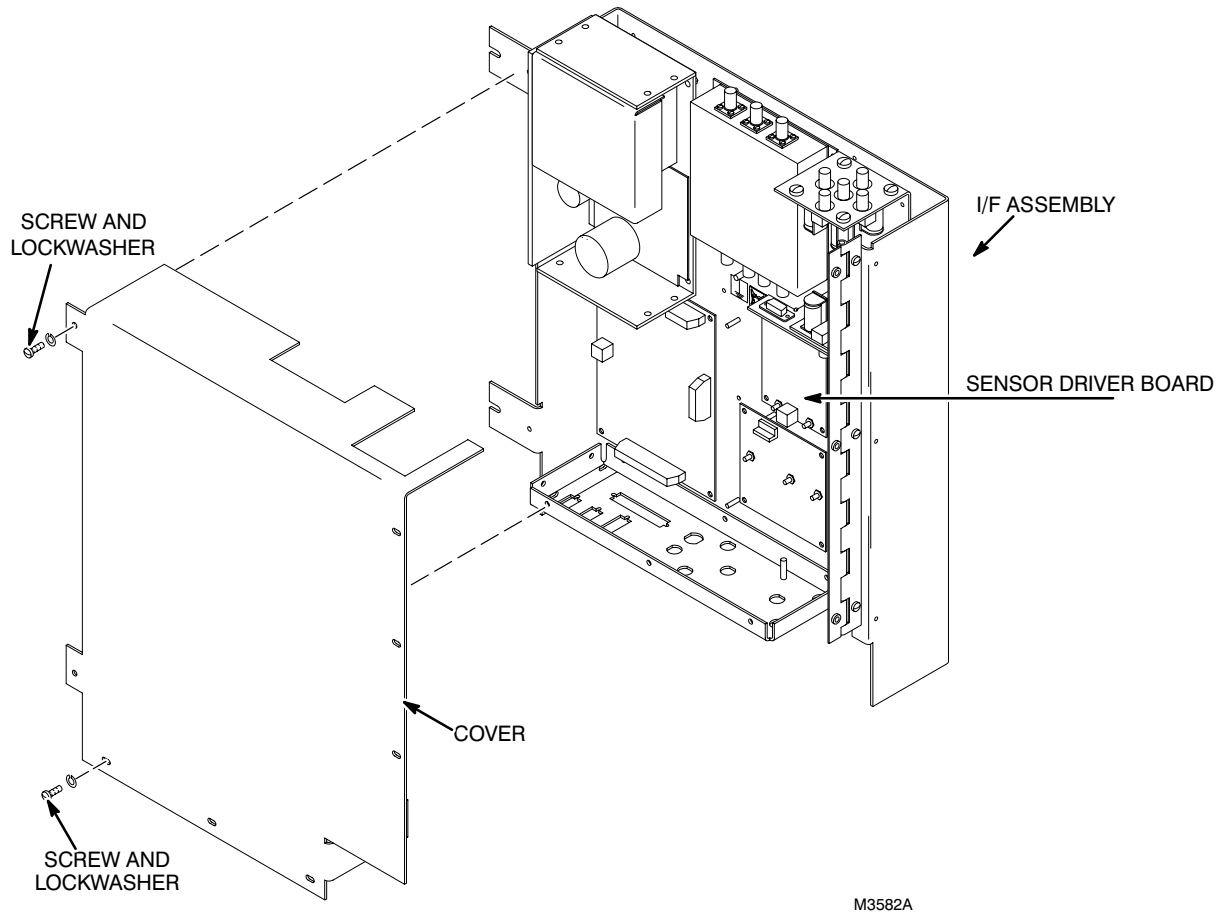
TABLE 5-17
POWER MONITOR CHASSIS CABLE CONNECTION LIST

RECONNECT FROM	RECONNECT TO	NOTES
Power Supply Harness	A3A3 J1	POWER to Analog Sense Board #1
Power Supply Harness	A3A4 J1	POWER to Analog Sense Board #2
A3A1 J8	A3A3 J2	HEAD / BB SPECTRO Sense Signal #1
A3A2 J8	A3A4 J2	HEAD / BB SPECTRO Sense Signal #2
A3A1 J7	A3A3 J3	BODY Sense Signal #1
A3A2 J7	A3A4 J3	BODY Sense Signal #2

9. No alignment or adjustments needed.
10. Replace front and top covers of the Power Monitor Module (MR1 A3).

5-17 BROADBAND CABINET I/F ASSEMBLY COVER REMOVAL

1. Remove four pan head screws and cover from the BroadBand Cabinet MR6 A2 I/F Assembly. Refer to Illustration 5-9.



I/F COVER REMOVAL (MR6 A2)

ILLUSTRATION 5-9

5-18 BROADBAND CABINET SENSOR DRIVER BOARD REMOVAL

The BroadBand Cabinet circuit boards contain static sensitive components that may be damaged if not handled in a static-free environment. Take appropriate care (such as wearing a wrist strap) when handling these boards or coming in contact with them. Avoid handling or touching any of the circuit board traces.

1. Disconnect J5 from the Sensor Driver Board (MR6 A2 A5). Cover with electrical tape the **cable** power connection that was attached to (J5) as it will no longer be used.
2. Disconnect J1, J2, J3, and J4 from the Sensor Driver Board (MR6 A2 A5).
3. Remove and discard the Sensor Driver Board (MR6 A2 A5), 46-288004G1. Refer to Illustration 5-9.

5-19 BROADBAND CABINET LINE SENSOR REMOVAL & DIRECTIONAL COUPLER INSTALLATION

The BroadBand Cabinet circuit boards contain static sensitive components that may be damaged if not handled in a static-free environment. Take appropriate care (such as wearing a wrist strap) when handling these boards or coming in contact with them. Avoid handling or touching any of the circuit board traces.

1. Put on a grounded wrist band.
2. Disconnect all connectors from 50 Ohm Line Sensor Housing, (A6).



Place your hand below the location of the screws so you can catch the spacer washers as the screws are removed.

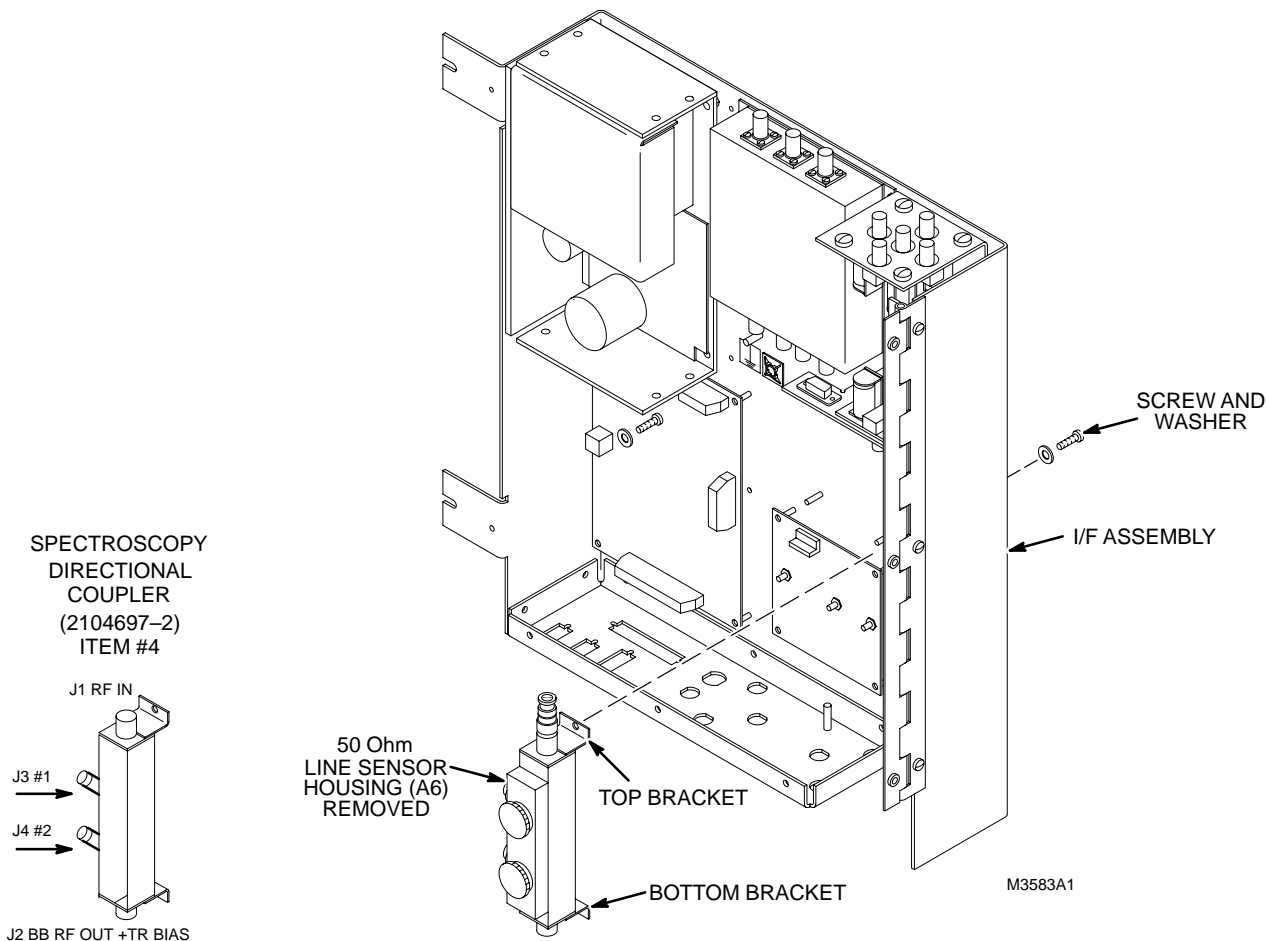
3. Remove two pan head screws from back of panel that secures line section (top bracket). Refer to Illustration 5-10.
4. Remove two pan head screws from back of panel that secures line section (bottom bracket). Refer to Illustration 5-10.

Note

Not all assemblies have spacer washers. Save all hardware (screws/spacers/washers) for re-use.

5. Remove 50 Ohm Line Sensor Housing (46-301780P1) and both Sensor Elements (46-255754P5), (A6).

5-19 BROADBAND CABINET LINE SENSOR REMOVAL & DIRECTIONAL COUPLER INSTALLATION (Continued)



LINE SENSOR REMOVAL/SPECTROSCOPY DIRECTIONAL COUPLER INSTALLATION
ILLUSTRATION 5-10

6. Install the Spectroscopy Directional Coupler, (item #4) in the A6 position. The coupler feet have the mounting holes in the same location as the 50 Ohm Line Sensor Housing. The BNC to N adapter is still used. Reattach output cable to J2 (BB RF OUT + TR BIAS). Refer to Illustration 5-10.
7. Reconnect the BNC to SMB cables that were originally connected to the 50 Ohm Line Sensor Housing (MR6 A6) to the Spectroscopy Directional Coupler (MR6 A6) as follows (refer to Illustrations 5-10 and 5-11) and refer to Table 5-18.
 - a. Re-label and connect the J2 BNC at the Coupler as J3 (item #9).
 - b. Re-label MR6 A2 A5 J1 SMB (originally connected to the Sensor Driver Board) as PM #1 (item #9).
 - c. Re-label MR6 A2 A5 J2 SMB (originally connected to the Sensor Driver Board) as PM #1 (item #9). The other end of this cable attaches to the hanging I/F Panel (MR6 A8) J10.

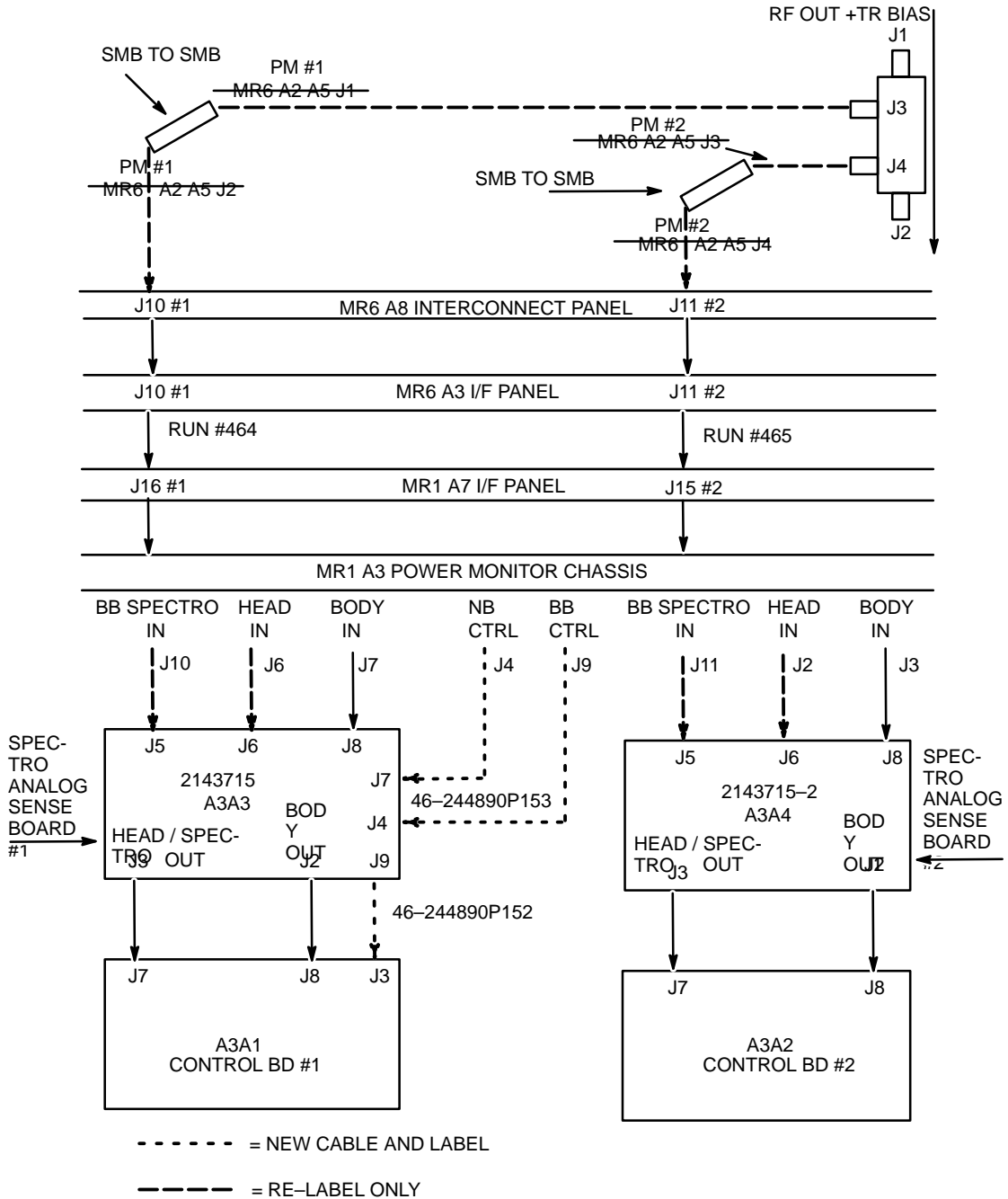
5-19 BROADBAND CABINET LINE SENSOR REMOVAL & DIRECTIONAL COUPLER INSTALLATION
(Continued)

- d. Using the SMB to SMB bullet connector, (item #5), connect the *PM #1* cables (originally A5J1 to A5J2), bullet cable ends together (bypassing the original Sensor Driver Board). To prevent a short circuit wrap the connection with the supplied yellow tape, (item #6).
 - e. Re-label and connect the J3 BNC at the Coupler as *J4* (item #9).
 - f. Re-label MR6 A2 A5 J3 SMB (originally connected to the Sensor Driver Board) as *PM #2* (item #9).
 - g. Re-label MR6 A2 A5 J4 SMB (originally connected to the Sensor Driver Board) as *PM #2* (item #9). The other end of this cable attaches to the hanging I/F Panel (MR6 A8) J11.
 - h. Using the SMB to SMB bullet connector, (item #5), connect the *PM #2* cables (originally A5J3 to A5J4), bullet cable ends together (bypassing the original Sensor Driver Board). To prevent a short circuit wrap the connection with the supplied yellow tape, (item #6).
8. Visually check wiring, see Illustration 5-11.

TABLE 5-18
MR6 I/F ASSEMBLY CABLE RE-LABEL LIST

REPLACE / (COVER) OLD LABEL (FROM)	NEW LABEL (ITEM #9)	NOTES
(50 Ohm Line Sensor BNC) J2	J3	ONE END OF CABLE ONLY
(SMB) MR6 A2 A5 J1	PM #1	ONE END OF CABLE ONLY
(SMB) MR6 A2 A5 J2	PM #1	ONE END OF CABLE ONLY
(50 Ohm Line Sensor BNC) J3	J4	ONE END OF CABLE ONLY
(SMB) MR6 A2 A5 J3	PM #2	ONE END OF CABLE ONLY
(SMB) MR6 A2 A5 J4	PM #2	ONE END OF CABLE ONLY

5-19 BROADBAND CABINET LINE SENSOR REMOVAL & DIRECTIONAL COUPLER INSTALLATION
 (Continued)



NEW WIRING DIAGRAM
 ILLUSTRATION 5-11

5-20 RE-INSTALL PROTECTIVE COVERS

1. Replace the I/F cover and four (4) pan head screws that secure the cover.

5-21 RESTORE SYSTEM POWER

1. Notify all personnel working on system that tags will be removed from PDU and circuit breakers will be turned on.
2. Reconnect both J1 power cables to the back of the RF (MR1) and BroadBand (MR6) Cabinets.
3. Switch circuit breaker CB1 on back of the RF Cabinet (MR1) and BroadBand Cabinet (MR6) to ON position.
4. Remove tag and unlock the RF and BroadBand Cabinet circuit breakers on the PDU.
5. Switch circuit breakers at the PDU to the ON position for the RF Cabinet (MR1) and BroadBand Cabinet (MR6).
6. Reset any tripped circuit breakers.
7. Verify that all system Cabinets are powered on.
8. Bring up system or reset TPS as needed.

SECTION 6 – RF CABINET KIT AND 5.X MN SPECTRO RF CABINET UPGRADE KIT

Note

This section applies to M1040FK.

6-1 RF CABINET KIT

The M1040FK RF Cabinet Kit provides cables for connection within the RF Cabinet between the new Analog Processor Board, 46-321382G1 and the other modules. The 5.x Spectro RF Cabinet Upgrade Kit is not included with M1040FK.

Installation procedures and illustrations in this section refer to kit item numbers listed in Table 6-1. Refer to Illustration 6-1.

TABLE 6-1
RF CABINET KIT (M1040FK)

ITEM	PART NO	S/C #	DESCRIPTION	QUANT
3	46-243775G747	None	7 foot 9-conductor Cable, MR1-A9-J12 to MR1-A7-J11	1
4	46-243775G748	None	7-1/2 foot Coax Cable, MR1-A9-J2 to MR1-A7-J14	1
7	2101659	None	Cable, MR1-A3-J11 to MR1-A7-J6 & MR1-A9-J6	1
8	46-230194P1	78483	BNC Feed through Connector, Female to Female, Isolated Ground	3
9	46-265067P1	84702	Cable Mount, I/F Panel Cable Interconnect	8
12	46-251182P616	None	Rating Plate, 46-301924G1 Kit Added	1
22	46-328000G844	None	7-1/2 foot 37-conductor Cable, MR1-A9-J11 to MR1-A7-J23	1
23	46-243775G843	None	7-1/2 foot 37-conductor Cable, MR1-A10-P2201 to MR1-A7-J24	1
24	46-208758P5	49924	13.38" x .301" Self-Locking Cable Tie	20
25	2104698	None	Spectroscopy Detector W/ BNC Cables, (MR1-A3-J1 to MR1-A7-J16 & MR1-A3-J9 to MR1-A7-J15)	2
26	2110643	None	Firmware Kit for 5.4 1.5T Spectroscopy	1

The RF Cabinet Kit includes items listed in Table 6-1.

1. Unpack RF Cabinet Kit from Box 1 and verify that contents are complete. Refer to PDI delivered with upgrade to locate missing items and/or verify shortages.

Aside: When kit parts are picked from a manufacturing stockroom, the part bags are marked with the S/C (Stock Code) or the stockroom "pick slip" is included. The part identification number, which is found on the fourth line of this slip, is either the 5-digit stock code or the part number.

6-2 RF CABINET CABLE INSTALLATION

Note

This section applies to M1040FK.

6-2-1 M1040FK

1. Install three BNC insulated ground feed through connectors (item 8) into Cab. I/F Panel J14, J15, and J16.
2. Install two cable mounts (item 9) into each 9-pin Subminiature D openings J6, J11, J23, & J24 of Cab. I/F Panel.
3. Use Table 6-2 as a checklist and install new cables as follows: See Illustration 6-1.
 - a. Route and connect cable 46-243775G747 (item 3) to Dynamic Disable Module J12 and Cab. I/F Panel J11.
 - b. Route and connect coax cable 46-243775G748 (item 4) to Dynamic Disable Module J2 and Cab. I/F Panel J14.
 - c. Route and connect cable 2101659 (item 7) to RF Power Monitor J11 and Cab. I/F Panel J6 and Dynamic Disable Module J23.
 - d. Route and connect coax cable 46-328000G844 (item 22) to Dynamic Disable Module J11 and Cab. I/F Panel J23.
 - e. Route and connect coax cable 46-243775G843 (item 23) to RF Amplifier Module P2201 and Cab. I/F Panel J24.
 - f. Route and connect coax cable 2104698 (item 25) to RF Power Monitor J1 and Cab. I/F Panel J16. Attach detector box to Power Monitor Module rear panel with double back tape provided on the detector box.
 - g. Route and connect coax cable 2104698 (item 25) to RF Power Monitor J9 and Cab. I/F Panel J15. Attach detector box to Power Monitor Module rear panel with double back tape provided on the detector box.

TABLE 6-2
NEW CABLE CONNECTIONS

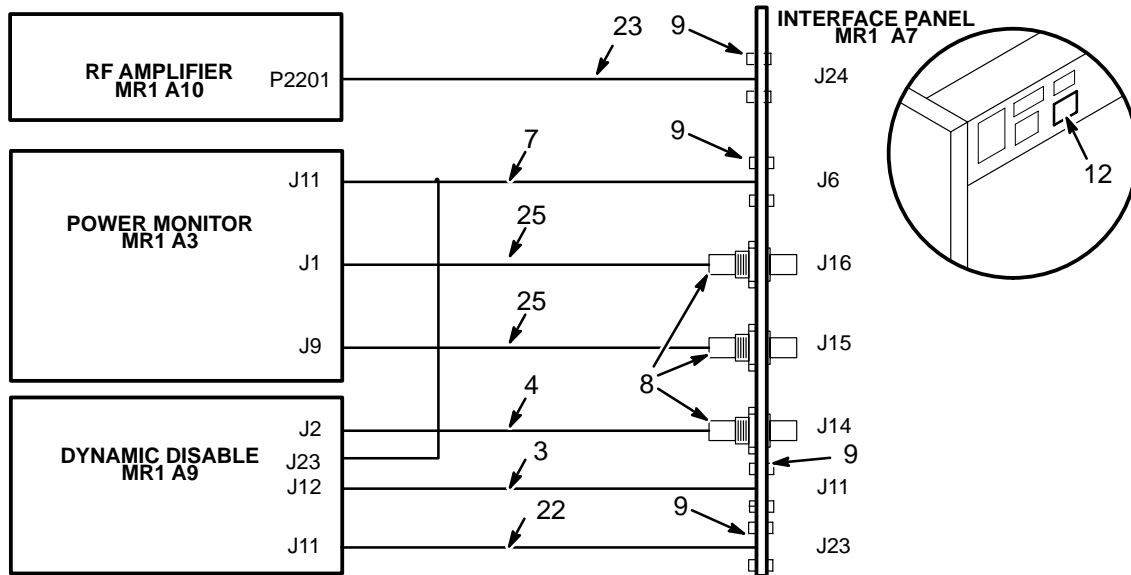
CABLE PART NUMBER	MODULE CONNECTION	I/F PANEL CONNECTION
46-243775G747	MR1 A9 J12	MR1 A7 J11
46-243775G748	MR1 A9 J2	MR1 A7 J14
2101659	MR1 A3 J11	MR1 A7 J6 & MR1 A9 J23
46-328000G844	MR1 A9 J11	MR1 A7 J23
46-243775G843	MR1 A10 P2201	MR1 A7 J24
2104698	MR1 A3 J1	MR1 A7 J16
2104698	MR1 A3 J9	MR1 A7 J15

6-3 RATING PLATE INSTALLATION

Note

This section applies to M1040FK.

1. Install rating plate (item 12) onto right-front corner (facing front of cabinet) on top of cabinet. See Illustration 6-1 (M1040FK).
2. Install cover on front of cabinet.



RF CABINET KIT AND NEW CABLE ROUTING (M1040FK)
ILLUSTRATION 6-1

6-4 RF CABINET CABLE CONNECTION

Note

This section applies to M1040FK.

1. Connect previously routed system cables listed in Table 6-3 (M1040FK).

TABLE 6-3
NEW CABLES CONNECTED TO RF CABINET (M1040FK)

RUN	CONNECTOR	TYPE OF CONNECTOR	REMARKS
461	MR1 A7 J3	RG223 BNC Coax	Exciter RF from System Cabinet through BroadBand RF Cabinet to Proton RF Amplifier
459	MR1 A7 J6	9-Pin Subminiature-D	RF Lock
738	MR1 A7 J24	37-Pin Subminiature-D	From BroadBand RF Cabinet
737	MR1 A7 J23	37-Pin Subminiature-D	From BroadBand RF Cabinet
462	MR1 A7 J11	9-Pin Subminiature-D	Unblank
460	MR1 A7 J14	RG223 BNC Coax	BB Spectro TR Bias
465	MR1 A7 J15	RG223 BNC Coax	BB Spectro RF Power Monitor Sensor #2
464	MR1 A7 J16	RG223 BNC Coax	BB Spectro RF Power Monitor Sensor #1

6-5 SPECTRO EPROM INSTALLATION

Note

This section applies to M1040FK.

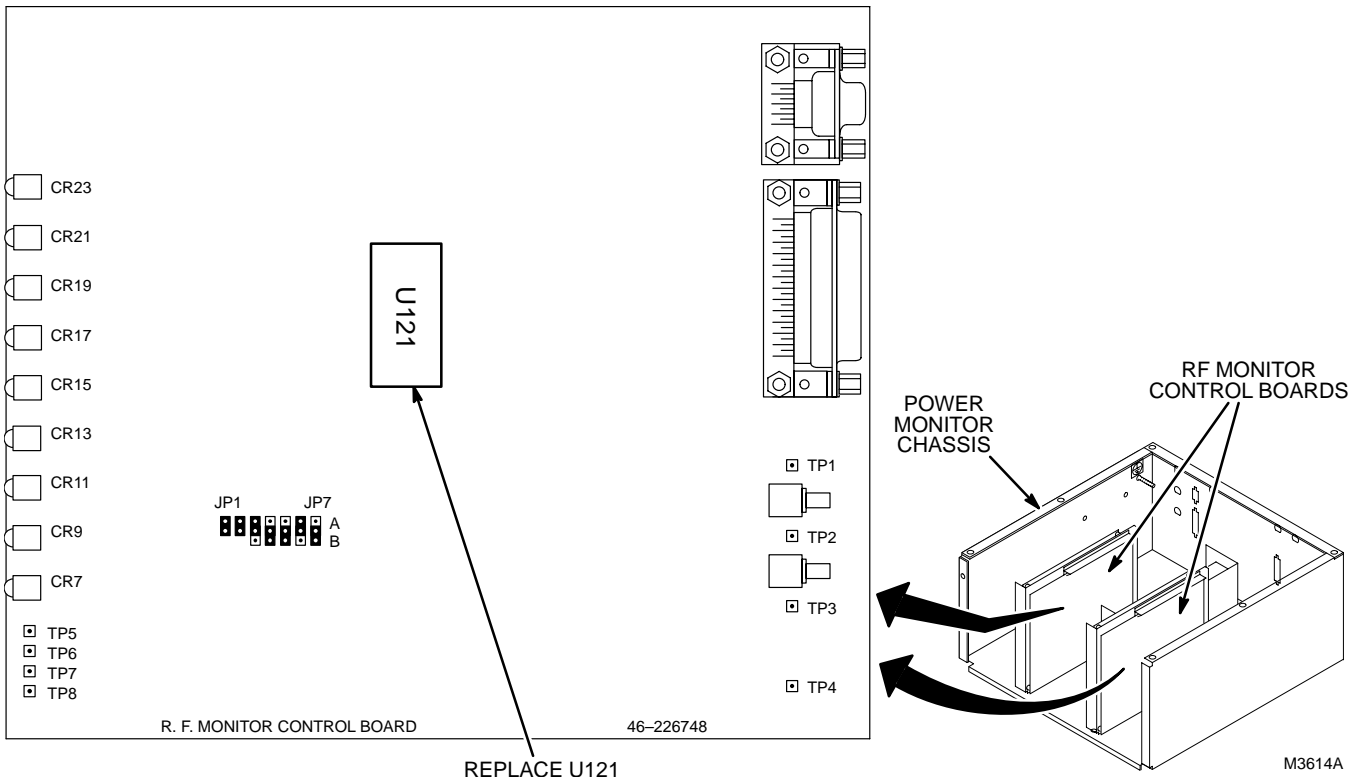
Refer to Section 10-2-2, SPECTRO EPROM INSTALLATION, for the procedure to install the Spectro EPROM (used to extend the unblank time for PROBE) into the Erbttec RF Amplifier.

6-6 POWER MONITOR EPROM INSTALLATION

Note

This section applies to M1040FK only.

1. Verify RF Cabinet power is shut off at the PDU, lock out, and tag status before continuing.
2. Remove RF Cabinet front door.
3. Remove four #10-32 screws securing RF Power Monitor to front of Cabinet.
4. Slide RF Power Monitor out of cabinet.
5. Remove seven pan head screws from power monitor top cover. Remove and set aside cover.
6. Remove four flat head screws and four pan head screws, with lockwashers, from front cover.
7. Disconnect and mark connector J1 of key assembly from connector J4 of Control Board #1 (A1) and connector J2 from connector J4 of Control Board #2 (A2). Remove and set aside front cover of Power Monitor.
8. Replace U121 EPROM with new EPROM, 2101782-2, on each Control Board. See Illustration 6-2.
9. Relabel each Control Board, 46-226748G14.



DISCONNECTING POWER MONITOR CABLES AND WIRES
ILLUSTRATION 6-2

6-6 POWER MONITOR EPROM INSTALLATION (Continued)

10. Holding RF Power Monitor front cover in place, install connector J1 from Key Assembly onto connector J4 of Control Board #1 and connector J2 onto connector J4 of Control Board #2.
11. Attach RF Power Monitor front cover to board assemblies with four flat head screws previously removed. Align cover holes with board LEDs. Tighten screws.
12. Attach RF Power Monitor front cover to chassis with four pan head screws and lockwashers previously removed. Tighten screws.
13. Replace power monitor top cover. Fasten with seven pan head screws previously removed.
14. Slide RF Power Monitor into the cabinet.
15. Install four pan head screws to secure RF Power Monitor to the cabinet.
16. Install RF Cabinet front door.

SECTION 7 – SYSTEM CABINET KIT

Note

This section applies to M1040FF and M1040FK.

7-1 UNPACKING SYSTEM CABINET KIT

The System Cabinet kit provides BB (BroadBand) Exciter and BB Receiver modules for Spectroscopy acquisition at other than Proton (Hydrogen) frequency.

The System Cabinet is shipped in Box 1. Refer to Table 7-1 for contents.

TABLE 7-1
SYSTEM CABINET KIT

ITEM	PART NO.	QUANT.	DESCRIPTION
2	46-264232G1	1	BB RECEIVER (MR2 A15 A18 A3)
3	46-264230G2	1	BB EXCITER (MR2 A15 A20 A3)
6	46-208560P12	10	SCREW, 4-40 X 0.312 BIND HD STL

7-2 RECEIVER BOARD AND EXCITER BOARD REMOVAL

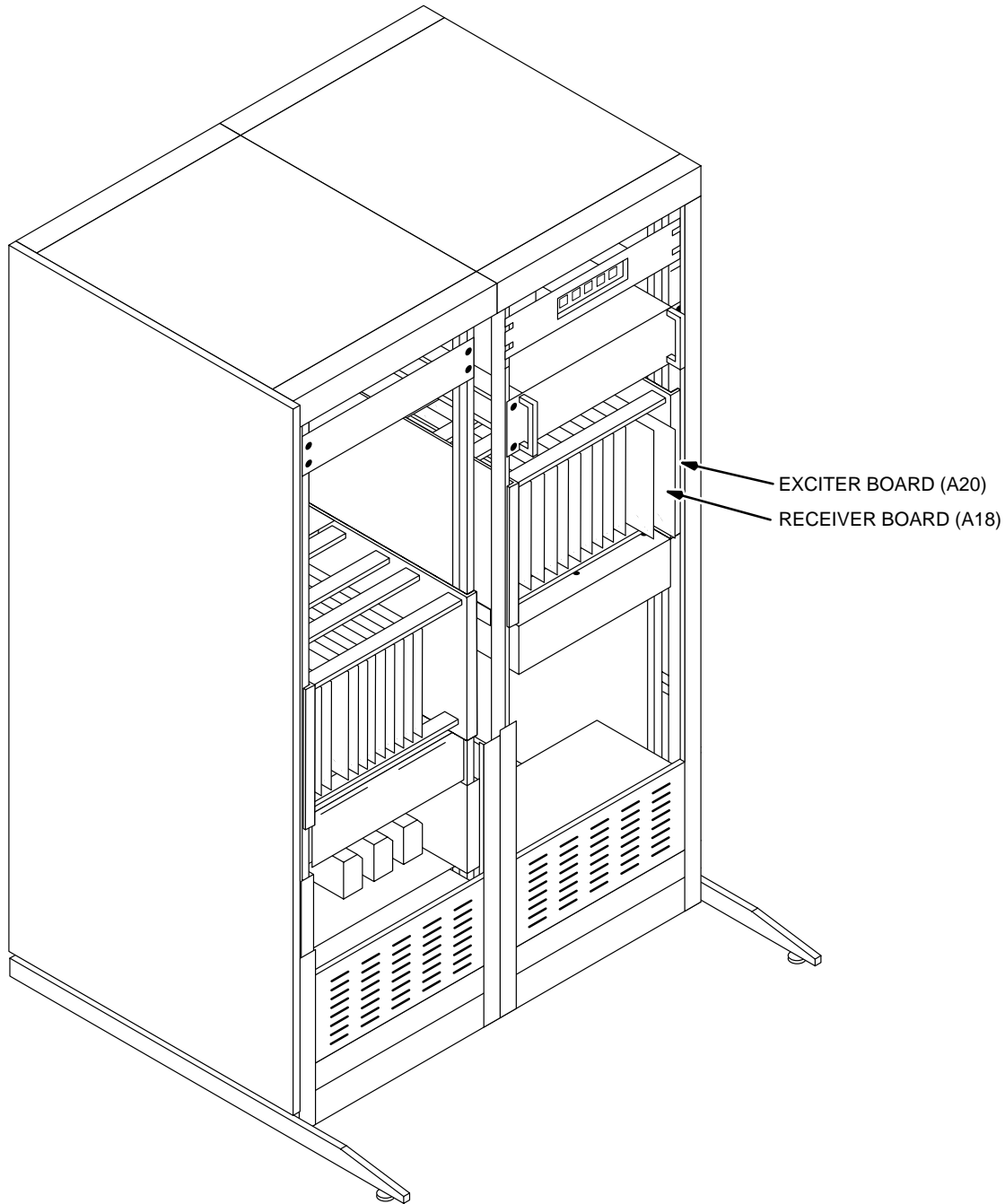
Note

The Receiver Board designators are MR2 A15 A18 (4.X) and MR2 A15 A16 (5.X).

The Exciter Board designators are MR2 A15 A20 (4.X) and MR2 A15 A18 (5.X).

1. If the flow chart (Illustration 1-5) is being followed, System Cabinet power should be shut off because PDU power is shut off. Verify that PDU power is disconnected, locked out, and tagged before continuing.
2. Put on a grounded wrist band.
3. Verify cables are labeled before disconnecting. Disconnect cable from J12 connector on Receiver Board and connector J14 from Exciter Board of TPS Assembly (A15).
4. Remove four screws which secure Receiver Board and Exciter Board to TPS Assembly (A15).
5. Use ejectors to push Receiver Board and Exciter Board out from connectors at rear of TPS Assembly (A15). Refer to Illustration 7-1.
6. Slide out and remove Receiver Board and Exciter Board from TPS Assembly (A15). Refer to Illustration 7-1.
7. Put each Receiver Board and Exciter Board into individual static free bags.
8. Put static free bags onto a workbench.

7-2 RECEIVER BOARD AND EXCITER BOARD REMOVAL (Continued)



M3518A

RECEIVER BOARD AND EXCITER BOARD LOCATIONS (4.X)
ILLUSTRATION 7-1

Note

For 5.X systems, the Systems Cabinet is only one bay. In addition, for 5.X, the Exciter Board is in slot 18, not 20. The Receiver Board is in slot 16, not 18.

7-3 BROADBAND RECEIVER MODULE INSTALLATION

Note

The BroadBand Receiver Module designators are MR2 A15 A18 A3 (4.X) and MR2 A15 A16 A3 (5.X).

The Narrowband Receiver Module designators are MR2 A15 A18 A2 (4.X) and MR2 A15 A16 A2 (5.X).

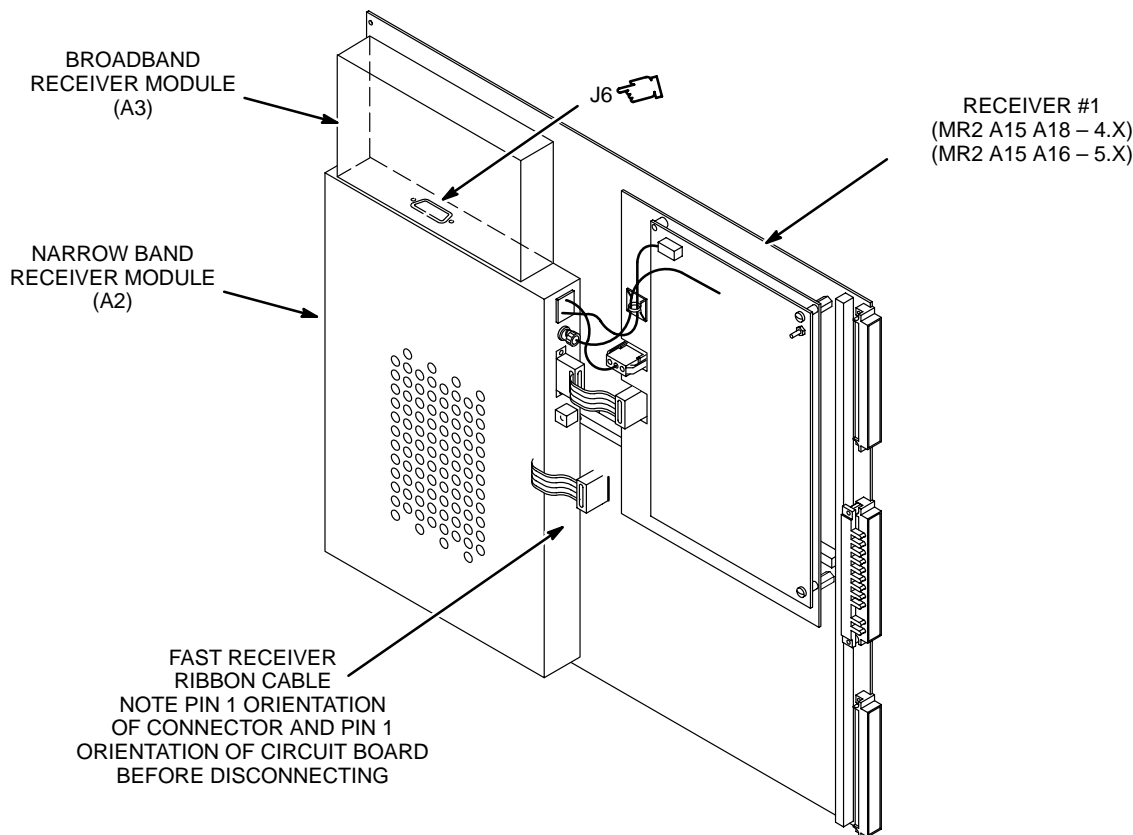
Install BroadBand Receiver Module onto Narrowband Receiver Module of Receiver Board as follows:

1. Put on a grounded wrist band.
2. Remove Receiver Board (item 2) from static free bag.
3. Remove two screws and protection cover from connector J6 of Narrowband Receiver Module. Discard cover.

Note

Make sure the screws just removed in step 3 are re-installed to secure connector J6 in next step. If the screws are not re-installed, correlated noise may develop.

4. Install two screws removed in step 3 to secure connector J6 to Narrowband Receiver Module and tighten.
5. Slide connector J6 of BroadBand Receiver Module into connector J6 of Narrowband Receiver Module.
6. Install four screws (item 6) through Receiver Board and into BroadBand Receiver Module. Tighten screws.
7. Put assembled Receiver Board into a static free bag.



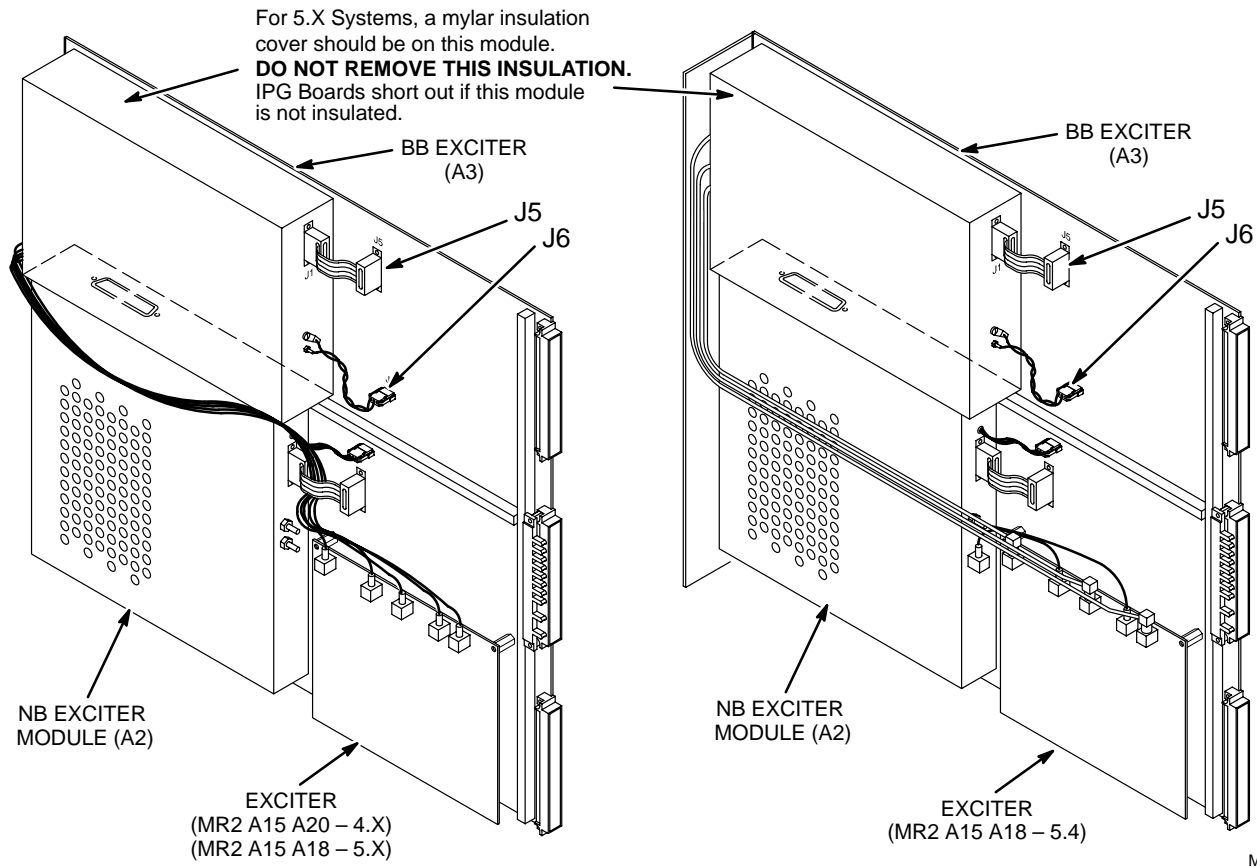
BROADBAND RECEIVER MODULE INSTALLED
ILLUSTRATION 7-2

M3525A

7-4 BROADBAND EXCITER MODULE INSTALLATION

Install BroadBand Exciter Module (A3) onto Narrowband Exciter Module (A2) of Exciter Board as follows:

1. Put on a grounded wrist band.
2. Move wire harness above Narrowband Exciter Module (A2) along the front of Narrowband Exciter Module. (Old style Narrowband Exciter Module (A2 – Pre 5.4))
3. Remove two screws and protection cover from connector J7 of Narrowband Exciter Module (A2). Discard cover.
4. Install two screws removed in step 3 to secure connector J7 to Narrowband Exciter Module (A2) and tighten.
5. Slide connector J7 of BroadBand Exciter Module (kit item 3) into connector J7 of Narrowband Exciter Module (A2).
6. Install four screws (item 6) through Exciter Board and into BroadBand Exciter Module (A3). Tighten screws. Refer to Illustration 7-3.
7. Install connector J5 into connector J5 of Exciter Board. Refer to Illustration 7-3.
8. Secure connector J5 of ribbon cable to Exciter Module with two #4-40 screws and tighten.
9. Install connector J6 of cable assembly into connector J6 of Exciter Board.
10. Put assembled Exciter Board into a static free bag.



M3517A

BROADBAND EXCITER MODULE INSTALLED
ILLUSTRATION 7-3

7-5 RECEIVER BOARD AND EXCITER BOARD INSTALLATION

Install Receiver Board and Exciter Board onto TPS Assembly (A15) as follows:

1. Put on a grounded wrist band.
2. Remove Receiver Board and Exciter Board from static free bags and slide into TPS Assembly (A15) until the connector at back of chassis lock into position and ejectors move into their locked positions.
3. Install four pan head screws to secure the Receiver Board and Exciter Board to TPS Assembly (A15) and tighten.
4. Simultaneously install connector J12 to Receiver Board and connector J14 to Exciter Board.

7-6 SYSTEM CABINET CABLE CONNECTION

1. Connect previously routed cables listed in Table 7-2 to System Cabinet Interface Panel.

TABLE 7-2
NEW CABLES CONNECTED TO SYSTEM CABINET

CONNECTOR	TYPE OF CONNECTOR	RUN	REMARKS
MR2 A11 J1	RG223 BNC Coax	466	RF Exciter out to BroadBand Cabinet (Proton RF or BB Spectro RF)
MR2 A11 J3	RG223 BNC Coax	469	Spectroscopy Receive from 20 dB Gain Block

SECTION 8 – PENETRATION PANEL KIT

Note

This section applies to M1040FF and M1040FK.

8-1 PENETRATION PANEL KIT

The Penetration Panel kit provides a new Quad II / Roemer Body Coil Filter Panel that includes the 20 dB Gain Block (PP1 A13) and connectors for additional RF cables. The Dynamic Disable and Inductive Drive Filter (PP1 A11) is installed on the new filter panel after being removed from a previously installed Penetration Panel, or obtained from the M1040FJ Options Prerequisite Upgrade.

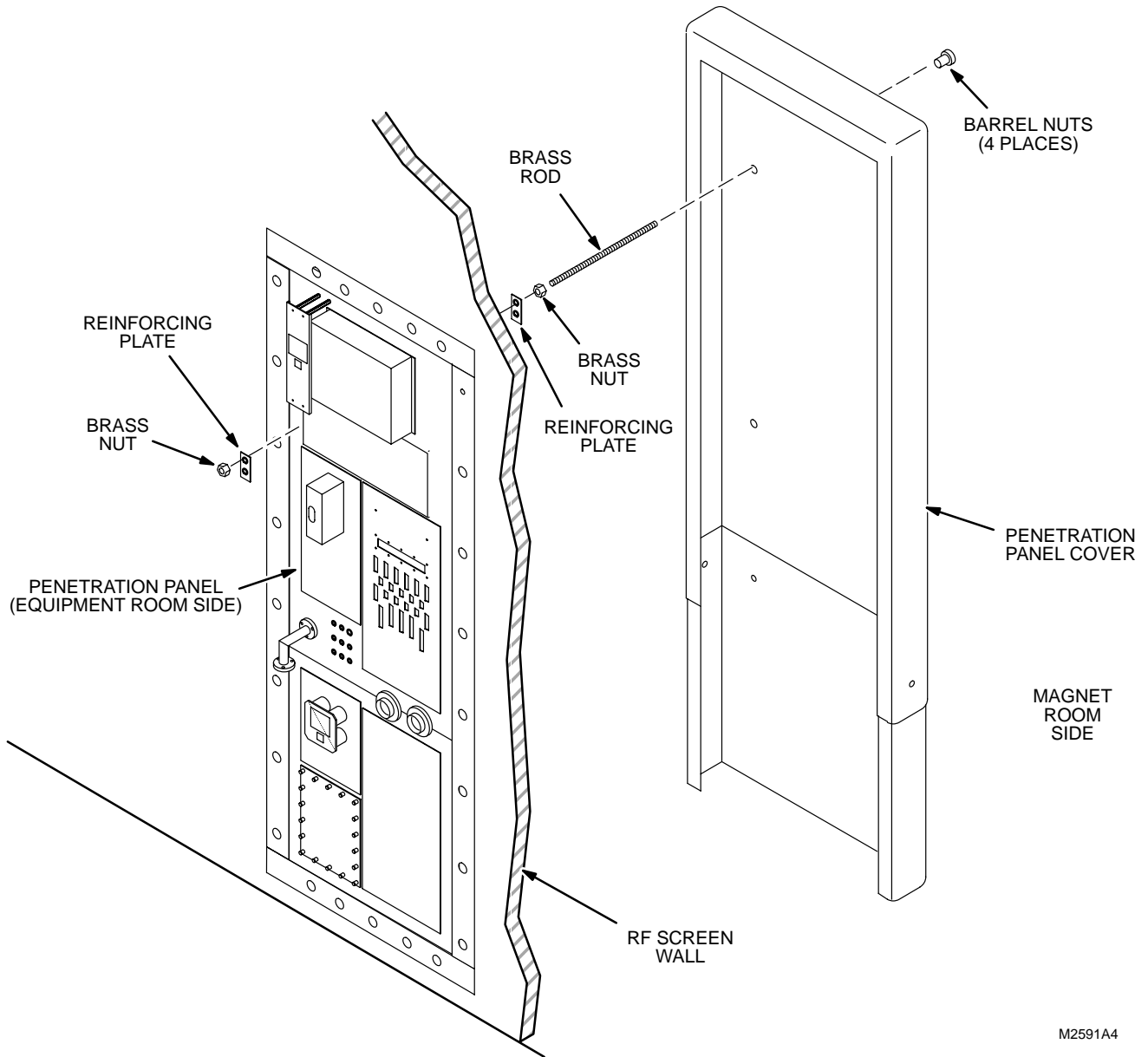
1. Unpack Penetration Panel Kit from Box 1 and verify that contents listed in Table 8-1 are complete.
2. If Signa Advantage Options Prerequisite Upgrade is also being installed, locate the Dynamic Disable and Inductive Drive Filter (PP1 A11) delivered with M1040FJ upgrade.
3. If the flow chart (Illustration 1-5) is being followed, RF Cabinet power should be shut off because PDU power is shut off. Verify that PDU power is disconnected, locked out, and tagged before continuing.

TABLE 8-1
PENETRATION PANEL KIT

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
2	46-301829G1	20 dB Gain Block Plate Assembly	1
3	46-208560P123	Binding Head Screw, 10-32 x 3/8, Stainless Steel	24
4	516A770P604	Blnding Head Screw, 6-32 X 1/4, Stainless Steel	8

8-2 PENETRATION PANEL COVER REMOVAL

1. Remove equipment room and magnet room covers and/or other field installed decorative enclosures for access to Penetration Panel. See Illustration 8-1.



M2591A4

PENETRATION PANEL COVER REMOVAL
ILLUSTRATION 8-1

8-3 FILTER PANEL REMOVAL

Note

The following procedure assumes a Signa Advantage (4.X) or Signa Advantage 1.5T (5.X) is already installed and disconnection of some cables are required.

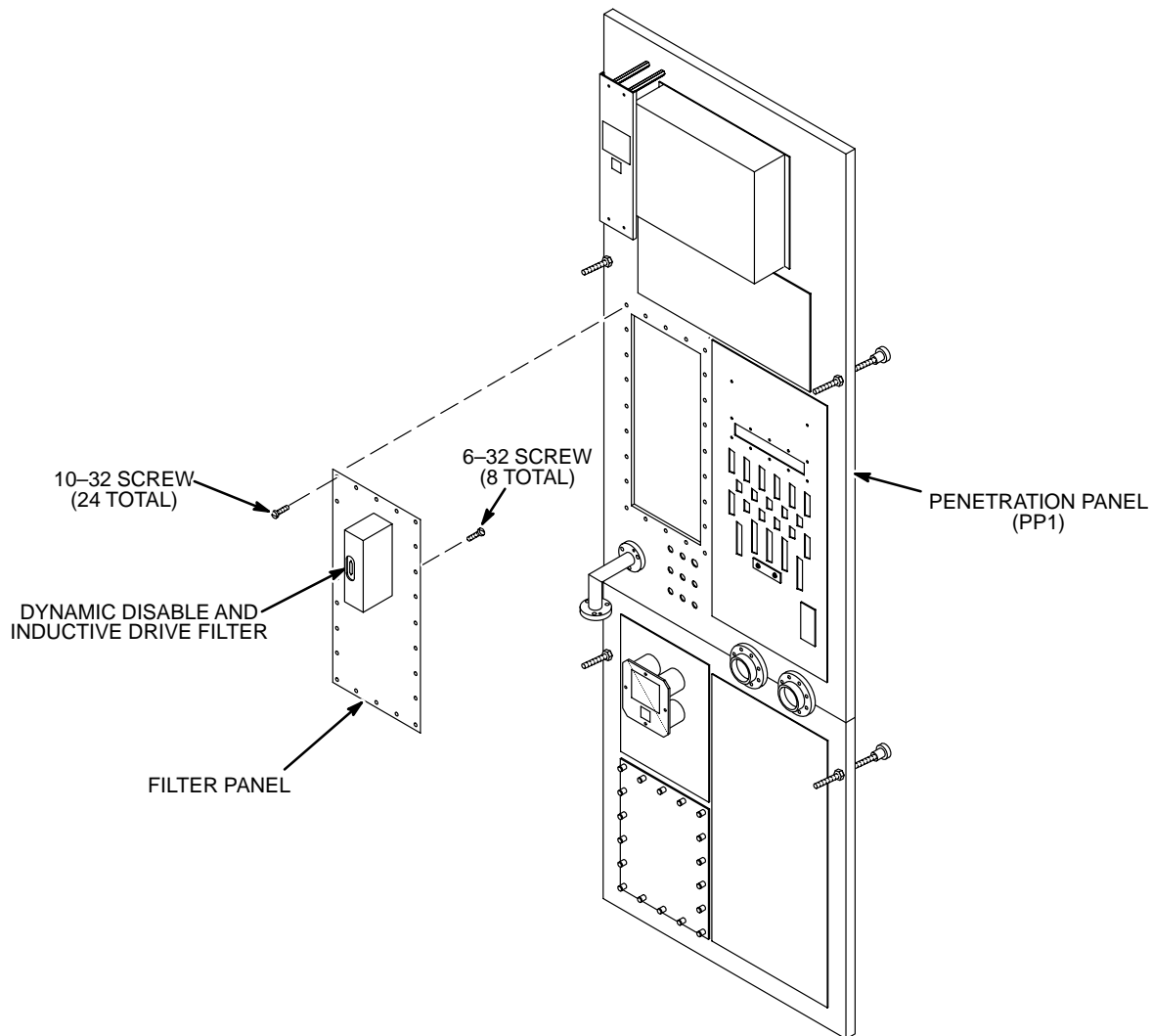
1. Disconnect cable end from Dynamic Disable and Inductive Drive Filter Module (PP1 A11). Refer to Table 8-2 cable ends to be disconnected.

TABLE 8-2
RUNS DISCONNECTED FROM FILTER PANEL

CONNECTOR	TYPE OF CONNECTOR	RUN
EQUIPMENT ROOM CABLES		
PP1-J71	15-pin Subminiature-D	470
MAGNET ROOM CABLES		
PP1-J72	BNC	474
PP1-J73	BNC	475
PP1-J74	BNC	476
PP1-J75	BNC	477
PP1-J76	BNC	478

8-3 FILTER PANEL REMOVAL (Continued)

2. Unfasten and remove 24 10-32 X 3/8" screws that fasten filter panel to Penetration Panel. See Illustration 8-2.
3. Remove filter panel from Penetration Panel.
4. Unfasten and remove eight 6-32 X 3/8 screws that fasten Dynamic Disable and Inductive Drive Filter to filter panel. See Illustration 8-2.
5. Place empty filter panel on discard pile.

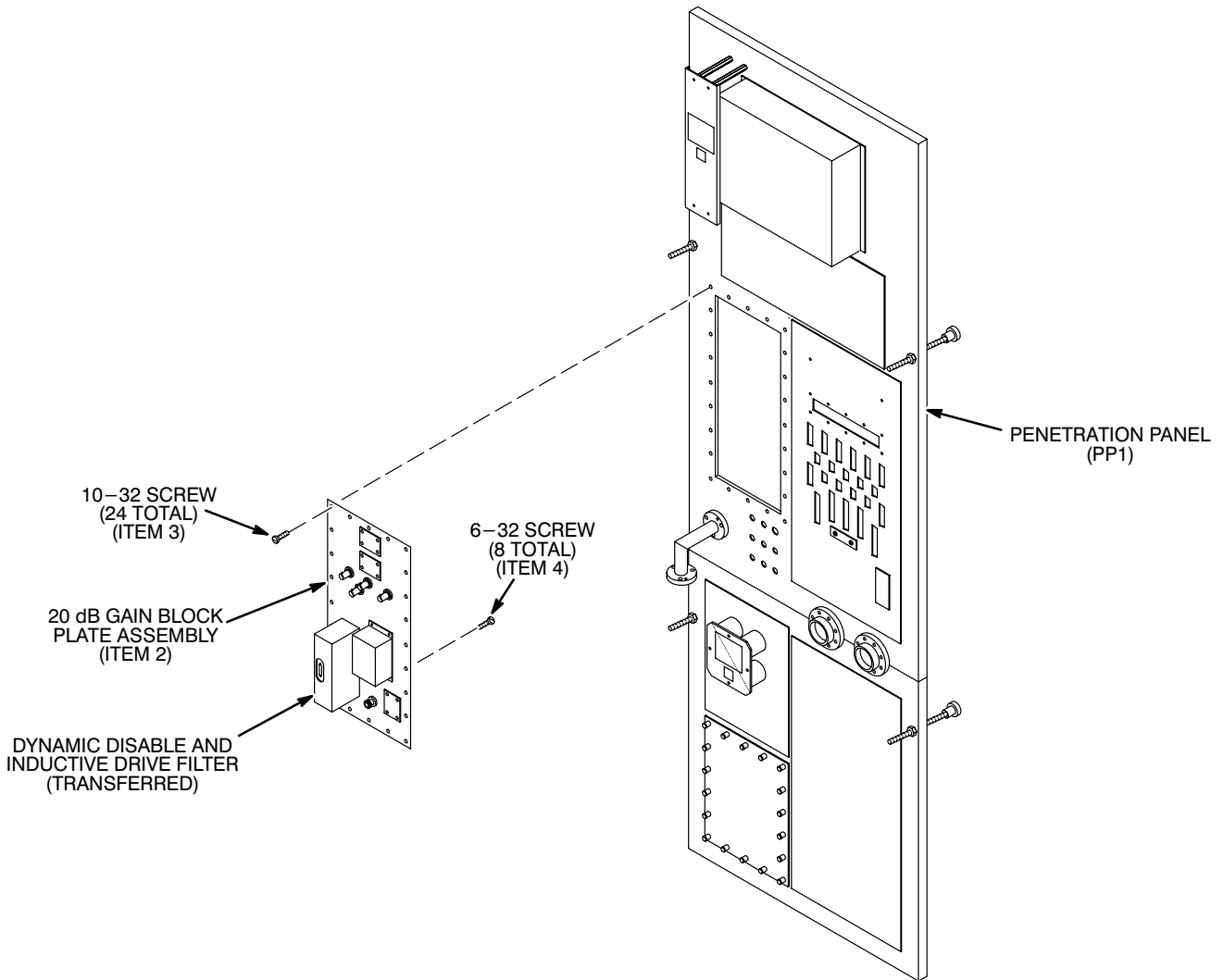


M3570A

REMOVE DYNAMIC DISABLE AND INDUCTIVE DRIVE FILTER ASSEMBLY
ILLUSTRATION 8-2

8-4 20 dB GAIN BLOCK PLATE ASSEMBLY INSTALLATION

1. Fasten Dynamic Disable and Inductive Drive Filter (J71 toward panel top) on new 20 dB Gain Block plate assembly (item 2) using six furnished 6-32 screws (item 4). See Illustration 8-3.
2. Align holes in plate of plate assembly with holes in Penetration Panel, install the 24 #10-32 screws (item 3), and tighten screws. See Illustration 8-3.



M3479A

INSTALL ADAPTOR PLATE ASSEMBLY
ILLUSTRATION 8-3

8-5 CONNECT CABLES TO 20 dB GAIN BLOCK PLATE

1. Connect previously routed spectroscopy subsystem cables to both sides of the new Penetration Panel as marked. Table 8-3 lists cables that are connected to the new 20 dB Gain Block (PP1 A13) plate. Also connect cables previously disconnected from Dynamic Disable and Inductive Drive Filter (PP1 A11).

TABLE 8-3
PREVIOUS AND NEW RUNS CONNECTING TO NEW 20 dB BLOCK PLATE

CONNECTOR	TYPE OF CONNECTOR	RUN
EQUIPMENT ROOM CABLES		
PP1-J79	37-pin Subminiature-D	470
PP1-J83	SC (right angle adaptor)	468
PP1-A13-OUT	BNC	469
MAGNET ROOM CABLES		
PP1-J72	BNC	474
PP1-J73	BNC	475
PP1-J74	BNC	476
PP1-J75	BNC	477
PP1-J76	BNC	478
PP1-J79	BNC	472
PP1-J83	SC	473

SECTION 9 – MAGNET ENCLOSURE KIT

Note

This section applies to M1040FF and M1040FK.

9-1 UNPACKING MAGNET ENCLOSURE KIT

The Magnet Enclosure Kit provides interconnect, Spectroscopy TR Module (and Preamplifier inside) for Spectroscopy Surface Coils operating at Phosphorus frequency. Alternate Multi-Nuclear TR Modules are available (2100718-#) under specific conditions where not prohibited.

The Magnet Enclosure Kit is shipped in Box 1. Refer to Table 9-1 for contents.

TABLE 9-1
MAGNET ENCLOSURE KIT

ITEM	PART NO.	QUANT.	DESCRIPTION
3	46-301166P1	2	RECEPTACLE, PANEL FEED THROUGH, LEMO
4	46-301319P1	4	WASHER, 1/2" OD, .36 ID, .030 THICK, 300 SST
5	2100718	1	PHOSPHORUS SPECTROSCOPY TR MODULE (MG2 A16 A7)
6	46-282467G4	1	SPECTROSCOPY COIL ADAPTER (MG2 A16 A7 A3)
7	46-301205P1	2	CABLE, WHITE RG58/U W/ LEMO STRAIGHT AND ELBOW CONNECTORS
8	46-301338P1	2	ADAPTOR, BNC TO LEMO
9	46-301690G1	1	CABLE ASSEMBLY, RUN NO. 456, MG3-A17-J3 TO MG2-A16-J1
10	46-243775G708	1	CABLE, RUN NO. 455, MG3-A17-J4 TO MG2-A16-J2
16	46-208990P1	1	ADAPTOR, 50 OHM IMPEDANCE, BULKHEAD/PANEL, BNC
20	46-221865P1	1	CONNECTOR, 50 OHM IMPEDANCE, JACK-JACK, N ADAPTORS
21	46-251182P229	1	RATING PLATE, MODIFICATION KIT ADDED, 46-301548G1
22	46-306506P1	1	ADAPTOR, N PLUG TO SC JACK
205	46-320405P5	1	9 COMPARTMENT BOX, FOR SMALL HARDWARE PIECES

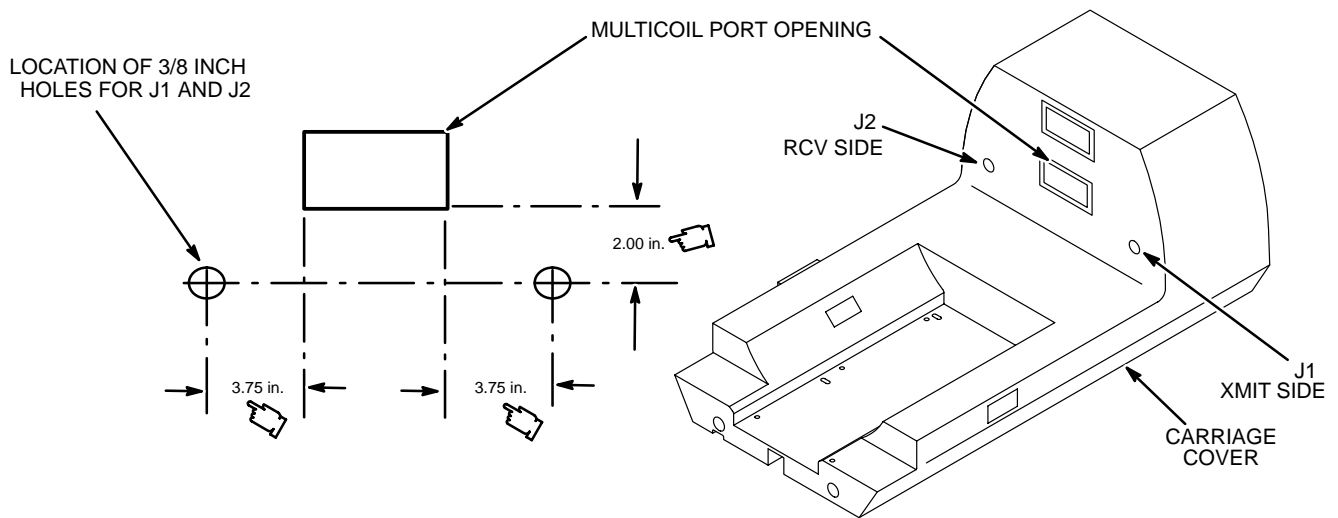
9-2 CARRIAGE COVER REMOVAL

Remove carriage cover from Carriage Cover Assembly (A16) of Magnet Enclosure (MG2) as follows:

1. Remove four screws and washers from top of carriage cover.
2. Lift up rear of carriage cover until it clears cable track.
3. Slide carriage cover forward until it clears front stops.
4. Disconnect Run 403 from Head Preampfier (MG2 A16 A3-OUTPUT).
5. Disconnect Run 485 from from Head Coil TR Switch (MG2 A16 A5 J6).
6. Put carriage cover onto a workbench.

9-3 CARRIAGE COVER MODIFICATION

1. Locate holes to drill for J1 and J2 on carriage cover. The centers of these holes are 2.00 in. below and 3.75 in. left and right from lower corners of Multicoil port opening. Refer to Illustration 9-1.
2. Drill two 3/8 in. holes in carriage cover as located in step 1.
3. Use a permanent marking pen to label holes J1 and J2 on inside of carriage cover. Refer to Illustration 9-1.

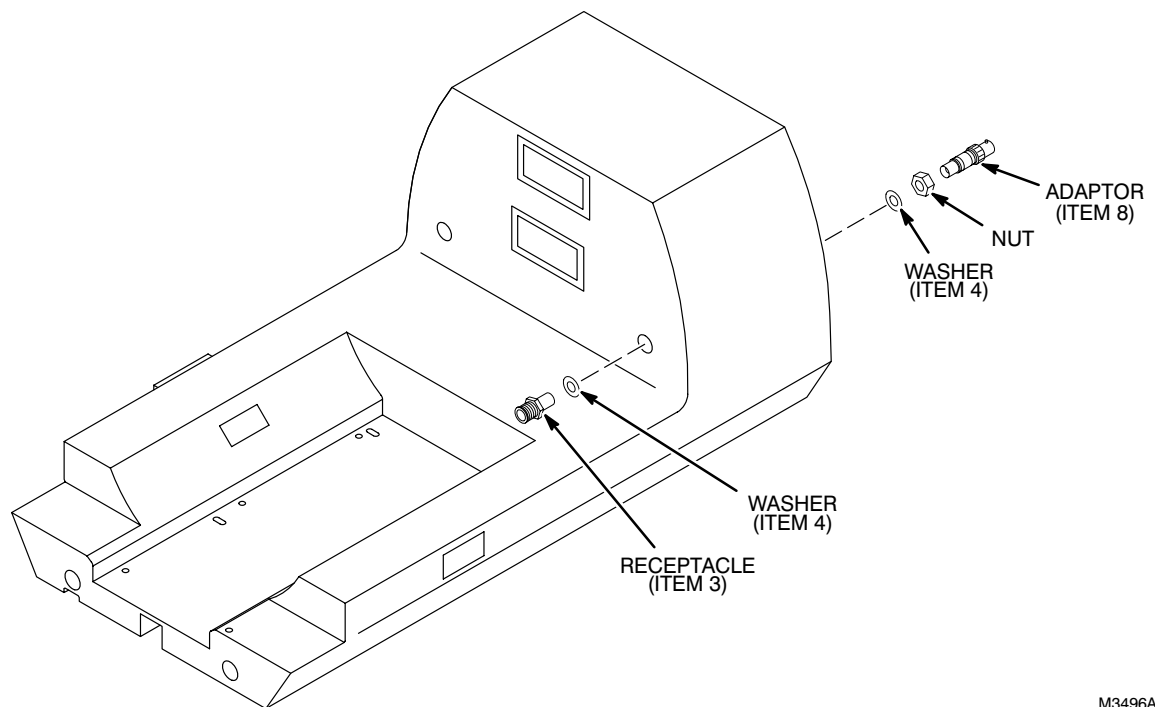


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DRILL TEMPLATE FOR CARRIAGE COVER
ILLUSTRATION 9-1

9-3 CARRIAGE COVER MODIFICATION (Continued)

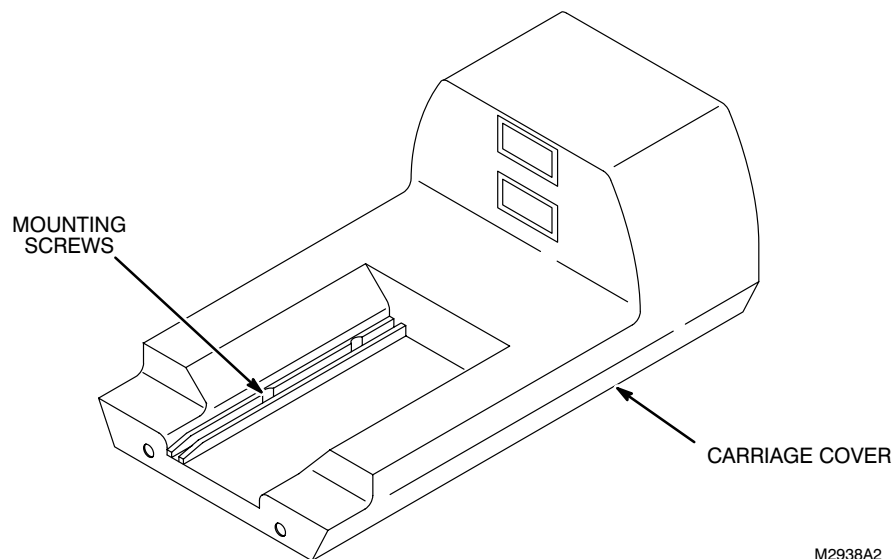
4. Remove nut from each Lemo receptacle (item 3).
5. Install washer (item 4) onto each receptacle.
6. Install assembled receptacle through hole J1 of carriage cover, install washer (item 4) and nut onto receptacle, and tighten nut. Refer to Illustration 9-2.
7. Install assembled receptacle through hole J2 of carriage cover, install washer (item 4) and nut onto receptacle, and tighten nut. Refer to Illustration 9-2.
8. Connect adaptor (item 8) onto receptacles J1 and J2. Refer to Illustration 9-2.
9. If present, remove protective covering, used for shipping, from carriage cover.



RECEPTACLE AND ADAPTOR INSTALLATION
ILLUSTRATION 9-2

9-4 CARRIAGE COVER INTERCONNECT

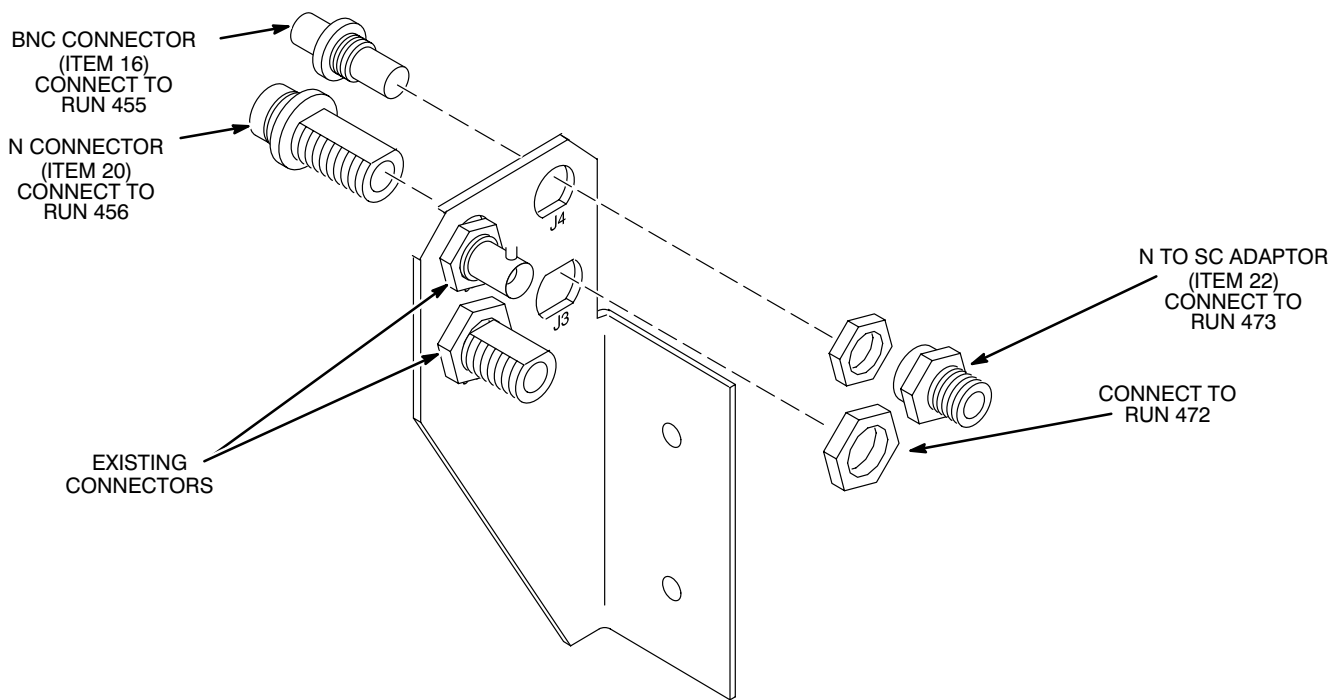
1. Feed new cables, Run 455 (item 10) and Run 456 (item 9) through cable track, down through hole in the bridge, and over to four-cable bracket on rear frame.
2. Turn carriage cover on its side and put onto the carriage.
3. Install cables onto carriage cover as follows:
 - a. Install existing Run 403 (46-243775G557) connector (output) to connector (output) of Preamp (A2) in carriage cover.
 - b. Install connector J6 of existing Run 485 (46-243775G757) to connector J6 of TR Switch (A1) in carriage cover.
 - c. Install connector J1 of new Run 456 cable 46-301690G1 (item 9) to connector J1 of adaptor on carriage cover. Label this cable inside the carriage cover the XMIT side.
 - d. Install connector J2 of new Run 455 cable 46-243775G708 (item 10) to connector J2 of adaptor on carriage cover. Label this cable inside the carriage cover the RCV side.
4. Align holes in front of carriage cover over front stops, slide carriage cover back onto front stops, and lower onto carriage plate.
5. Install four screws and washers onto carriage cover. Tighten screws. Refer to Illustration 9-3.



INSTALLING CARRIAGE COVER
ILLUSTRATION 9-3

9-5 CABLE INTERCONNECTION

1. Install BNC connector (item 16) through hole marked J4 on bracket (MG3 A17), install nut onto connector, and tighten nut.
2. Install "N" connector (item 20) through hole marked J3 on bracket (MG3 A17). Install nut onto connector, and tighten nut.
3. Install "N" to SC adaptor connector (item 22) on rear side of connector installed in step 2.
4. Connect end of Run 456 (marked MG3-A17-J3) to connector J3 on bracket.
5. Connect end of Run 455 (marked MG3-A17-J4) to connector J4 on bracket.



J3 AND J4 CONNECTORS
ILLUSTRATION 9-4

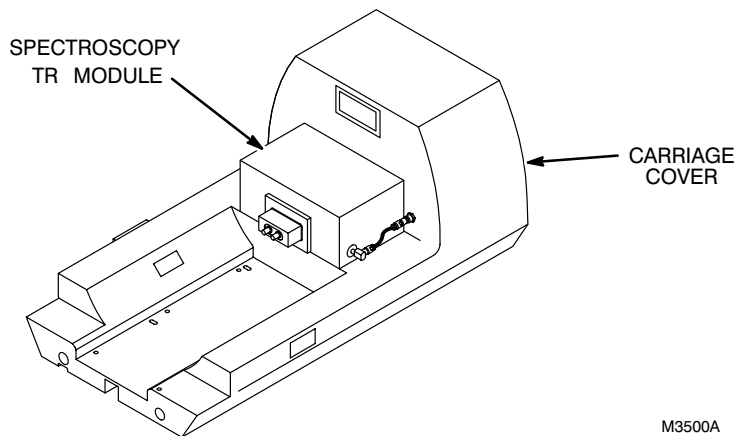
6. Connect previously routed Run 473 from Penetration Panel (PP1-J83) to N to SC Adaptor on J3 of bracket.
7. Connect previously routed Run 472 from Penetration Panel (PP1-J79) to BNC connector on J4 of bracket.

9-6 INSTALLING SPECTROSCOPY TR SWITCH MODULE



Do not leave the Spectro Phosphorus TR Module installed (connected / disconnected) during non-spectroscopy scanning. The BB Spectro TR Module will be installed and fully connected during Proton localizer scans per this document, this is acceptable. Once the BroadBand Spectroscopy scanning has been completed and the Narrowband scanning is resumed the Spectro TR Module should be removed from the bore of the magnet. It is important to remember that the Spectro TR Bias sent to the Spectro TR Module is monitored only when the BroadBand Spectro scan is selected.

1. Make sure mating Velcro strips are properly aligned on the bottom of Spectroscopy TR Module (A7) box (item 5).
2. Remove protective cover from Velcro strips.
3. Place Spectroscopy TR Module (A7) onto carriage cover of Carriage Cover Assembly (A16). Refer to Illustration 9-5.
4. Press down firmly onto Spectroscopy TR Module (A7) to secure Velcro to carriage cover.
5. Install one cable (item 7) to connector J1 on carriage cover and connector of Spectroscopy TR Module (A7). Refer to Illustration 9-5.
6. Install second cable (item 7) to connector J2 on carriage cover and connector of Spectroscopy TR Module. Refer to Illustration 9-5.
7. Install Quick Disconnect (item 6) into bezel of Spectroscopy TR Module. Refer to Illustration 9-5.

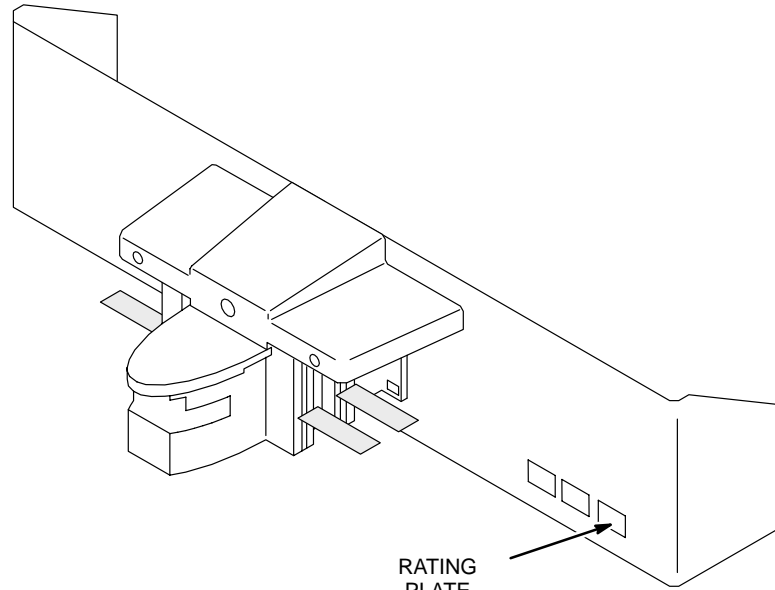


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SPECTROSCOPY TR MODULE INSTALLATION
ILLUSTRATION 9-5

9-7 INSTALLING RATING PLATE

1. Install rating plate (item 21) on base trim on front of Magnet Enclosure. Refer to Illustration 9-6.



RATING
PLATE
(ITEM 21)
LOCATION OF RATING PLATE
ILLUSTRATION 9-6

SECTION 10 – 5.X SPECIFIC RELATED OPTIONS

Note

This section applies to M1040FF and M1040FK.

For Spectroscopy to be fully operational, install the related options included in Table 10–1.

TABLE 10–1
RELATED OPTIONS

CAT #	SIGNA ADVANTAGE 1.5T (5.X) SYSTEMS	
	NEED?	DOCUMENTED IN:
M1040BH Resistive Shim for GE Magnets	Not required	<i>Direction 15144, Resistive Shim Option for S-I, S-II & S-III Magnets</i> (Delivered with Option – same as 4.X option)
M1040BJ SAGE Software	Maybe	<i>Direction 15309, Analysis Workstation Software</i> (Delivered with Catalog Option) (same as 4.X option) [Alternate outside sources are available]
M1040CB, CC,CD,CF Surface Coils	Obsolete	Operator Manuals (same as 4.X option) [Alternate outside sources are available]
M1040HT 5.X Option Key	Yes	<i>Direction 15400, Signa Advantage 1.5T & 0.5T System</i> (5.X Specific Option)
M1090MC Additional Magnetic Disk for System Host Computer	Yes	<i>Direction 15416, Second Disc Drive Option Installation</i> (5.X Specific Option)
Workstation	Yes, type determined and supplied by customer.	
Peripherals (printer, etc)	Determined and supplied by customer.	

Refer to the Directions listed with each catalog for installation instructions for:

- M1040BH Resistive Shim for GE Magnets
- Analysis Workstation and peripherals
- M1040CB, CC, CD, CF Spectro Surface Coils—Obsolete with UFI Introduction
- M1040BJ SAGE software

For your convenience, this section includes installation instructions for specific 5.X Option installation:

- M1090MC Additional Magnetic Disk (prerequisite)
- M1040HT Spectro Option Key and EPROM

10-1 M1090MC ADDITIONAL MAGNETIC DISK INSTALLATION

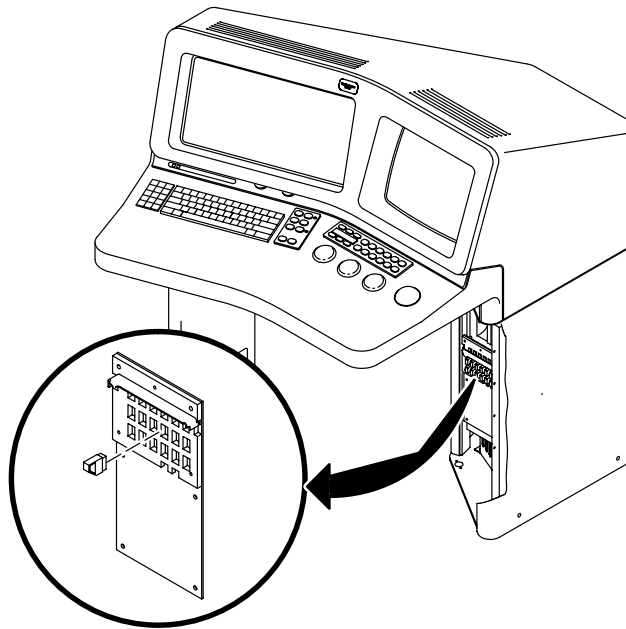
Refer to *Direction 15416, Second Disc Drive Option Installation*, for the procedure to install the second disc drive into the Genesis computer cabinet.

10-2 M1040HT SPECTRO OPTION KEY AND EPROM INSTALLATION

M1040HT includes the option key (317350G1), Proton Spectroscopy (PROBE) specific EPROM and a Quick Disconnect Box (this may be discontinued). This option key is needed for Proton Spectroscopy and is required for BroadBand Spectroscopy.

10-2-1 SPECTRO OPTION KEY

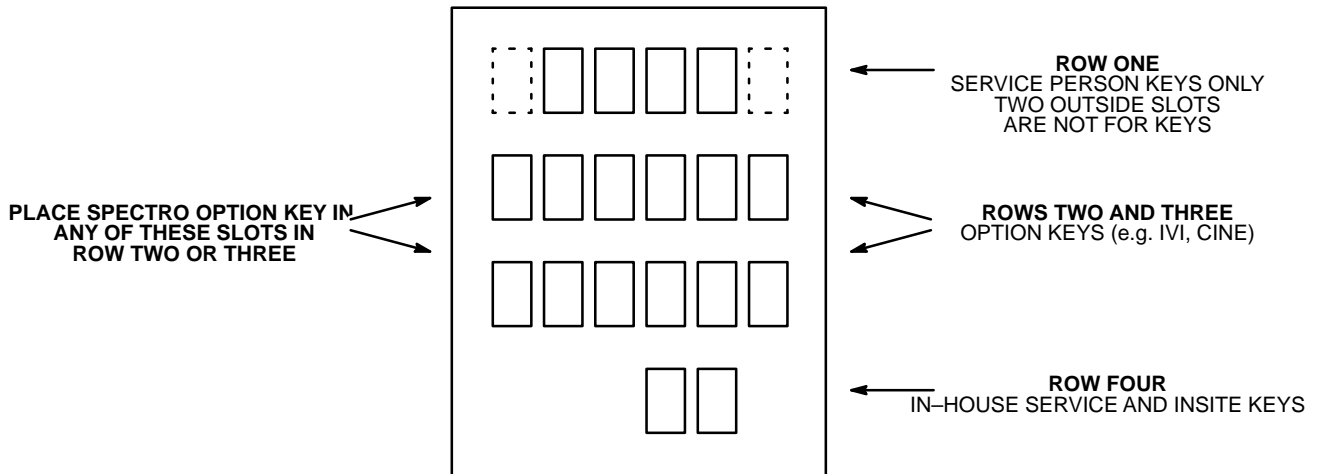
To install the Spectro Option Key, refer to Illustration 10-1 and Illustration 10-2. Once installed the option key is site specific and cannot be moved from one system to another. This key needs to be in place at all times Spectro is to be used. If taken out, Spectro can be reinitialized by bringing the system down, inserting the key and then bringing the system back up again.



- STEP 1**
REMOVE FRONT COVER
OF CONSOLE PEDESTAL
- STEP 2**
LOCATE PROPER KEY SLOT
- STEP 3**
INSERT KEY INTO SOCKET
PRESS FIRMLY
BUT DO NOT DAMAGE PINS

M3724A

OPTION KEY LOCATION
ILLUSTRATION 10-1



PLACE SPECTRO OPTION KEY IN
ANY OF THESE SLOTS IN
ROW TWO OR THREE

ROW ONE
SERVICE PERSON KEYS ONLY
TWO OUTSIDE SLOTS
ARE NOT FOR KEYS

ROWS TWO AND THREE
OPTION KEYS (e.g. IVI, CINE)

ROW FOUR
IN-HOUSE SERVICE AND INSITE KEYS

SECURITY BOARD KEY SLOT ASSIGNMENTS
ILLUSTRATION 10-2

10-2-2 SPECTRO EPROM INSTALLATION

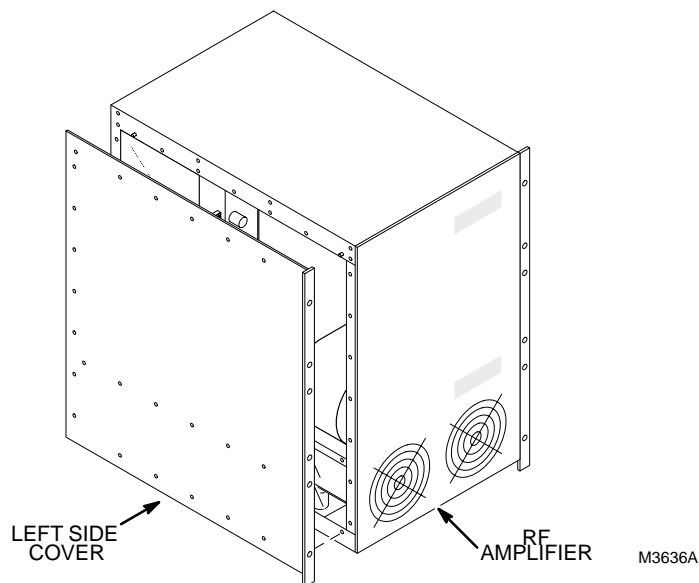
Remove RF Amplifier Covers

1. If already ON and connected, turn OFF RF Cabinet circuit breaker at rear of cabinet.
2. Disconnect power cable to RF Cabinet. Perform Lock-out/Tag-out procedures. (Refer to *Direction 15400, Signa Advantage 1.5T & 0.5T System*, Introduction tab, Section 7, SAFETY).
3. Remove RF Cabinet front door and open rear door.



Personal injury hazard. Cabinet may tip off if anti-tip legs are not in place. Make sure that anti-tip legs are installed before pulling RF Amplifier.

4. Remove securing screws and pull RF Amplifier completely forward.
5. Remove Left Side Cover. See Illustration 10-3.
6. Locate Processor Board in Processor Cavity just behind AC Switching Module (see Illustration 10-5). Place a service cloth, paper or cardboard piece over High Voltage Cavity to catch any hardware that may drop.
7. Push RF Amplifier back into the cabinet.

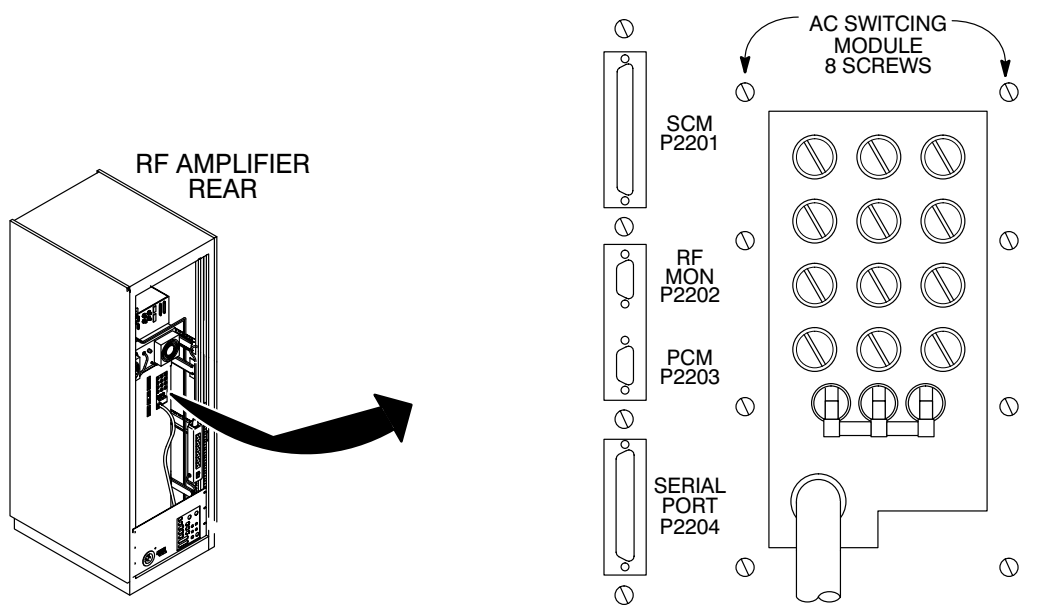


REMOVE RF AMPLIFIER COVERS
ILLUSTRATION 10-3

10-2-2 SPECTRO EPROM INSTALLATION (Continued)

Remove AC Switching Module

1. Remove eight 8-32 x 3/8 screws securing AC Switching Module from outside of rear panel. See Illustration 10-4.

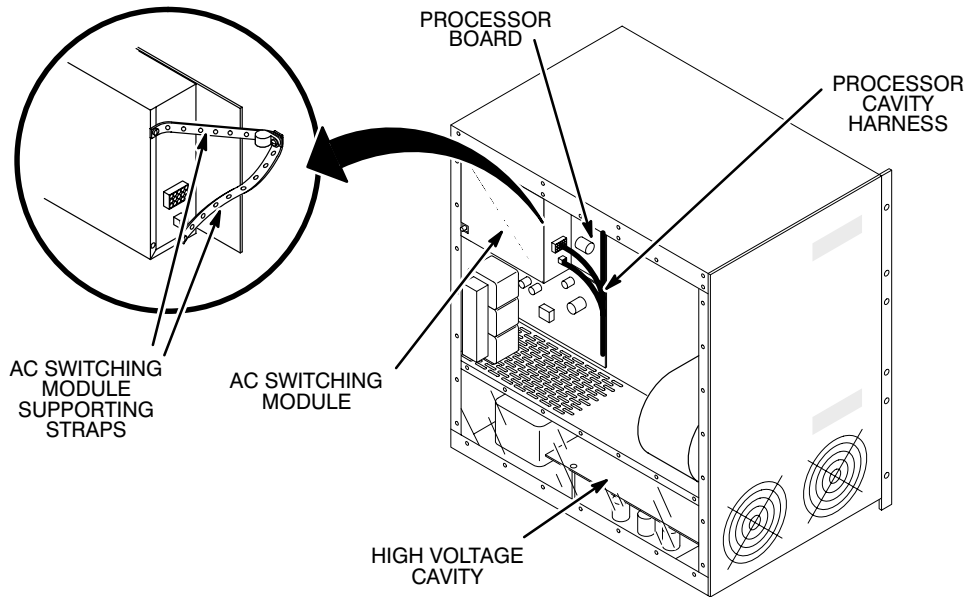


REMOVE SCREWS AND CABLES FROM REAR OF AMPLIFIER
ILLUSTRATION 10-4

2. Pull RF Amplifier completely forward and locate AC Switching Module.

10-2-2 SPECTRO EPROM INSTALLATION (Continued)

3. Support the AC Switching Module with one hand and remove supporting straps from module by removing two screws. See Illustration 10-5.



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PROCESSOR AND AC SWITCHING MODULE LOCATION
ILLUSTRATION 10-5

4. Lift up slightly on module and remove it towards front of amplifier to slide off locating stud on rear panel.
5. Disconnect two Processor Cavity Harness connectors (P2101 and P2102) from AC Switching Module unit by grasping connector, depressing locking tabs, and rocking connector housing while pulling gently. **DO NOT PULL WIRES.**
6. Feed Power cord through rectangular opening in rear panel and remove AC Switching module. Rest module on the floor.

10-2-2 SPECTRO EPROM INSTALLATION (Continued)

Install EPROM

1. Locate Processor Board (now exposed with AC switching module removed).

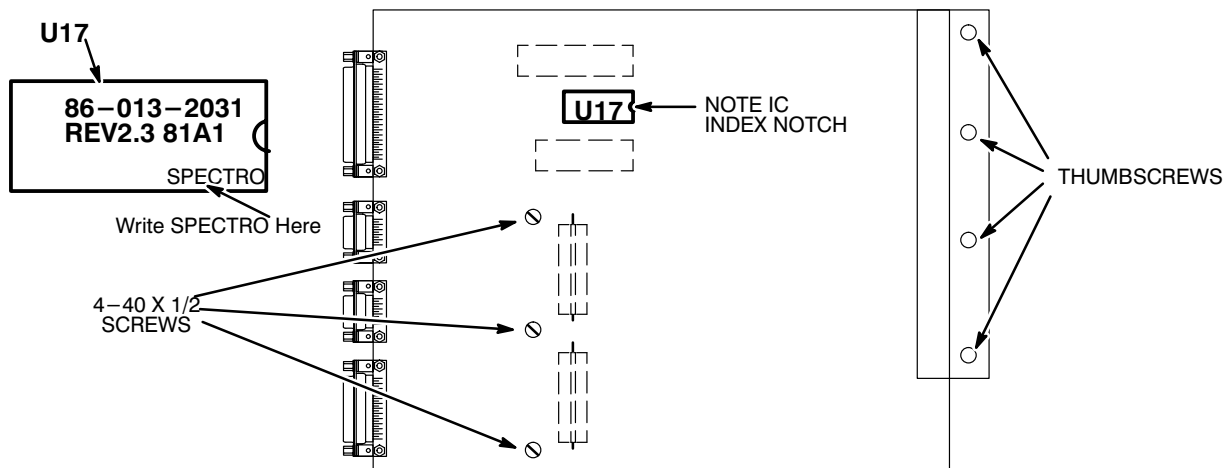


Processor Board and Components are static sensitive. Board components may be damaged if not handled in a static free environment. Take appropriate precautions (e.g. wear properly grounded wrist strap and use a grounding mat) when handling this board.

2. Locate and remove U17 on Processor Board. See Illustration 10-6.
3. Mark the original U17 EPROM as **original** and store it in the static bag supplied for the Proton Spectroscopy EPROM.
4. Install new EPROM (46-320103P1 from M1040HT kit) at U17 location (write the word **spectro** on the white label). See Illustration 10-6. The static bag containing the original U17 EPROM must be marked as **ORIGINAL PROCESSOR BOARD U17 EPROM** on the outside of the static bag and it should be visably stored in the MR1 RF Cabinet by taping the static bag to the front of the Amplifier.

Note

This **original** EPROM must be replaced on the Processor Board and Proton Spectro EPROM must be retained if replacing the RF Amplifier or the Processor Board.



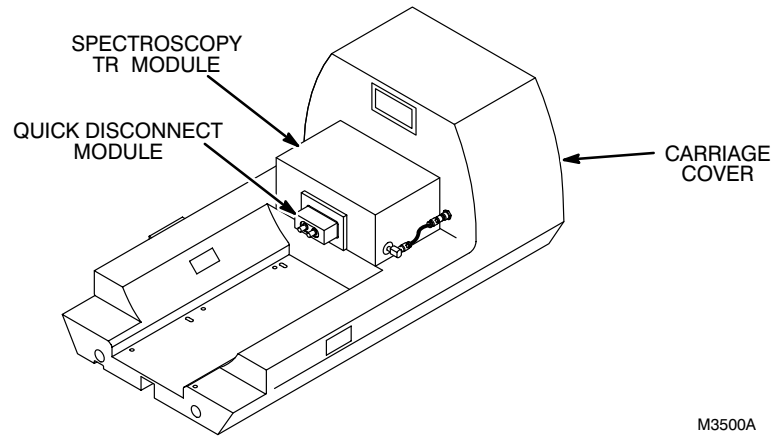
EPROM (U17) LOCATION ON PROCESSOR BOARD
ILLUSTRATION 10-6

10-2-2 SPECTRO EPROM INSTALLATION (Continued)**Re-assemble Amplifier**

5. Position removed AC Switching Module in Processor Cavity with power cord fed through rectangular opening in rear panel. The DANGER message should be facing out.
6. Locate stud on interior side of rear panel and line it up with hole in module. The stud provides locationing and support while securing the unit.
7. Support module by fastening straps. See Illustration 10-5.
8. Plug in two connectors (P2102, P2101) from Processor Cavity Harness making certain orientation is correct and pins are properly seated. The connector will click when tabs have fully locked.
9. Push RF Amplifier back into the cabinet.
10. Attach module to rear panel by first loosely securing with eight 8-32 x 3/8 screws. Securely tighten all screws. See Illustration 10-4.
11. Fasten Processor Board to rear panel using four 8- 32 x 3/8 screws installed on either side of D connectors. Tighten securely. See Illustration 10-4.
12. Pull RF Amplifier completely forward. Remove service cloth, cardboard or paper used to catch falling hardware.
13. Blow out unit with dry compressed air.
14. Replace left side cover with all screws.

10-2-3 QUICK DISCONNECT MODULE

You may have received two of these modules (one from this kit and one from the M1040FF/FK kit). Use the second module as a spare (if present). The quick disconnect module is installed in the magnet enclosure carriage cover as shown.



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SPECTROSCOPY BOX INSTALLATION
ILLUSTRATION 10-7

SECTION 11 – FINAL PROCEDURES

Note

This section applies to M1040FF and M1040FK.

11-1 RESTORING POWER

1. Notify field service and other installation personnel that are working at the site that the PDU main disconnect locks and tags will be removed so PDU power can be turned on.

Note

Verify the circuit breaker is turned OFF on the rear of the BroadBand RF Cabinet, MR6, so Signa will initialize the RF Cabinet, MR1, correctly.

2. Swing left panel closed.
3. Install three screws to secure left front panel to cabinet.
4. Swing right front panel to the closed position.
5. Remove “locks and tags” tag from main disconnect.
6. Restore power to the PDU from main disconnect.
7. Press the FULL ON button on the PDU front control panel. Turn ON circuit breaker on the rear of the BroadBand RF Cabinet, MR6.

11-2 SPECTROSCOPY SOFTWARE AND CONFIGURATION FILE

11-2-1 4.X PROCEDURES

Software for Signa Advantage Spectroscopy Option is included in Release 4.5 software tapes. The Key tape is used to activate the Spectroscopy Option resident in the load from cold tape.

The Configuration File is updated to allow Spectroscopy software to function once Spectroscopy hardware is incorporated within SIGNA Advantage System as follows:

1. Refer to *Direction 15300, Signa Advantage System*, SECTION 6, CONFIGURATION FILE EDIT, and enter configuration file edit per Section 6-1, CONFIGURATION FILE EDIT PROCEDURE.
2. Refer to *Direction 15300, Signa Advantage System*, SECTION 6, CONFIGURATION FILE EDIT, and perform procedure 6-2, SYSTEM INFORMATION MENU. Select “A. System Information”.
 - **Spectroscopy** – Answer “YES” .
 - **Spectro RF Amp** – Answer “ YES”.
 - **BroadBand Transceiver**– Answer “ YES”.
 - **T/R Driver** – Answer “ New”.
3. Refer to *Direction 15300, Signa Advantage System*, SECTION 6, CONFIGURATION FILE EDIT, and perform procedure 6-6, SAVING EDITS AND LOADING KEY TAPE, to save edits made in step 2.
4. The system should be ready for Calibration and Functional Checks.

11-2-2 5.X PROCEDURES

Software for Signa Advantage Spectroscopy Option is included in the 5.X software tapes. The Option Key is used to activate the Spectroscopy Option resident in the load from cold tape.

Complete an entire Load From Cold found in *Direction 15401, Signa Advantage 1.5T, 1.0T, & 0.5T Subsystems*, Computer Tab, Set Up and Calibration, Section 1, LOAD FROM COLD, and Section 2 or Section 3, depending on current software revision.

Items to pay close attention to while completing the load for Spectroscopy:

1. Reformat disks as a dual disk OC system.
2. When asked if this is a Spectroscopy system, answer **y** for yes.
3. When asked if this has a BroadBand Transceiver, answer **y** for yes.
4. **For 5.4 RF Cabinet with APB:** The "Amp Cal" values are always "0".
5. **For 5.4 Release:** The MR Configuration File has several new fields that must be filled in depending on the RF Amplifier and Power Monitor types you have. Refer to *Direction 15400, Signa Advantage 1.5T, 1.0T, & 0.5T System*, Set-up & Calibration tab: SECTION 6, CONFIGURATION FILE EDIT, for details.
6. After modifying the MR Configuration File, the system must be rebooted.

11-2-3 P31_FLEX COIL MULTI-NUCLEAR SPECTROSCOPY CONFIGURATION FILE MANAGER

1. The Coil Config file will not contain the P31_FLEX MNS coil. Add the coil with the following information:
2. “**Add a Coil**” to create a P31_FLEX Coil. This information is for 8.X release systems. Modify info as required.
Coil Name = **P31_FLEX**
CoilType = **3**
Extremity Coil = **yes**
Cable Loss = **1.3**
CoilLoss = **0.032**
Recon Scale Factor = **1.0**
Linear vs. Quadrature = **0** (linear)
Multiple Receiver Coil? = **no**
Number of Receivers = **0**
Starting Receiver ID = **0**
Ending Receiver ID = **0**
Multi-Coil Port Enable = **0**
Multi-Coil Port Error Enable = **0**
Additional transmit attenuation = **0**
Number of Fast Receivers = **0**
Starting Fast Receiver ID = **4**
Ending Fast Receiver ID = **4**
Fast TG Start TA = **190**
Fast TG Start RG = **12**
Multi Coil Recon Enable = **0**
korecName = (enter a space here if applicable to your software revision)
3. Save all changes before exiting.

Note

The Spectro Option Key should have been previously installed. ONLY sites with an ERBTEC RF Amplifier are required to install the EPROM which allows for increased unblank time (for Hydrogen ONLY Spectroscopy).

4. Signa must be shutdown and rebooted to save any file changes.

11-3 SET UP AND CALIBRATION

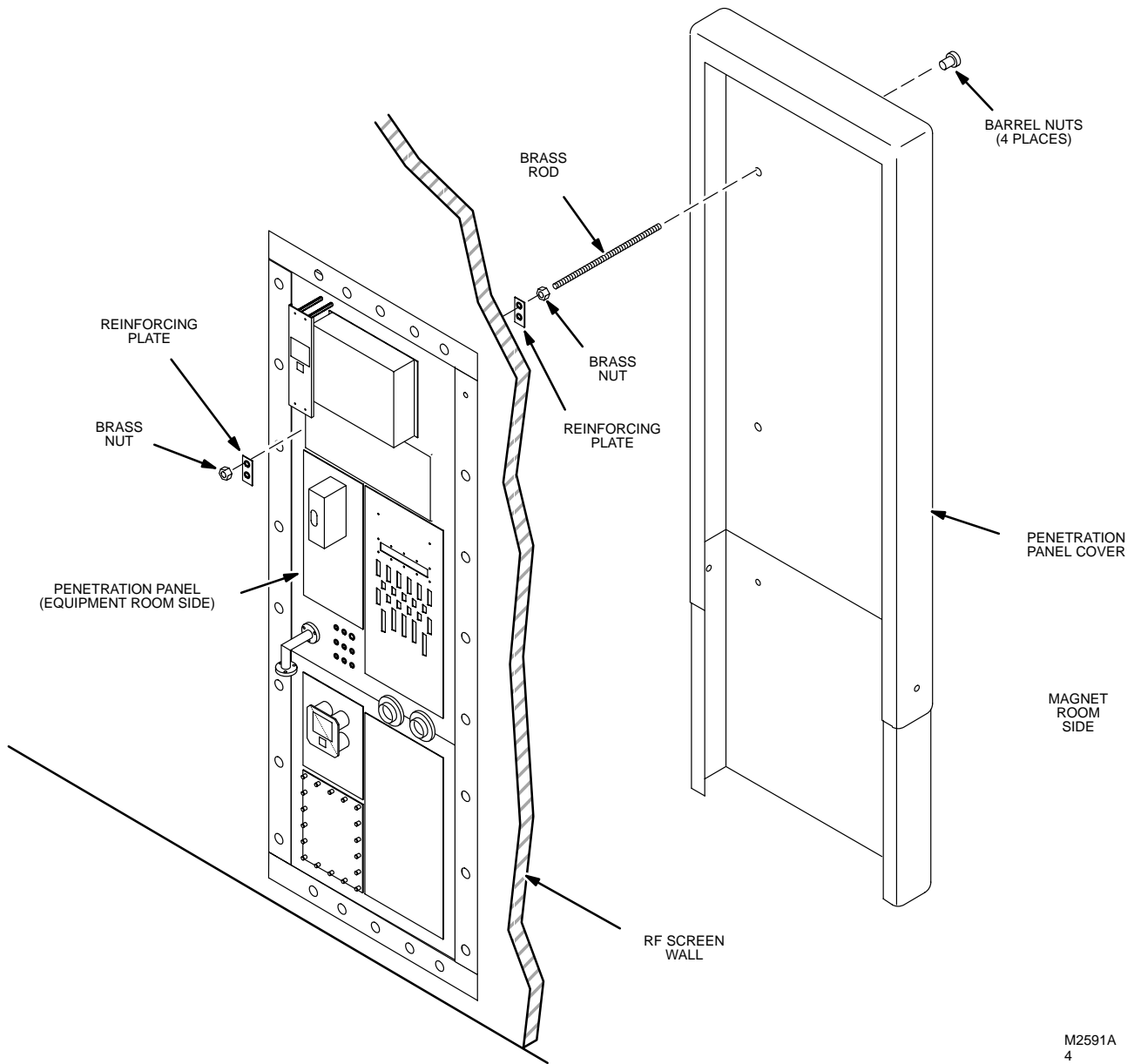
1. Perform procedures in Set Up and Calibration tab.

11-4 FUNCTIONAL CHECKS

1. Perform procedures in Functional Checks tab, Section 1.

11-5 REPLACE COVERS

1. After all cable installation procedures are completed in magnet and equipment rooms, install assembled telescoping covers on brass rods and secure with four barrel nuts or replace other customer supplied panel covering. See Illustration 11-1.



INSTALLATION OF PENETRATION PANEL COVER
ILLUSTRATION 11-1

M2591A
4

11-5 REPLACE COVERS (Continued)

2. Replace all cabinet covers that have not been previously replaced.
3. Replace Magnet Enclosure covers that have not been previously replaced.
 - a Replace Magnet Enclosure side covers.
 - b Close front cover and check cable clearance. Position and adjust cables as required. Latch Front cover.
 - c Close and latch rear cover.
 - d Replace Rear Pedestal covers.

11-6 MATERIAL DISPOSAL GUIDANCE

The "Return Pile" consists of items that have a potential value for service of the installed base and the disposition of such must be controlled by GE. Disposition of the return pile is per Medical Systems Marketing and Engineering Policy and Procedures: effective date – July 1, 1990; issued by – VICE PRESIDENT AND GENERAL MANAGER; Subject titled – USED AND REFURBISHED EQUIPMENT. This Policy was distributed to field personnel October 9, 1990 per cover letter signed by Vice President General Manager – Service and Vice President General Manager – Sales.

1. For coordination of return pile, refer to above policy "Exhibit A" and contact GEMS Salvage Operation: Phone (414)-747-6997 or (414)-548-2527; Dial Comm 8*320-2527 or 8*579-6997; Fax (414-747-6855); WizMail "SALVAGE".
2. Disposition of all items in the discard (or recycle) pile per above referenced policy and procedure.

11-7 FINAL COORDINATION

1. Record and enter applicable data into applicable site configuration files and records.
2. Verify that coordination of application support for instruction of site users in Spectroscopy Option before returning system to the users. Turn site over to applications who will instruct users.

SECTION 12 – 4.X TO 5.X UPGRADE

Note

This section applies to M1040FF only.

This section explains how to upgrade a Multi-Nuclear Spectroscopy Subsystem on a 4.X System to be compatible with a 5.X System. This section assumes the Signa Advantage (4.X) has already been upgraded to the Signa Advantage 1.5T (5.X) using *Direction 15409, Signa Advantage to Signa Advantage 1.5T Upgrade*.

12-1 PRE-UPGRADE CHECKLIST

Verify all 4.X Multi-Nuclear Spectroscopy Option parts are still available in new 5.X system after the 4.X to 5.X System Upgrade. Refer to the following tables to verify all parts still exist.

12-1-1 PDU

The PDU Kit Parts should not have been affected by the 4.X to 5.X System Upgrade. Refer to Table 12-1 for part listing. Refer to Section 3 – POWER DISTRIBUTION UNIT (PDU) KIT for detailed installation instructions if items were effected.

TABLE 12-1
PDU KIT PARTS

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	46-221898P1	Contactors, 120VAC, 60Hz, 90A, Size 3, GE CR305E002	1
2	46-221905P33	Circuit Breaker, 30 Amp, 3 Pole	1
3	46-301192P8	Circuit Breaker Panel Label, "RF Broadband Amp"	1
4	46-251182P240	Rating Plate, "46-301826G1 kit added"	1
5	46-265520G1	AC Coil Filter, RC Network	1
6	46-208758P2	Strap, 1/16 in. to 1-1/4 in. Diameter Wire bundle, Ty-wrap TY24M	1
7	46-208747P2	Cable Tie Mount, Adhesive Backed	1
9	511A590P27	Terminal, #8 Ring, Insulated, Red	2
10	46-220181P6	Lock Washer, 1/4 in. Screw Size	3
11	46-1000904P171	Flat Washer, 1/4 in. Screw size, 1/2 in. Diameter	3
12	46-220203P30	Screw 1/4-20 X 1/2, Round Head Phillips	3

12-1-2 BROADBAND RF CABINET

The BroadBand RF Cabinet Kit Parts should not have been affected by the 4.X to 5.X System Upgrade. However, cabling to the BroadBand Cabinet has. Refer to Table 12-2 for cable listing. Refer to Section 4 – BROADBAND RF CABINET KIT for detailed installation instructions.

TABLE 12-2
CABLES CONNECTED TO BROADBAND RF CABINET

CONNECTOR	TYPE OF CONNECTOR	RUN	REMARKS
MR6 A3 J1	Power cable plug	036	220V AC Power Input
MR6 A3 J2	9-Pin Subminiature-D	459	RF Lock
MR6 A3 J3	RG223 BNC Coax	466	RF Exciter IN (Proton and BB RF)
MR6 A3 J4	RG223 BNC Coax	460	Multi-Nuclear Spectro TR Bias
MR6 A3 J5	RG223 BNC Coax	461	Exciter RF (Proton) to RF Cabinet
MR6 A3 J7	9-Pin Subminiature-D	462	Unblank
MR6 A3 J8	37-Pin Subminiature-D	467 (4.X) or 737 (5.X)	Bicycle link to Gradient Cabinet Link to RF Cabinet (after cable is relabeled in this procedure)
MR6 A3 J9	37-Pin Subminiature-D	463 (4.X) or 738 (5.X)	Bicycle link to RF Cabinet Link to RF Cabinet (after cable is relabeled in this procedure)
MR6 A3 J10	RG223 BNC Coax	464	BB Spectro RF Power Monitor Sensor #1
MR6 A3 J11	RG223 BNC Coax	465	BB Spectro RF Power Monitor Sensor #2
MR6 A3 J15	Male N – 1/2 in. Helix	468	BroadBand RF Power Out

12-1-3 RF CABINET KIT

The RF Cabinet Kit Parts may have been affected by the 4.X to 5.X System Upgrade. Refer to Table 12-3 for part listing. Verify all connections are made using Tables 12-3 to 12-7. Refer to Section 5 – RF CABINET KIT for detailed installation instructions if help is needed.

TABLE 12-3
RF CABINET KIT

ITEM	PART NO	S/C NO	DESCRIPTION	QUANT
3	46-243775G747	None	7 foot 9-conductor Cable, MR1-A9-J12 to MR1-A7-J11	1
4	46-243775G748	None	7-1/2 foot Coax Cable, MR1-A9-J2 to MR1-A7-J14	1
5	46-243775G744	None	10 foot Coax Cable, MR1-A3-J10 to MR1-A7-J16	1
6	46-243775G745	None	10 foot Coax Cable, MR1-A3-J11 to MR1-A7-J15	1
7	46-243775G746	None	10 foot 9-Conductor Cable, MR1-A3-J9 to MR1-A7-J6	1

TABLE 12-4
CONNECTING CABLES FROM INTERFACE BOARD

CABLE DESCRIPTION	FROM INTERFACE BOARD	CONNECT OTHER END TO
COAX CABLE	MR1 A3 A7 J10	SPECTRO ANALOG SENSE BOARD #2 MR1 A3 A4 J6
COAX CABLE	MR1 A3 A7 J6	SPECTRO ANALOG SENSE BOARD #1 MR1 A3 A3 J6
COAX CABLE	MR1 A3 A7 J3	CONTROL BOARD #1 MR1 A3 A1 J3

12-1-3 RF CABINET KIT (Continued)

TABLE 12-5
CABLES CONNECTED TO REAR OF POWER MONITOR CHASSIS

CABLE DESCRIPTION	CABLE FROM CONNECTION AT	CONNECT TO CHASSIS REAR
MULTI-CONDUCTOR SUBMINATURE-D	CONTROL BOARD #2 MR1 A3 A2 J5	MR1 A3 J1
COAX CABLE	SPECTRO ANALOG SENSE BOARD #2 MR1 A3 A4 J8	MR1 A3 J3
MULTI-CONDUCTOR SUBMINATURE-D	CONTROL BOARD #1 MR1 A3 A1 J5	MR1 A3 J5
COAX CABLE	SPECTRO ANALOG SENSE BOARD #1 MR1 A3 A3 J8	MR1 A3 J7

TABLE 12-6
NEW CABLE CONNECTIONS

CABLE PART NUMBER	MODULE CONNECTION ON CHASSIS REAR	I/F PANEL CONNECTION
46-243775G744	MR1 A3 J10	MR1 A7 J16
46-243775G745	MR1 A3 J11	MR1 A7 J15
46-243775G746	MR1 A3 J9	MR1 A7 J6
46-243775G747	MR1 A9 J12	MR1 A7 J11
46-243775G748	MR1 A9 J2	MR1 A7 J14

TABLE 12-7
NEW EXTERNAL CABLES CONNECTED TO RF CABINET

RUN	I/F PANEL CONNECTOR	TYPE OF CONNECTOR	REMARKS
461	MR1 A7 J3	RG223 BNC Coax	Exciter RF (Proton) from System Cabinet through BroadBand RF Cabinet
459	MR1 A7 J6	9-Pin Subminiature-D	RF Lock
463 (4.X) or 738 (5.X)	MR1 A7 J9 or MR1 A7 J24	37-Pin Subminiature-D	Bicycle link from BroadBand RF Cabinet or From BroadBand RF Cabinet (after cable is relabeled in this upgrade)
462	MR1 A7 J11	9-Pin Subminiature-D	Unblank
460	MR1 A7 J14	RG223 BNC Coax	Multi-Nuclear Spectro TR Bias
465	MR1 A7 J15	RG223 BNC Coax	BB Spectro RF Power Monitor Sensor #2
464	MR1 A7 J16	RG223 BNC Coax	BB Spectro RF Power Monitor Sensor #1

12-1-4 SYSTEM CABINET KIT

The System Cabinet Kit Parts may have been affected by the 4.X to 5.X System Upgrade. Refer to Table 12-8 for part listing. Verify all connections are made using Table 12-9. Refer to Section 7 – SYSTEM CABINET KIT for detailed installation instructions if help is needed.

TABLE 12-8
SYSTEM CABINET KIT

ITEM	PART NO.	QUANT.	DESCRIPTION
2	46-264232G1	1	BB RECEIVER
3	46-264230G2	1	BB EXCITER (may still be on Exciter removed from 4.X System Cabinet)
6	46-208560P12	10	SCREW, 4-40 X 0.312 BIND HD STL

TABLE 12-9
CABLES CONNECTED TO SYSTEM CABINET

CONNECTOR	TYPE OF CONNECTOR	RUN	REMARKS
MR2 A11 J1	RG223 BNC Coax	466	RF Exciter out to BroadBand RF Cabinet
MR2 A11 J3	RG223 BNC Coax	469	Spectroscopy Receive from 20 dB Gain Block

12-1-5 PENETRATION PANEL KIT

The Penetration Panel Kit Parts may have been affected by the 4.X to 5.X System Upgrade. Refer to Table 12-10 for part listing. Verify all connections are made using Table 12-11. Refer to Section 8 – PENETRATION PANEL KIT for detailed installation instructions if help is needed.

TABLE 12-10
PENETRATION PANEL KIT

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
2	46-301829G1	20 dB Gain Block Plate Assembly	1
3	46-208560P123	Binding Head Screw, 10-32 x 3/8, Stainless Steel	24
4	516A770P604	Blnding Head Screw, 6-32 X 1/4, Stainless Steel	8

TABLE 12-11
SYSTEM AND SPECTROSCOPY RUNS CONNECTING TO SPECTROSCOPY FILTER PANEL

CONNECTOR	TYPE OF CONNECTOR	RUN
EQUIPMENT ROOM CABLES		
PP1-J71	37-pin Subminiature-D	470
PP1-J83	SC (right angle adaptor)	468
PP1-A13-OUT	BNC (right angle)	469
MAGNET ROOM CABLES		
PP1-J72	BNC	474
PP1-J73	BNC	475
PP1-J74	BNC	476
PP1-J75	BNC	477
PP1-J76	BNC	478
PP1-J79	BNC	468
PP1-J83	SC	473

12-1-6 MAGNET ENCLOSURE KIT

The Magnet Enclosure Kit Parts may have been affected by the 4.X to 5.X System Upgrade. Refer to Table 12-12 for part listing. Verify all connections are made using Table 12-13. Refer to Section 9 – MAGNET ENCLOSURE KIT for detailed installation instructions if help is needed.

TABLE 12-12
MAGNET ENCLOSURE KIT

ITEM	PART NO.	QUANT.	DESCRIPTION
3	46-301166P1	2	RECEPTACLE, PANEL FEED THROUGH, LEMO
4	46-301319P1	4	WASHER, 1/2" OD, .36 ID, .030 THICK, 300 SST
5	46-287918G1 (or) 2100718	1	SPECTROSCOPY TR MODULE (MG2 A16 A7)
6	46-282467G4	1	SPECTROSCOPY COIL ADAPTER (MG2 A16 A7 A3)
7	46-301205P1	2	CABLE, WHITE RG58/U W/ LEMO STRAIGHT AND ELBOW CONNECTORS
8	46-301338P1	2	ADAPTOR, BNC TO LEMO
9	46-301690G1	1	CABLE ASSEMBLY, RUN NO. 456, MG3-A17-J3 TO MG2-A16-J1
10	46-243775G708	1	CABLE, RUN NO. 455, MG3-A17-J4 TO MG2-A16-J2
13	46-306732P1	1	COVER, FOR MULTICOIL QD OPENING, FIBERGLASS
14	46-306733P1	1	COVER SUPPORT, 3/8" THICK PHENOLIC
16	46-208990P1	1	ADAPTOR, 50 OHM IMPEDANCE, BULKHEAD/PANEL, BNC
20	46-221865P1	1	CONNECTOR, 50 OHM IMPEDANCE, JACK-JACK, N ADAPTORS
21	46-251182P229	1	RATING PLATE, MODIFICATION KIT ADDED, 46-301548G1
22	46-221865P3	1	ADAPTOR, N PLUG TO SC JACK
23	46-220196P3	4	LOCK WASHER, #10, SST
24	46-220184P43	4	SCREW, MACH, 10-32 X 0.750 LG RD HD SLOT BRASS
25	1000904P425	2	WASHER, FLAT, ID 0.200 OD 0.5000 THK .0400

TABLE 12-13
CABLES CONNECTED TO REAR PEDESTAL

CONNECTOR	TYPE OF CONNECTOR	RUN	REMARKS
MG3-A17-J3	BNC Coax	456	From Magnet Enclosure
MG3-A17-J4	BNC Coax	455	From Magnet Enclosure
MG3-A17-J3	BNC Coax	473	From Pen Panel
MG3-A17-J4	BNC Coax	472	From Pen Panel

12-2 5.X SPECIFIC INSTALLATION

To upgrade a Spectro Subsystem option on a 4.X system to be compatible with a 5.X system, obtain the following items:

- **M1040HT — Spectro 5.X Option Key, Spectro EPROM, and Quick Disconnect.**
Refer to Section 9, 5.X SPECIFIC RELATED OPTIONS for installation instructions.
- **M1090MC — Additional Disk Drive for Host Computer.**
Refer to Section 9, 5.X SPECIFIC RELATED OPTIONS for installation instructions.
- **46-320134P1 — Mylar Insulator for BB Exciter Module** in Systems Cabinet.
Refer to Section 12-2-1, MYLAR INSULATION FOR BB EXCITER MODULE for installation instructions.
- **46-317905G1 — 5.X Spectro RF Cabinet Upgrade Kit** (Portion of M1040FF)
Refer to Section 12-2-2, 5.X SPECTRO RF CABINET UPGRADE for installation instructions.

12-2-1 MYLAR INSULATION FOR BB EXCITER MODULE

Locate the mylar insulation tape found in the 4.X to 5.X Upgrade Kit. This tape should be used to cover the entire face of the BroadBand Exciter Module that will be facing the IPG Board. This insulation will keep pins on the IPG Board from shorting out on the BroadBand Exciter Module.

12-2-2 5.X SPECTRO RF CABINET UPGRADE

Table 12-14 shows the parts found in the 5.X Spectroscopy RF Cabinet Upgrade Kit.

TABLE 12-14
5.X SPECTRO RF CABINET UPGRADE KIT

ITEM	PART NO	S/C NO	DESCRIPTION	QUANT
2	46-328000G844	None	7 foot 37 cond. cable, MR1-A9-J11 to MR1-A7-J23	1
3	46-243775G843	None	7 foot 37 cond. cable, MR1-A10-P2201 to MR1-A7-J24	1
6	46-251905p209	None	Cable Label; states: Run 463, 4.X MR1-A7-J9, Run 738, 5.X MR1-A7-J24	1
7	46-251905P210	None	Cable Label; states: Run 738, MR6-A3-J9	1
8	46-251905P211	None	Cable Label; states: Run 737, MR1-A7-J23	1
9	46-221856P13	07763	Cable Tape; Blue	1
10	46-221856P14	07764	Cable Tape; Green	1
12	46-251905P212	None	Cable Label; states: Run 737; MR6-A3-J8	1

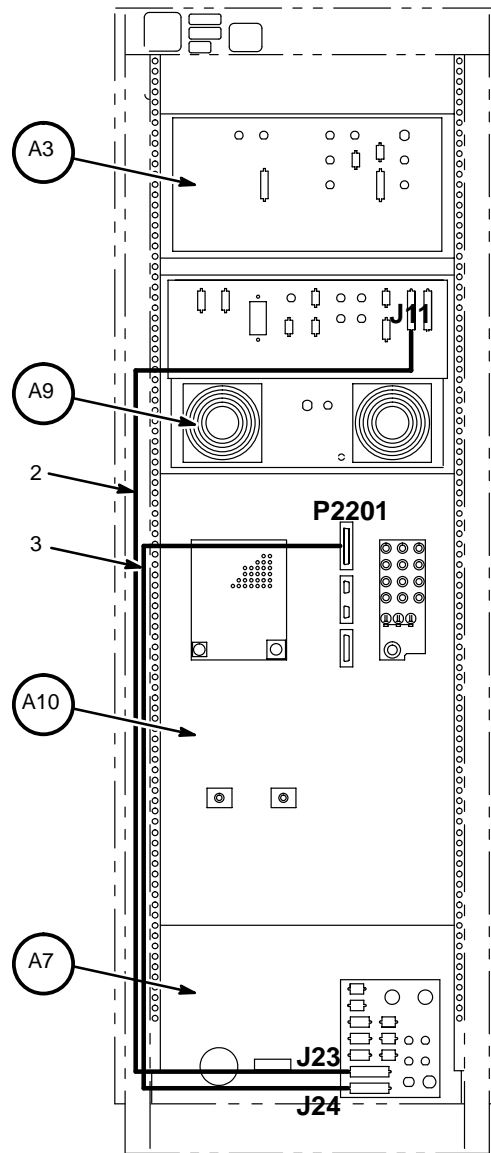
External Cabling

1. Locate 5.X Spectro RF Cabinet Upgrade Kit 46-317905G1. Open kit and locate cable markers and labels as listed in Table 12-14.
2. Locate 4.X run 463. Remove existing labels and color markers. Label one end with Item 6 (stating RUN 463, 4.X MR1-A7-J9, RUN 738, 5.X MR1-A7-J24). Place one tape strip of blue tape and one tape strip of green tape around cable at this end. Label other end with Item 7 (stating RUN 738, MR6-A3-J9). Place two strips of blue tape around cable at this end, one next to the other.
3. For 5.X, locate 4.X run 467. Remove existing labels and color markers. Label one end with Item 8 (stating RUN 737, MR1-A7-J23). Place one tape strip of blue tape and one tape strip of green tape around cable at this end. Label other end with Item 12 (stating RUN 737, MR6-A3-J8). Place two strips of blue tape around cable at this end, one next to the other.
4. Re-Route cabling as needed.
5. Run 737 goes from MR6-A3-J8 (same as 4.X) to MR1-A7-J23 (new).
Run 738 goes from MR6-A3-J9 (same as 4.X) to MR1-A7-J24 (new).

12-2-2 5.X SPECTRO RF CABINET UPGRADE (Continued)

Internal Cabling

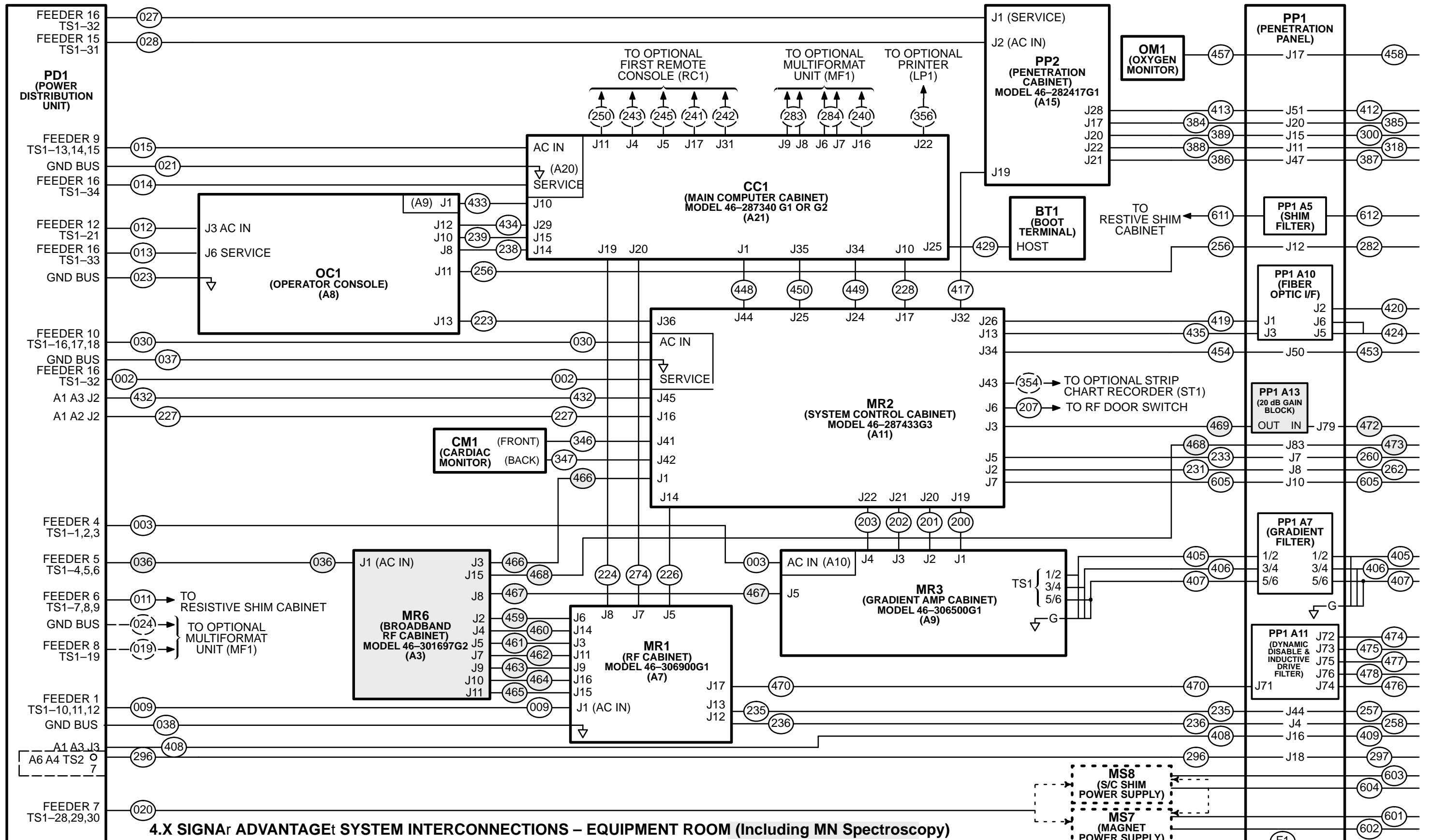
1. Remove the the following cable from the rear of the RF Cabinet and place on the discard pile.
 - MR1 A9 J11 to MR1 A10 P2201
2. Install the following cables as shown in Illustration 5-4.
 - MR1 A9 J11 to MR1 A7 J23 (Item 2, Table 5-11)
 - MR1-A10-P2201 to MR1-A7-J24 (Item 3, Table 5-11)



M317911A

RF CABINET 5.X UPGRADE KIT CABLE CONNECTIONS

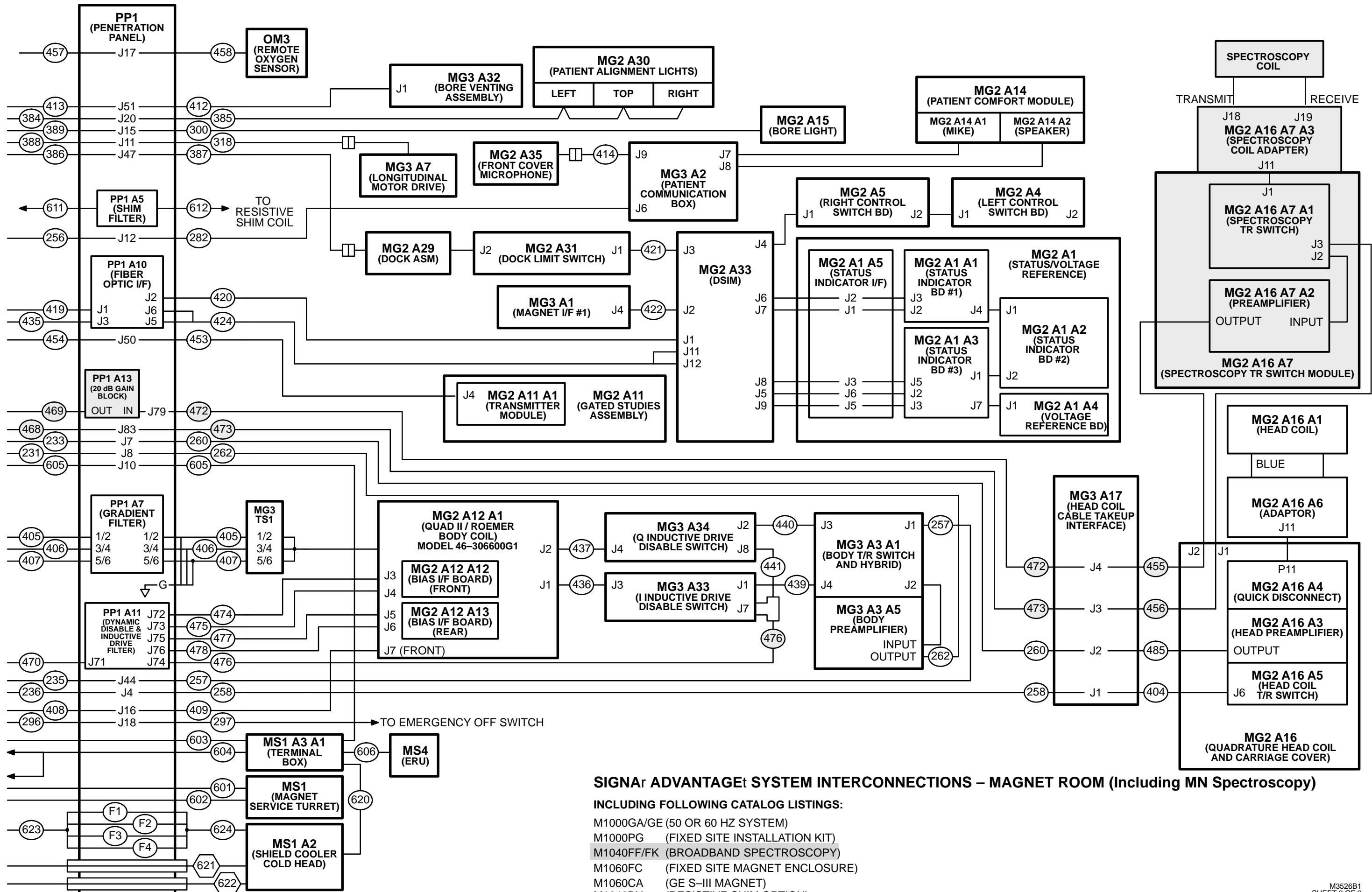
ILLUSTRATION 12-1



4.X SIGNA_r ADVANTAGE_t SYSTEM INTERCONNECTIONS – EQUIPMENT ROOM (Including MN Spectroscopy)

INCLUDING FOLLOWING CATALOG LISTINGS:

- M1000GA/GE (50 OR 60 HZ SYSTEM)
- M1000PG (FIXED SITE INSTALLATION KIT)
- M1040FF/FK (BROADBAND SPECTROSCOPY)
- M1060FC (FIXED SITE MAGNET ENCLOSURE)
- M1060CA (GE S-III MAGNET)



SIGNAr ADVANTAGEr SYSTEM INTERCONNECTIONS – MAGNET ROOM (Including MN Spectroscopy)

- INCLUDING FOLLOWING CATALOG LISTINGS:**
- M1000GA/GE (50 OR 60 HZ SYSTEM)
 - M1000PG (FIXED SITE INSTALLATION KIT)
 - M1040FF/FK (BROADBAND SPECTROSCOPY)
 - M1060FC (FIXED SITE MAGNET ENCLOSURE)
 - M1060CA (GE S-III MAGNET)
 - M1040BH (RESISTIVE SHIM OPTION)