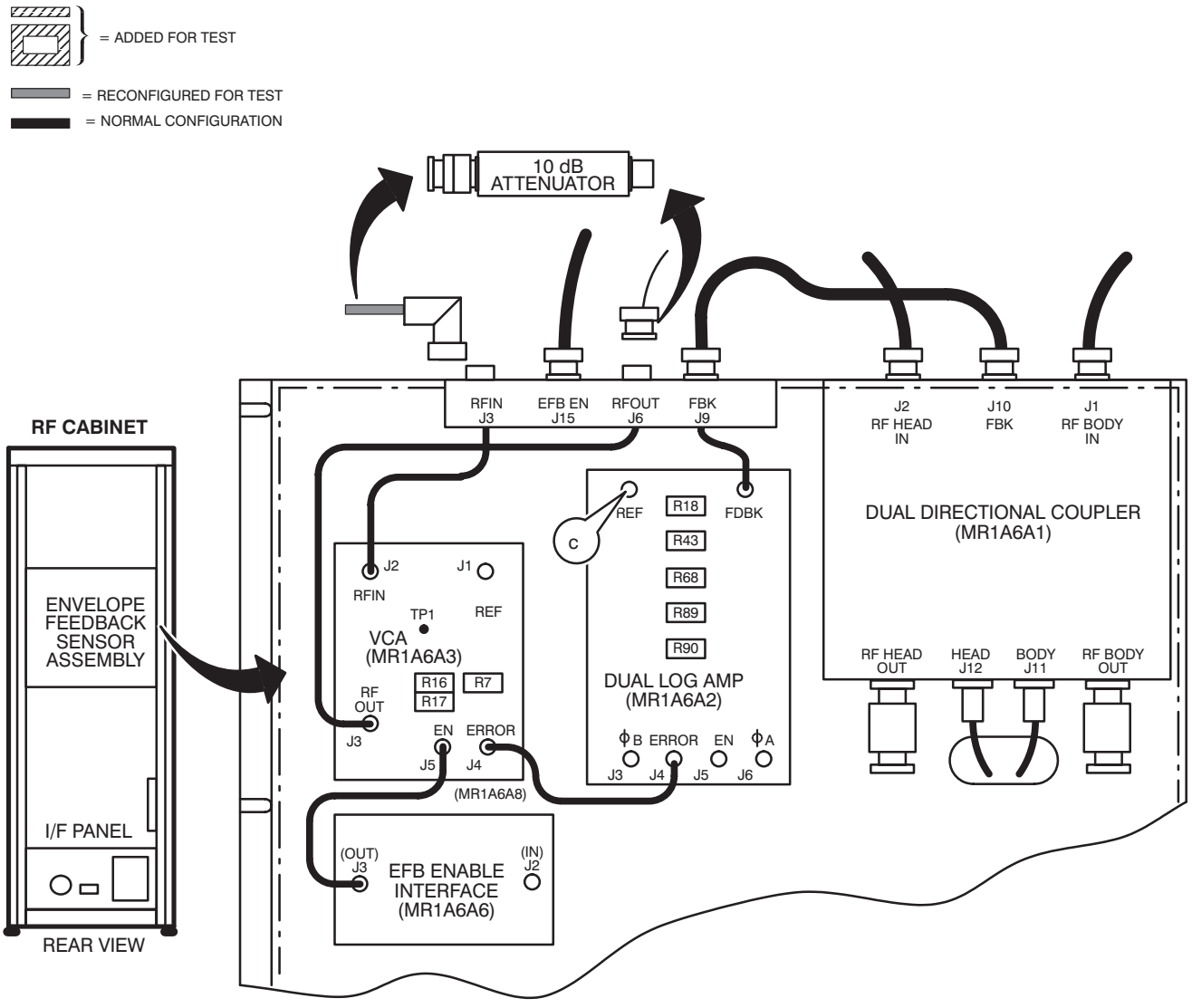
2−7 RF AMPLIFIER CHECKOUT

2−7−1 Required Tools And Instruments

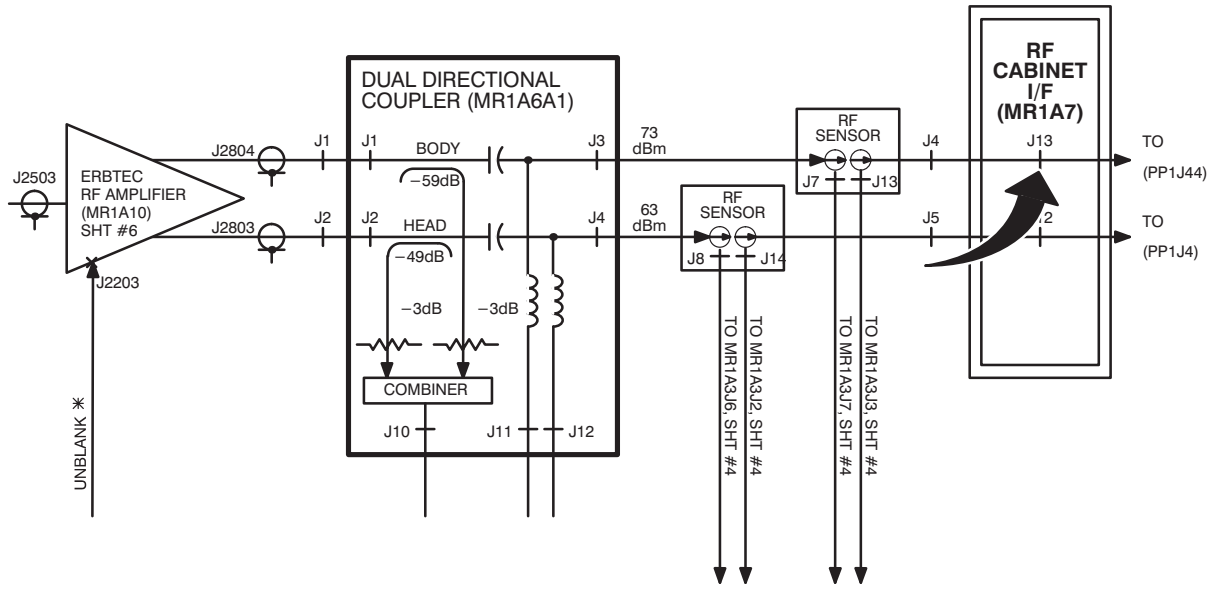
Item	Description	Part Number	Qty.
1.	TPS RF Connector/Adapter and Cable Test Kit	46−301549G1	1
2.	RF Test Cables Kit	46−251710G4	1
3.	100 mHz Oscilloscope − Tektronix® 468 or equivalent	46−183029P61 or P64	1
	or 400 mHz Oscilloscope − Tektronix® 2465 or equivalent	46−194427P234	1
4.	50 ohm dummy load, 200 watt, 30 dB attenuator − Bird Model 8322	46−255837P10	1

2−7−2 Bypass Envelope Feedback Assembly



RECONFIGURATION FOR EFB ASSEMBLY BYPASS
ILLUSTRATION 2−68

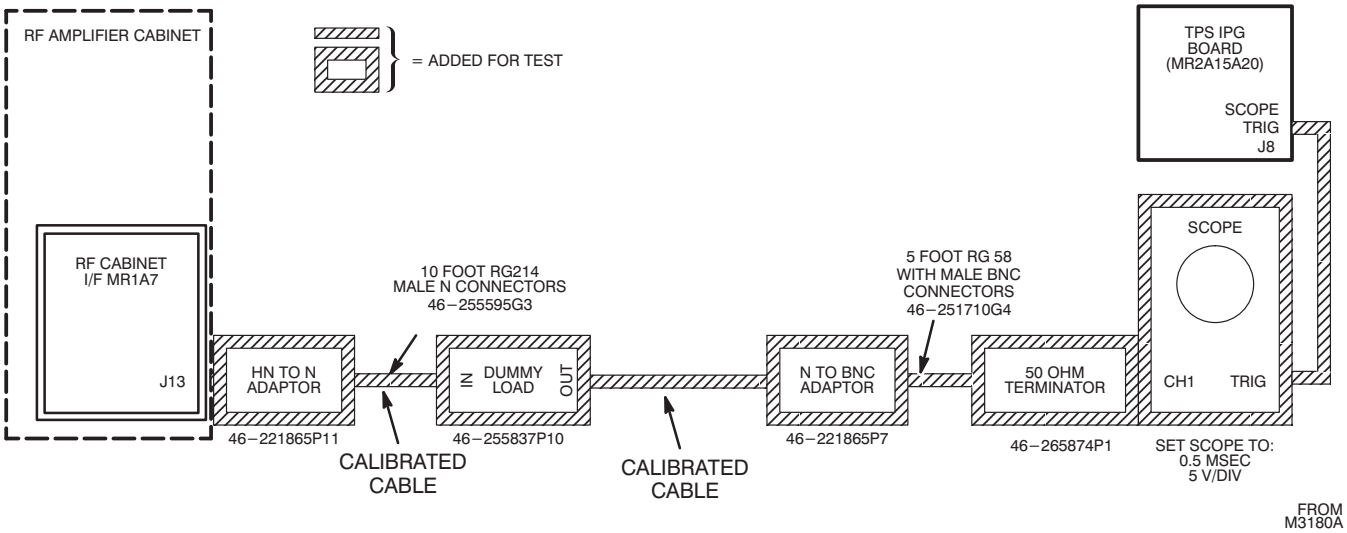
2−7−3 Body RF Output Power (Full)



BLOCK DIAGRAM OF BODY RF OUTPUT POWER
ILLUSTRATION 2−69

3. Bypass Envelope Feedback Assembly. See Illustration 2−68.

4. Set up to measure body power. See Illustration 2−70.



RECONFIGURATION FOR BODY RF OUTPUT POWER (FULL)
ILLUSTRATION 2−70

2−7−3 Body RF Output Power (Full) (continued)

5. Prepare system to scan using the following scan parameters:

SCAN PRESCRIPTION

MAIN MENU **[New Exam]**

PATIENT/EXAM INFORMATION

Id: **geservice**
Name:
Weight (lb) **111**
[Patient Position]

PATIENT POSITION

Patient Entry **[Head First]**
Patient Position **[Supine]**
Axial/Sag. Landmark **[Sternal Notch]**
Coil Type **[Body Coil]**
Scan Plane **[Axial]**
[Image Params]

IMAGING PARAMETERS

Image Mode **[2D]**
(⋆ SAR must be "On" ⋆) **[Monitor SAR]**
Pulse Sequence **[Spin Echo]**
Imaging Options **[None]**
or enter PSD Filename **pcal**
[Scan Timing] or [Next Screen]

SCAN TIMING

Number of Echoes **[1]**
Echo Time (TE) **[20 msec]**
Rep Time (TR) **[Other] 150** msec
[Scan Set−Up]

SCAN SET−UP

Prescan Options none *(Release 5.4)*
Auto CF **[Peak]**
[Scanning Range]

SCANNING RANGE

Field of View **[24 cm]**
Scan Thickness **[10 mm]**
Interscan Spacing **[Other] 0**
Start Loc (I/S): **0**
End Loc (I/S): **0**
No. of Scan Locations: 1
FOV Center (L/R): 0 (P/A): 0
[⇐] [Acq Time]

ACQUISITION TIME

Acq. Matrix (freq.) **[256]**
Acq. Matrix (phase) **[128]**
Frequency Direction **[R/L]**
Phase FOV default
Imaging Time **[2 NEX 0:52]**
Contrast **[No]**
Table Delta: 0 mm
[Scan Ops]

SCAN OPERATIONS

[Modify CVs]

CALMODE = 5 (NORMAL RF)
IA_RF1 = 32766 (sets 90˚ pulse full−scale)
IA_RF2 = 0 (turns off 180˚ pulse)

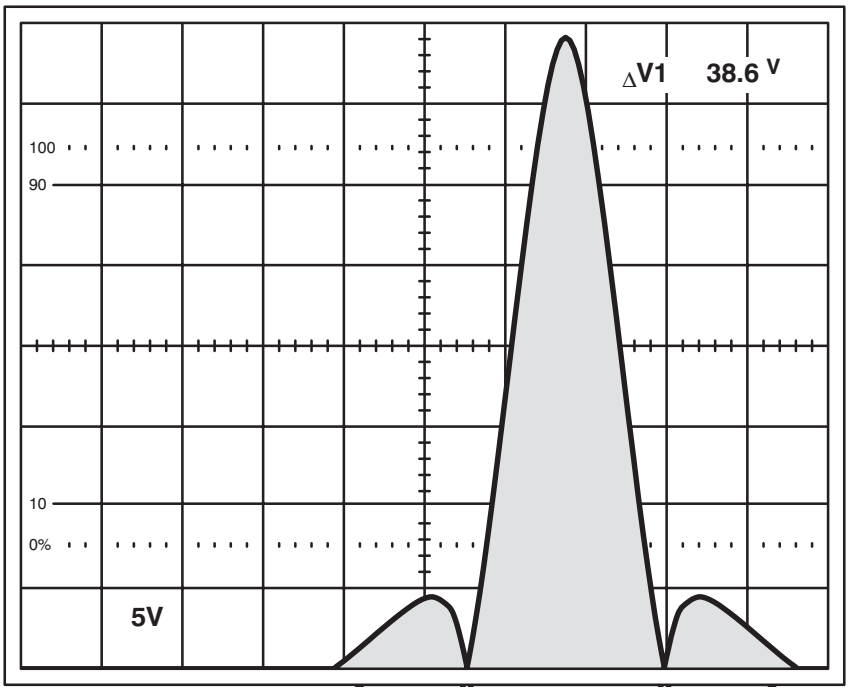
[Setup Params]

R1 = 6 (RECEIVER ANALOG GAIN SETTING)
R2 = 15 (RECEIVER DIGITAL GAIN)
TG = 100
RIGHT DISPLAY
FRAME 1
FRAME 0
PLOT GAIN 1
PLOT TYPE I

6. Select **[Manual Prescan]** and **[Scan TR]**.

7. Increase TG until 16 KW is obtained on the scope. See Illustration 2−71.

2−7−3 Body RF Output Power (Full) (continued)

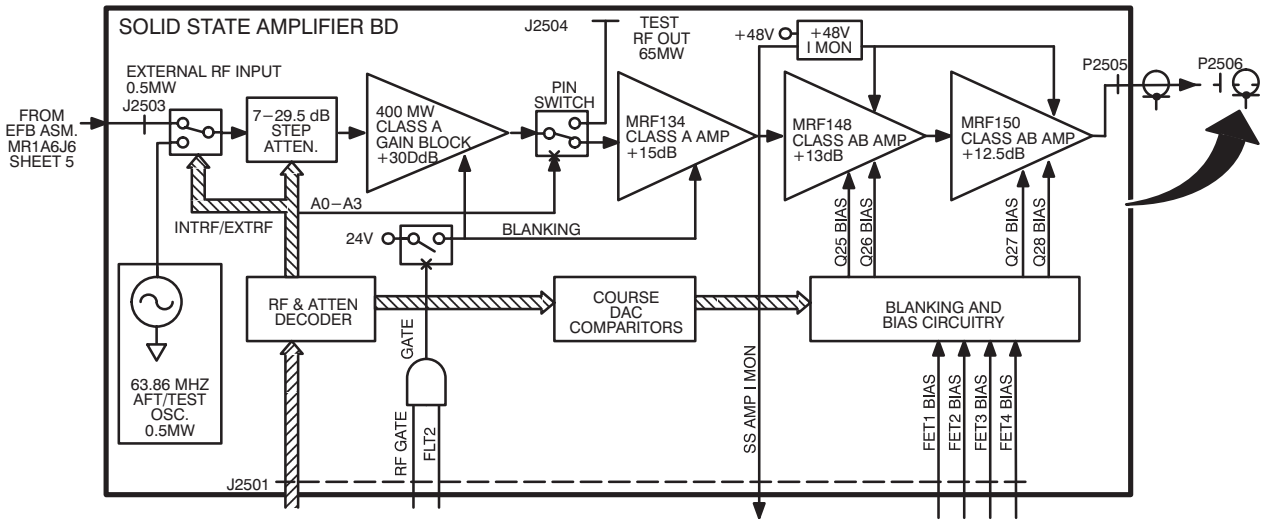


Scope Channel 1:
50Ω input ⧫ **NOTE**
5V/div
Trigger: External

FROM
M3309A

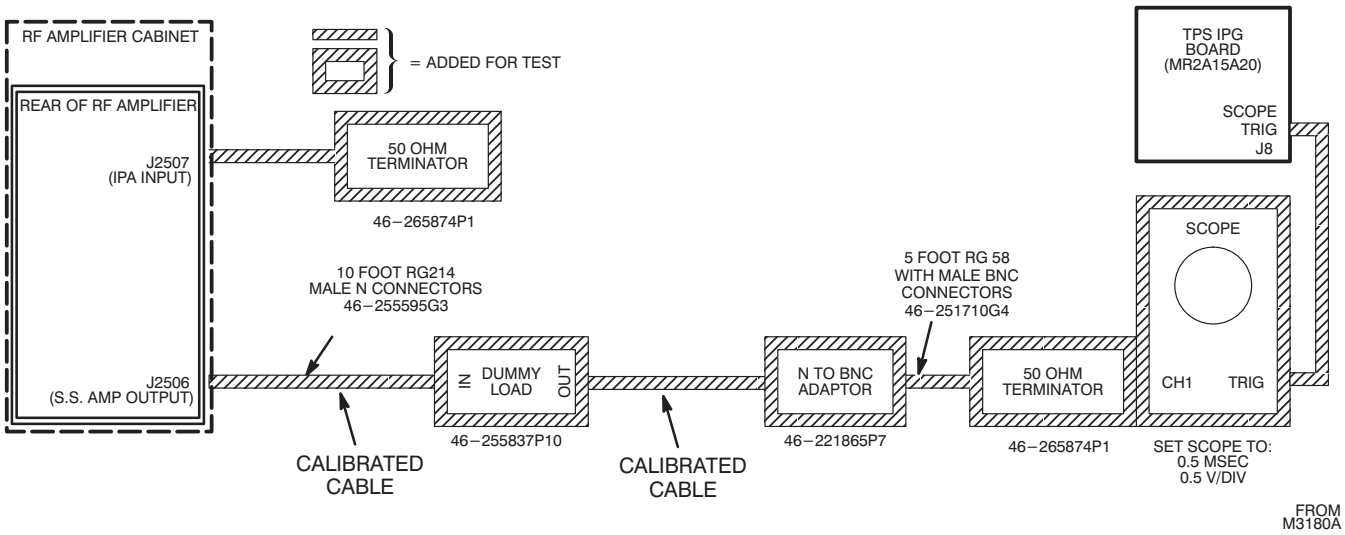
BODY RF OUTPUT POWER (FULL)
ILLUSTRATION 2−71

2−7−4 Solid State Amplifier (Body Mode)



BLOCK DIAGRAM OF SOLID STATE AMPLIFIER OUTPUT
ILLUSTRATION 2−72

1. Bypass Envelope Feedback Assembly. See Illustration 2−68.
2. Set up to measure Solid State Amplifier power. See Illustration 2−73.



RECONFIGURATION FOR SOLID STATE AMPLIFIER (BODY MODE)
ILLUSTRATION 2−73

3. Terminate IPA Section by putting 50Ω terminator on J2507 at the rear of the RF Amplifier.

CAUTION

This prevents damage from occuring to the IPA section.

2−7−4 Solid State Amplifier (Body Mode) (continued)

4. Prepare system to scan using the following scan parameters:

SCAN PRESCRIPTION

MAIN MENU **[New Exam]**

PATIENT/EXAM INFORMATION

Id: **geservice**
Name:
Weight (lb) **111**
[Patient Position]

PATIENT POSITION

Patient Entry **[Head First]**
Patient Position **[Supine]**
Axial/Sag. Landmark **[Sternal Notch]**
Coil Type **[Body Coil]**
Scan Plane **[Axial]**
[Image Params]

IMAGING PARAMETERS

Image Mode **[2D]**
(⋆ SAR must be "On" ⋆) **[Monitor SAR]**
Pulse Sequence **[Spin Echo]**
Imaging Options **[None]**
or enter PSD Filename **pcal**
[Scan Timing] or [Next Screen]

SCAN TIMING

Number of Echoes **[1]**
Echo Time (TE) **[20 msec]**
Rep Time (TR) **[Other] 150** msec
[Scan Set−Up]

SCAN SET−UP

Prescan Options none *(Release 5.4)*
Auto CF **[Peak]**
[Scanning Range]

SCANNING RANGE

Field of View **[24 cm]**
Scan Thickness **[10 mm]**
Interscan Spacing **[Other] 0**
Start Loc (I/S): **0**
End Loc (I/S): **0**
No. of Scan Locations: 1
FOV Center (L/R): 0 (P/A): 0
[⇐] [Acq Time]

ACQUISITION TIME

Acq. Matrix (freq.) **[256]**
Acq. Matrix (phase) **[128]**
Frequency Direction **[R/L]**
Phase FOV default
Imaging Time **[2 NEX 0:52]**
Contrast **[No]**
Table Delta: 0 mm
[Scan Ops]

SCAN OPERATIONS

[Modify CVs]

CALMODE = 5 (NORMAL RF)
IA_RF1 = 32766 (sets 90˚ pulse full−scale)
IA_RF2 = 0 (turns off 180˚ pulse)

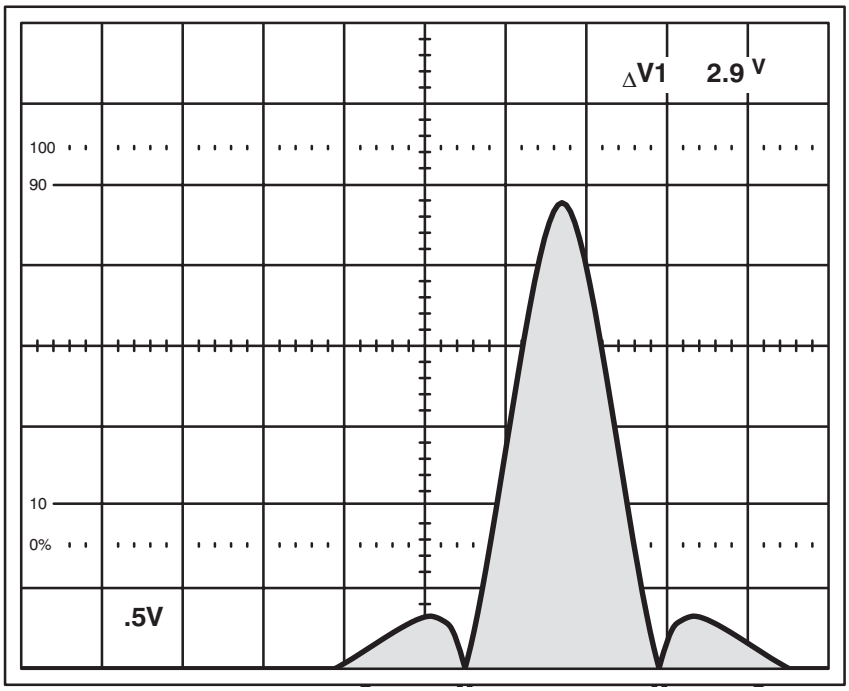
[Setup Params]

R1 = 6 (RECEIVER ANALOG GAIN SETTING)
R2 = 15 (RECEIVER DIGITAL GAIN)
TG = 100
RIGHT DISPLAY
FRAME 1
FRAME 0
PLOT GAIN 1
PLOT TYPE I

5. Select **[Manual Prescan]** and **[Scan TR]**.

6. Enter the TG value recorded from Section 2−7−3, Body RF Output Power (Full), step 5. See Illustration 2−74.

2−7−4 Solid State Amplifier (Body Mode) (continued)



Scope Channel 1:
50Ω input ♦ **NOTE**
0.5V/div
Trigger: External

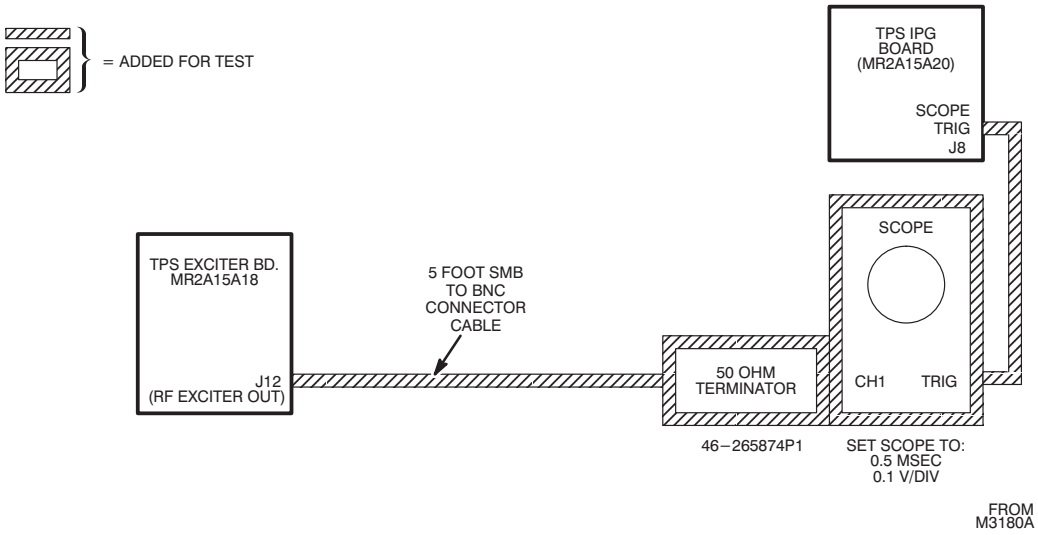
FROM
M3309A

SOLID STATE AMPLIFIER (BODY MODE)
ILLUSTRATION 2−74

2−7−5 Exciter Board Output

1. Bypass Envelope Feedback Assembly. See Illustration 2−68.

2. Set up to measure exciter power. See Illustration 2−75.



RECONFIGURATION FOR EXCITER BOARD OUTPUT
ILLUSTRATION 2−75

2−7−5 Exciter Board Output (continued)

3. Prepare system to scan using the following scan parameters:

SCAN PRESCRIPTION

MAIN MENU **[New Exam]**

PATIENT/EXAM INFORMATION

Id: **geservice**
Name:
Weight (lb) **111**
[Patient Position]

PATIENT POSITION

Patient Entry **[Head First]**
Patient Position **[Supine]**
Axial/Sag. Landmark **[Sternal Notch]**
Coil Type **[Body Coil]**
Scan Plane **[Axial]**
[Image Params]

IMAGING PARAMETERS

Image Mode **[2D]**
(⋆ SAR must be "On" ⋆) **[Monitor SAR]**
Pulse Sequence **[Spin Echo]**
Imaging Options **[None]**
or enter PSD Filename **pcal**
[Scan Timing] or [Next Screen]

SCAN TIMING

Number of Echoes **[1]**
Echo Time (TE) **[20 msec]**
Rep Time (TR) **[Other] 150** msec
[Scan Set−Up]

SCAN SET−UP

Prescan Options none *(Release 5.4)*
Auto CF **[Peak]**
[Scanning Range]

SCANNING RANGE

Field of View **[24 cm]**
Scan Thickness **[10 mm]**
Interscan Spacing **[Other] 0**
Start Loc (I/S): **0**
End Loc (I/S): **0**
No. of Scan Locations: 1
FOV Center (L/R): 0 (P/A): 0
[⇐] [Acq Time]

ACQUISITION TIME

Acq. Matrix (freq.) **[256]**
Acq. Matrix (phase) **[128]**
Frequency Direction **[R/L]**
Phase FOV default
Imaging Time **[2 NEX 0:52]**
Contrast **[No]**
Table Delta: 0 mm
[Scan Ops]

SCAN OPERATIONS

[Modify CVs]

CALMODE = 5 (NORMAL RF)
IA_RF1 = 32766 (sets 90˚ pulse full−scale)
IA_RF2 = 0 (turns off 180˚ pulse)

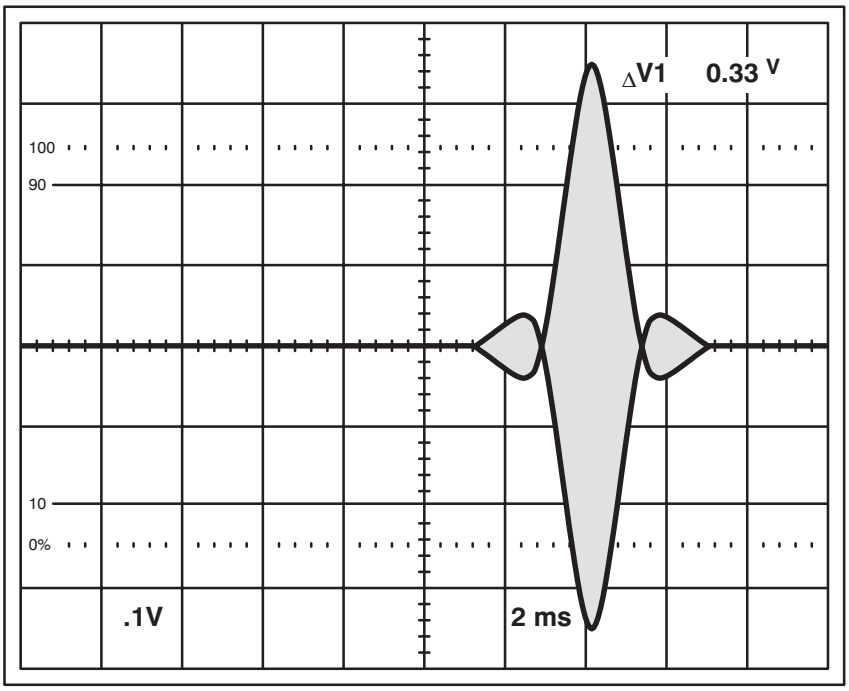
[Setup Params]

R1 = 6 (RECEIVER ANALOG GAIN SETTING)
R2 = 15 (RECEIVER DIGITAL GAIN)
TG = 100
RIGHT DISPLAY
FRAME 1
FRAME 0
PLOT GAIN 1
PLOT TYPE I

4. Select **[Manual Prescan]** and **[Scan TR]**.

5. Enter the TG value recorded from Section 2−7−3, Body RF Output Power (Full), step 5. See Illustration 2−76.

2−7−5 Exciter Board Output (continued)



Scope Channel 1:
50Ω input ♦ **NOTE**
0.1V/div
Trigger: External

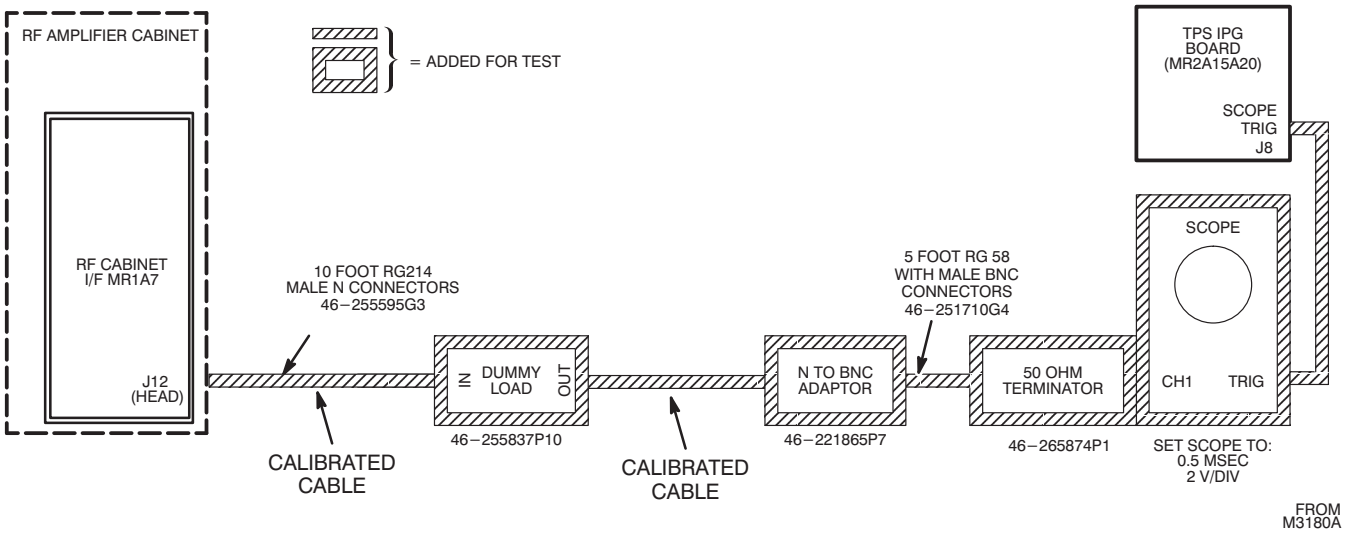
FROM
M3309A

EXCITER BOARD OUTPUT
ILLUSTRATION 2−76

2−7−6 Head RF Output Power (Full)

1. Bypass Envelope Feedback Assembly. See Illustration 2−68.

2. Set up to measure head power. See Illustration 2−77.



RECONFIGURATION FOR HEAD RF OUTPUT POWER (FULL)
ILLUSTRATION 2−77

2−7−6 Head RF Output Power (Full) (continued)

3. Prepare system to scan using the following scan parameters:

SCAN PRESCRIPTION

MAIN MENU **[New Exam]**

PATIENT/EXAM INFORMATION

Id: **geservice**
Name:
Weight (lb) **111**
[Patient Position]

PATIENT POSITION

Patient Entry **[Head First]**
Patient Position **[Supine]**
Axial/Sag. Landmark **[Sternal Notch]**
Coil Type **[Head Coil]**
Scan Plane **[Axial]**
[Image Params]

IMAGING PARAMETERS

Image Mode **[2D]**
(⋆ SAR must be "On" ⋆) **[Monitor SAR]**
Pulse Sequence **[Spin Echo]**
Imaging Options **[None]**
or enter PSD Filename **pcal**
[Scan Timing] or [Next Screen]

SCAN TIMING

Number of Echoes **[1]**
Echo Time (TE) **[20 msec]**
Rep Time (TR) **[Other] 150** msec
[Scan Set−Up]

SCAN SET−UP

Prescan Options none *(Release 5.4)*
Auto CF **[Peak]**
[Scanning Range]

SCANNING RANGE

Field of View **[24 cm]**
Scan Thickness **[10 mm]**
Interscan Spacing **[Other] 0**
Start Loc (I/S): **0**
End Loc (I/S): **0**
No. of Scan Locations: 1
FOV Center (L/R): 0 (P/A): 0
[⇐] [Acq Time]

ACQUISITION TIME

Acq. Matrix (freq.) **[256]**
Acq. Matrix (phase) **[128]**
Frequency Direction **[R/L]**
Phase FOV default
Imaging Time **[2 NEX 0:52]**
Contrast **[No]**
Table Delta: 0 mm
[Scan Ops]

SCAN OPERATIONS

[Modify CVs]

CALMODE = 5 (NORMAL RF)
IA_RF1 = 32766 (sets 90˚ pulse full−scale)
IA_RF2 = 0 (turns off 180˚ pulse)

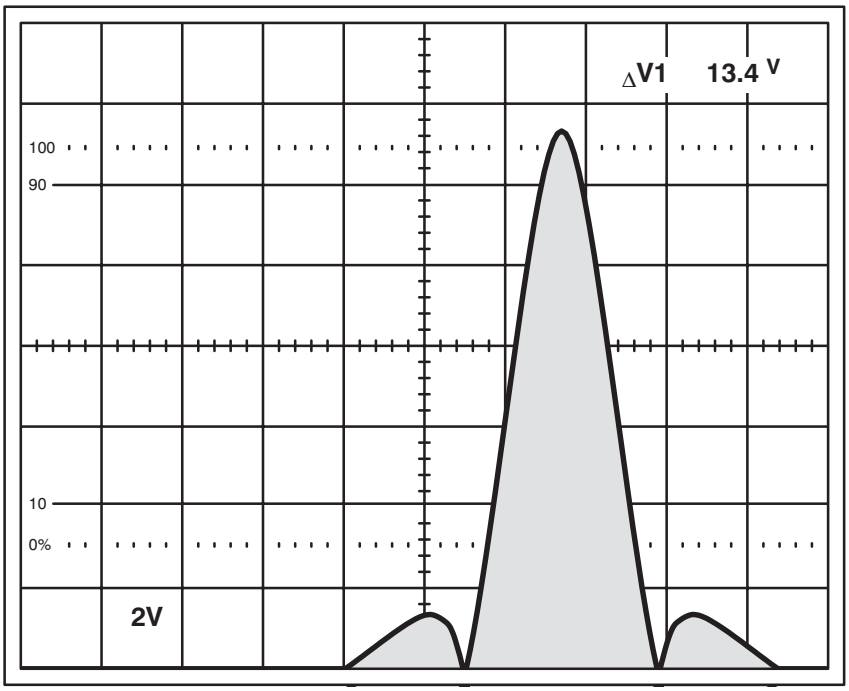
[Setup Params]

R1 = 6 (RECEIVER ANALOG GAIN SETTING)
R2 = 15 (RECEIVER DIGITAL GAIN)
TG = 100
RIGHT DISPLAY
FRAME 1
FRAME 0
PLOT GAIN 1
PLOT TYPE I

4. Select **[Manual Prescan]** and **[Scan TR]**.

5. Adjust TG until 2KW peak power is reached. See Illustration 2−78.

2−7−6 Head RF Output Power (Full) (continued)



Scope Channel 1:
50Ω input ♦ **NOTE**
2V/div
Trigger: External

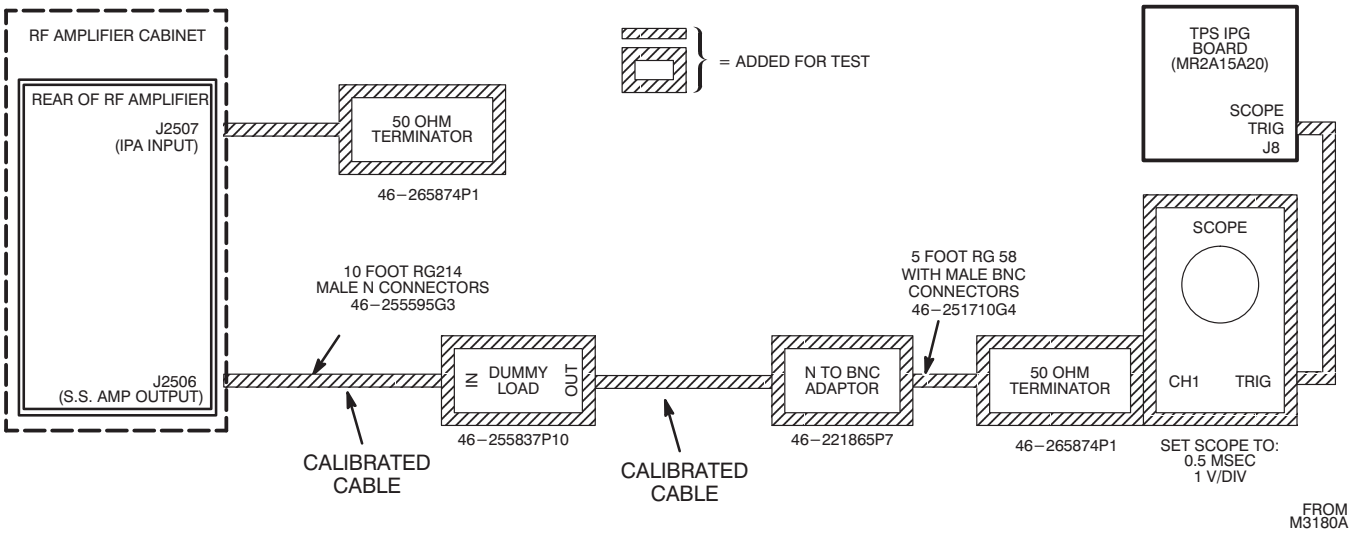
FROM
M3309A

HEAD RF OUTPUT POWER (FULL)
ILLUSTRATION 2−78

2−7−7 Solid State Amplifier (Head Mode)

1. Bypass Envelope Feedback Assembly. See Illustration 2−68.

2. Set up to measure head power. See Illustration 2−79.



RECONFIGURATION FOR SOLID STATE AMPLIFIER (HEAD MODE)
ILLUSTRATION 2−79

3. Terminate IPA Section by putting 50Ω terminator on J2507 at the rear of the RF Amplifier.

CAUTION

This prevents damage from occuring to the IPA section.

2−7−7 Solid State Amplifier (Head Mode) (continued)

4. Prepare system to scan using the following scan parameters:

SCAN PRESCRIPTION

MAIN MENU **[New Exam]**

PATIENT/EXAM INFORMATION

Id: **geservice**
Name:
Weight (lb) **111**
[Patient Position]

PATIENT POSITION

Patient Entry **[Head First]**
Patient Position **[Supine]**
Axial/Sag. Landmark **[Sternal Notch]**
Coil Type **[Head Coil]**
Scan Plane **[Axial]**
[Image Params]

IMAGING PARAMETERS

Image Mode **[2D]**
(⋆ SAR must be "On" ⋆) **[Monitor SAR]**
Pulse Sequence **[Spin Echo]**
Imaging Options **[None]**
or enter PSD Filename **pcal**
[Scan Timing] or [Next Screen]

SCAN TIMING

Number of Echoes **[1]**
Echo Time (TE) **[20 msec]**
Rep Time (TR) **[Other] 150** msec
[Scan Set−Up]

SCAN SET−UP

Prescan Options none *(Release 5.4)*
Auto CF **[Peak]**
[Scanning Range]

SCANNING RANGE

Field of View **[24 cm]**
Scan Thickness **[10 mm]**
Interscan Spacing **[Other] 0**
Start Loc (I/S): **0**
End Loc (I/S): **0**
No. of Scan Locations: 1
FOV Center (L/R): 0 (P/A): 0
[⇐] [Acq Time]

ACQUISITION TIME

Acq. Matrix (freq.) **[256]**
Acq. Matrix (phase) **[128]**
Frequency Direction **[R/L]**
Phase FOV default
Imaging Time **[2 NEX 0:52]**
Contrast **[No]**
Table Delta: 0 mm
[Scan Ops]

SCAN OPERATIONS

[Modify CVs]

CALMODE = 5 (NORMAL RF)
IA_RF1 = 32766 (sets 90˚ pulse full−scale)
IA_RF2 = 0 (turns off 180˚ pulse)

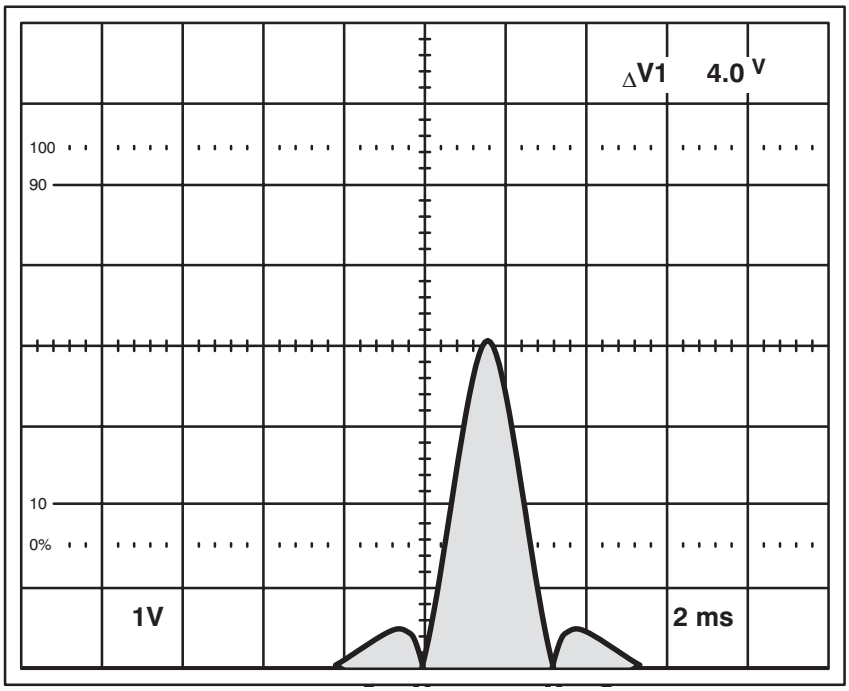
[Setup Params]

R1 = 6 (RECEIVER ANALOG GAIN SETTING)
R2 = 15 (RECEIVER DIGITAL GAIN)
TG = 100
RIGHT DISPLAY
FRAME 1
FRAME 0
PLOT GAIN 1
PLOT TYPE I

5. Select **[Manual Prescan]** and **[Scan TR]**.

6. Enter the TG value recorded from Section 2−7−6, Head RF Output Power (Full), step 5. See Illustration 2−80.

2−7−7 Solid State Amplifier (Head Mode) (continued)



Scope Channel 1:
50Ω input ♦ **NOTE**
1V/div
Trigger: External

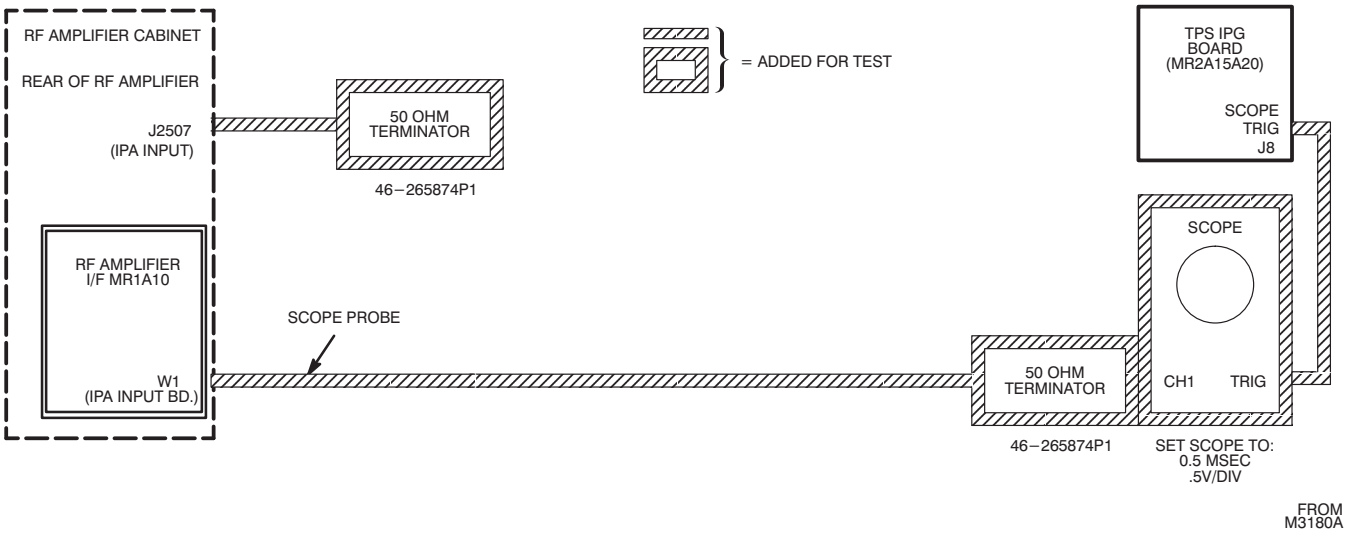
FROM
M3309A

SOLID STATE AMPLIFIER (HEAD MODE)
ILLUSTRATION 2−80

2−7−8 IPA Input Board

1. Bypass Envelope Feedback Assembly. See Illustration 2−68.

2. Set up to measure IPA output power. See Illustration 2−81.



RECONFIGURATION FOR IPA INPUT BOARD
ILLUSTRATION 2−81

3. Terminate IPA Section by putting 50Ω terminator on J2507 at the rear of the RF Amplifier.

CAUTION

This prevents damage from occuring to the IPA section.

2−7−8 IPA Input Board (continued)

4. Prepare system to scan using the following scan parameters:

SCAN PRESCRIPTION

MAIN MENU **[New Exam]**

PATIENT/EXAM INFORMATION

Id: **geservice**
Name:
Weight (lb) **111**
[Patient Position]

PATIENT POSITION

Patient Entry **[Head First]**
Patient Position **[Supine]**
Axial/Sag. Landmark **[Sternal Notch]**
Coil Type **[Head Coil]**
Scan Plane **[Axial]**
[Image Params]

IMAGING PARAMETERS

Image Mode **[2D]**
(⋆ SAR must be "On" ⋆) **[Monitor SAR]**
Pulse Sequence **[Spin Echo]**
Imaging Options **[None]**
or enter PSD Filename **pcal**
[Scan Timing] or [Next Screen]

SCAN TIMING

Number of Echoes **[1]**
Echo Time (TE) **[20 msec]**
Rep Time (TR) **[Other] 150** msec
[Scan Set−Up]

SCAN SET−UP

Prescan Options none *(Release 5.4)*
Auto CF **[Peak]**
[Scanning Range]

SCANNING RANGE

Field of View **[24 cm]**
Scan Thickness **[10 mm]**
Interscan Spacing **[Other] 0**
Start Loc (I/S): **0**
End Loc (I/S): **0**
No. of Scan Locations: 1
FOV Center (L/R): 0 (P/A): 0
[⇐] [Acq Time]

ACQUISITION TIME

Acq. Matrix (freq.) **[256]**
Acq. Matrix (phase) **[128]**
Frequency Direction **[R/L]**
Phase FOV default
Imaging Time **[2 NEX 0:52]**
Contrast **[No]**
Table Delta: 0 mm
[Scan Ops]

SCAN OPERATIONS

[Modify CVs]

CALMODE = 5 (NORMAL RF)
IA_RF1 = 32766 (sets 90˚ pulse full−scale)
IA_RF2 = 0 (turns off 180˚ pulse)

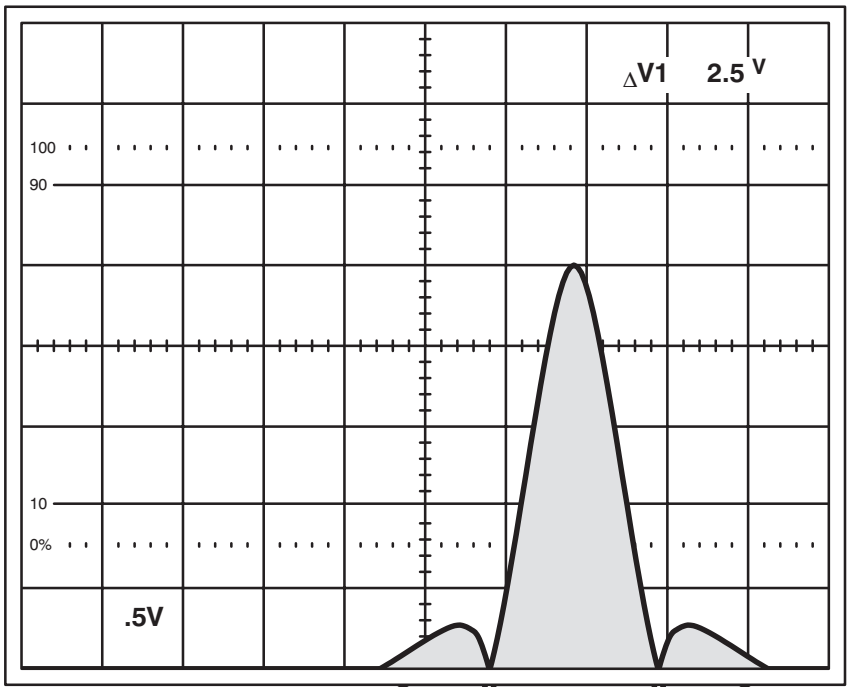
[Setup Params]

R1 = 6 (RECEIVER ANALOG GAIN SETTING)
R2 = 15 (RECEIVER DIGITAL GAIN)
TG = 100
RIGHT DISPLAY
FRAME 1
FRAME 0
PLOT GAIN 1
PLOT TYPE I

5. Select **[Manual Prescan]** and **[Scan TR]**.

6. Enter the TG value recorded from Section 2−7−3, Body RF Output Power (Full), step 5. See Illustration 2−82.

2−7−8 IPA Input Board (continued)



Scope Channel 1:
50Ω input ♦ **NOTE**
0.5V/div
Trigger: External

FROM
M3309A

IPA INPUT BOARD
ILLUSTRATION 2−82

2−7−9 Serial Link Configurations

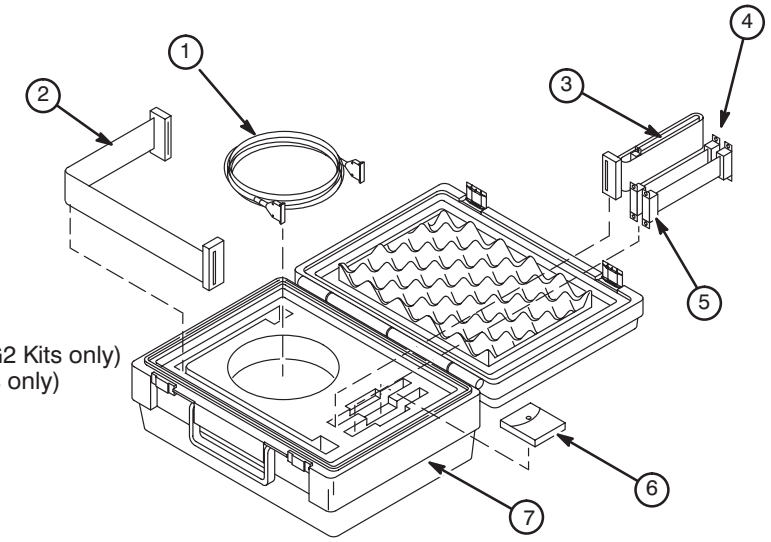
The RS 232/422 Breakout Kit (46−306668G1) contains a Breakout Box (46−306651P1) made by M−Test. This Breakout Box is no longer available and a replacement Breakout Box made by GC/Thorsen has been identified. The new Breakout Box has been assigned the part number of 46−320005P1 and all RS 232/422 Breakout Kits will now be supplied with this new item. We have also now changed the part number of the RS 232/422 Breakout Kit to 46−306668G2. See Illustration 2−83.

A RS 232/422 Breakout Kit(s) (46−306668G2/G1) have been assembled to provide common cabling for use when performing AFT on the ERBTEC RF Amplifier. Refer to Section 2−7−10, AFT FOR THE ERBTEC AMPLIFIER. Use the Breakout Box and 30 ft. 25 conductor shielded cable to connect the ERBTEC serial port (P2204) (rear panel of the ERBTEC Amplifier) to the HOST serial port (Genesis Computer, CC1).

This RS 232/422 Breakout Kit (46−306668G2 or G1) contains:

Item # Part # Description

1. 46-244710G23 30 ft., 25 line, M−F cable
2. 46−287382P2 40 line ribbon cable
3. 46−265478P1 26−25 line ribbon cable
4. 46−244890P129 25 line F−F ribbon cable
5. 46-244890P130 25 line M−F ribbon cable
6. 46-320005P1 G.C./Thorsen Breakout Box (G2 Kits only)
46-306651P1 M−Test Breakout Box (G1 Kits only)
7. 46-306668G50 Case, Foam & Label



RS 232/422 BREAKOUT KIT (46−306668G2/G1)
ILLUSTRATION 2−83

Configure the Genesis, JP8 (5.x) to ERBTEC serial link, as follows: See Illustration 2−84 (M−Test) or Illustration 2−85 (G.C./Thorsen).

1. Move all the switches on the Breakout Box (46−320005P1 or 46−306651P1) to the “OFF” position.

2. Configure the Breakout Box jumpers as follows:

For G.C./Thorsen Breakout Box (46−320005P1):

“ON” Side Pin 2 to “OFF” Side Pin 3,
“ON” Side Pin 3 to “OFF” Side Pin 2,
“ON” Side Pin 7 to “OFF” Side Pin 7,
“ON” Side Pin 5 to “ON” Side Pin 20,
“OFF” Side Pin 4 to “OFF” Side Pin 5,
“OFF” Side Pin 6 to “COMMON” on Side of Breakout Box)
“OFF” Side Pin 8 to “COMMON” on Side of Breakout Box)
“OFF” Side Pin 20 to “COMMON” on Side of Breakout Box).

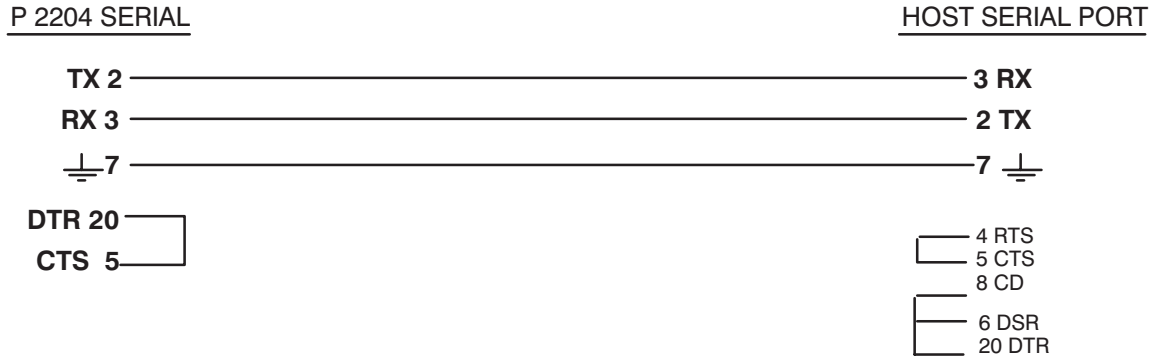
2−7−9 Serial Link Configurations (continued)

For M−Test Breakout Box (46−306651P1): "ON" Side Pin 2 to "OFF" Side Pin 3,
"ON" Side Pin 3 to "OFF" Side Pin 2,
"ON" Side Pin 7 to "OFF" Side Pin 7,
"ON" Side Pin 5 to "ON" Side Pin 20,
"OFF" Side Pin 4 to "OFF" Side Pin 5,
"OFF" Side Pin 6 to "OFF" Side Pin 8 to "OFF" Side Pin 20.

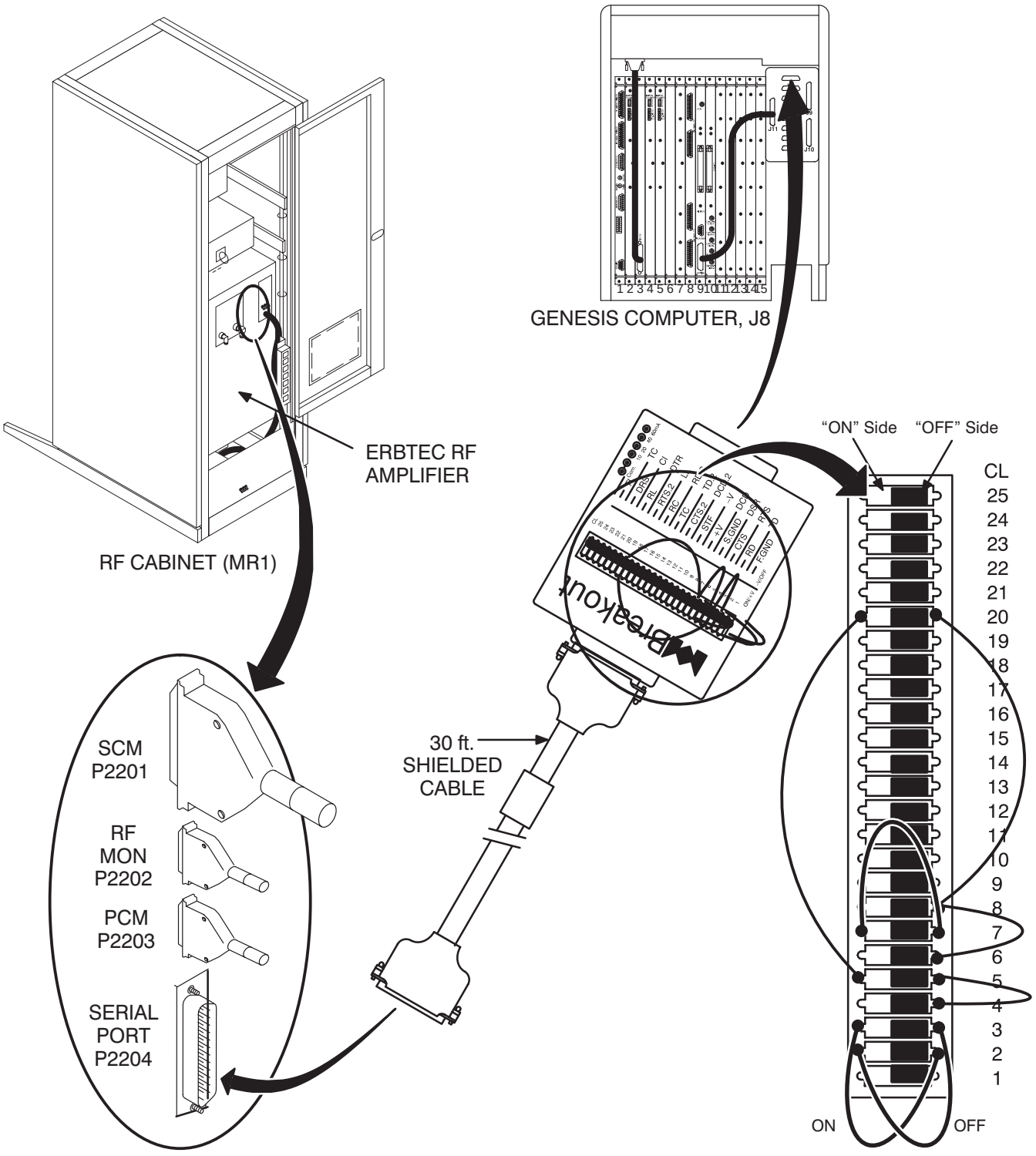
3. Proceed to Section 2−7−10, AFT FOR THE ERBTEC AMPLIFIER, to perform AFT.

Note

The following diagram details the serial port cable configuration used by the Breakout Box:

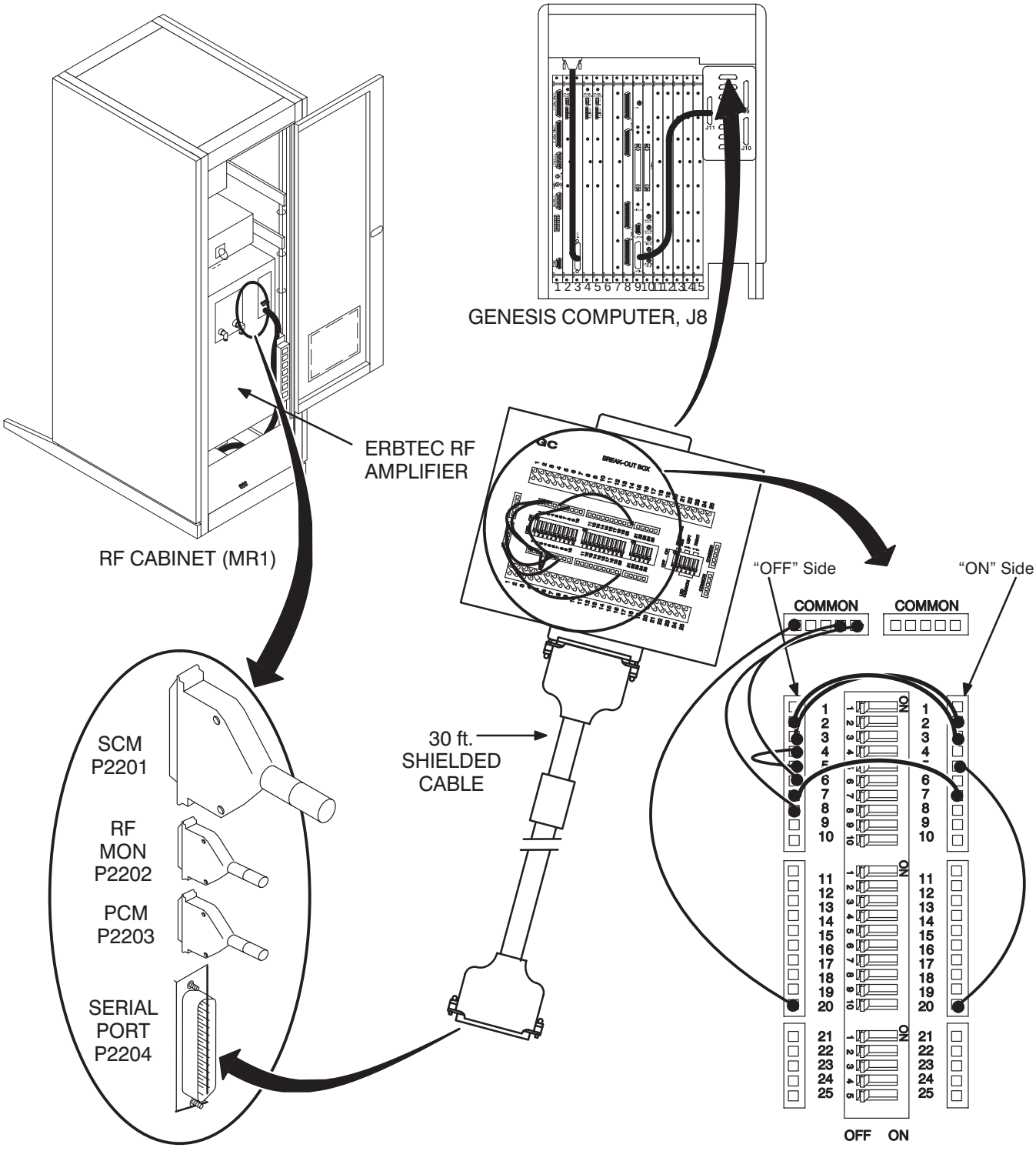


2−7−9 Serial Link Configurations (continued)



ERBTEC SERIAL LINK CONNECTIONS USING M−TEST BREAKOUT BOX (46−306651P1)
ILLUSTRATION 2−84

2−7−9 Serial Link Configurations (continued)



ERBTEC SERIAL LINK CONNECTIONS USING G.C./THORSEN BREAKOUT BOX (46−320005P1)
ILLUSTRATION 2−85

2−7−10 AFT For The Erbtec Amplifier

Note

Refer to Section 2−7−9, SERIAL LINK CONFIGURATIONS, for Breakout Box configuration.

Note

AFT should be run every 3 months.

Note

If a IPA tube is replaced, perform Head AFT first, then Body AFT. If a PA tube is replaced, perform Body AFT only. If the Amplifier is being tuned as part of P.M., perform Head AFT first, then Body AFT.

For BODY mode or HEAD mode:

1. Select **[Utilities]**, **[1]**, **[2]**, **[3]**, **[C Shell]**. At the prompt, type:

OUTPUT/PROMPTS	INPUT/COMMENTS
`genesis @ <Suite_Id>: .....`	**cd /w/config** ENTER .
`genesis @ <Suite_Id>: .....`	**vi ipg_stage** ENTER .
`a .....`	**a** *This will append text after cursor position.*
`a .....`	**H [ESC]** . *This will insert "H" to emulate the RF Amp.*
`aH .....`	**:wq** ENTER . *This will save the text and quit.*
`:wq`	
`genesis @ <Suite_Id>: .....`	**exit** ENTER . *This will close the C Shell.*

2. Turn OFF power to ERBTEC Amplifier, circuit breaker, CB1. This will prevent static discharge problems to the amplifier. It will also download and reset motor positions within the amplifier.

3. Select **[Reset TPS]**. This is needed to activate the changes to the "ipg_stage" file.

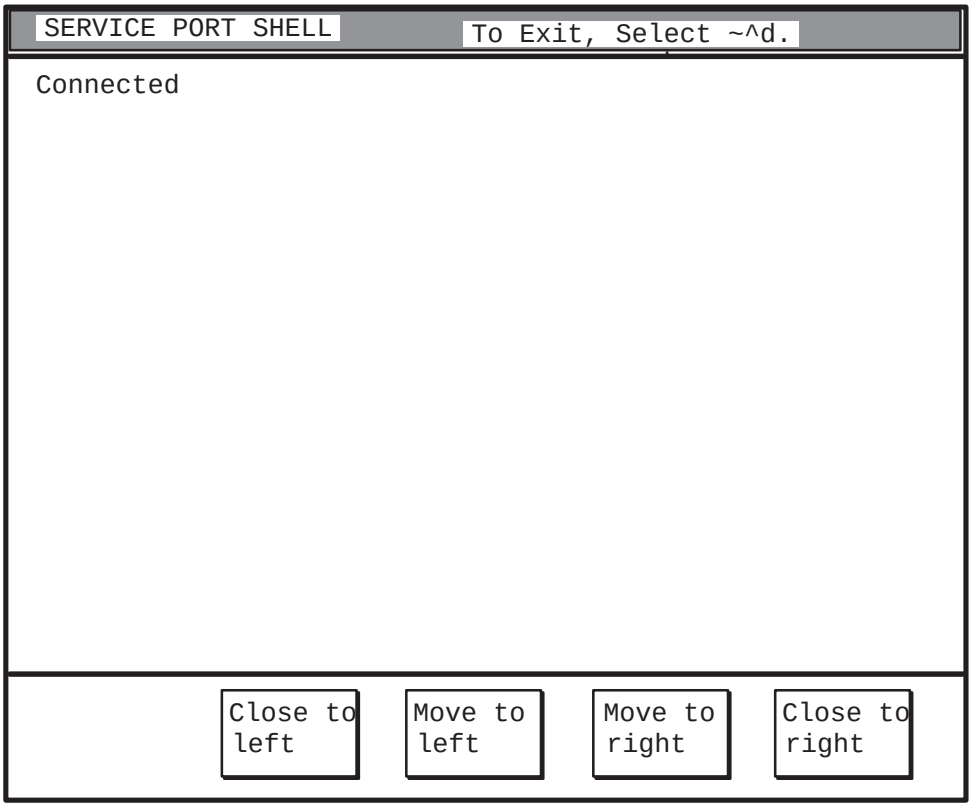
4. Disconnect cables at J2, J3, J6, & J7 at rear of Power Monitor to defeat trips during AFT.

5. Connect a serial cable (46−320252P1) or serial cable (46−244710G23) and Breakout Box (46−320005P1) from Breakout Box Kit (46−306668G1/G2) between the Sun computer's service serial port, CC1−A2−J8, and the Erbtec RF Amplifier's serial port, P2204.

6. Turn ON power to ERBTEC Amplifier, circuit breaker, CB1. ERBTEC Amplifier may take 7 − 8 minutes to reset.

7. When Signa is up, enter the following softkeys to bring up the service port window: **[MR Tools]**, **[Service Port]**. See Illustration 2−86.

2−7−10 AFT For The Erbtec Amplifier (continued)



SERVICE PORT SHELL
ILLUSTRATION 2−86

2–7–10 AFT For The Erbtec Amplifier (continued)

8. In the Service Port window, type:

OUTPUT/PROMPTS	INPUT/COMMENTS
`Connected .....`	**s** (ENTER) *To communicate to ERBTEC RF Amplifier.*
`Ready .....`	**o1** (ENTER) . *This will bring the Erbtec to "standby". If already at standby, only a new line will be returned. Verify "standby" LED is on and "wait" LED is off. If previously at "off", there will be a six–minute wait to get to "standby".*
	Note The leading o is a lower–case letter o, not a zero.
`Standby .....`	**body** (ENTER) or **head** (ENTER). *This will set the Erbtec to body (or head) mode. This can be typed in either upper or lower case. A new line will be returned. Verify either "body" LED or "head" LED is on, depending on the one you selected.*
`Body or Head .....`	**a+** (ENTER) . *Turns AFT on. "AFT enabled" will be returned.*
`AFT enabled .....`	**o3** (ENTER) **.** *Brings the amp to "operate". The "wait" LED will come on briefly while AFT is performed. "Operate wait" and then "Operate" will be returned. The "wait" LED should go off and the "operate" LED should turn on.*
`operate wait .....` `operate`	**o1** (ENTER) . *This will return the Erbtec to "standby". If already at standby, only a new line will be returned. Verify "standby" LED is on and "wait" LED is off.*
`standby .....`	**N** (ENTER) *(retune existing tube)* or **N (serial number)** (ENTER) *(tune a new tube) .*
	Note The function of typing "N" is to download the final motor positions, determined by AFT, to the normal motor position addresses. If AFT fails, do not type "N". Redo AFT until AFT passes. Otherwise, it is possible to download erroneous motor positions.
	Note If this is being done because of a tube replacement, type "N" followed by the new tube's serial number and **[enter]**. A string of ASCII HEX characters will be returned representing the "heater ontime meter" and the new tuning positions will be saved to memory. If this is not being done because of a tube replacement, then just type "N" **[enter]**. The tuning positions will be saved to memory and a newline will be returned.
`standby .....`	**a–** (ENTER) . *Turns AFT off. "AFT disabled" will be returned.*
	Note If you need to rerun AFT for another mode, simply return to step 14. If AFT is complete, continue as follows:
`AFT disabled .....`	(SHIFT) ~ followed by (CTRL) **d**. *This will exit the Service Port window.*
	Note The " ~ " character is the "tilda". It's located at the upper right corner of the console keyboard.

2−7−10 AFT For The Erbtec Amplifier (continued)

9. Select **[Utility Main]**, **[C Shell]**. At the prompt, type:

OUTPUT/PROMPTS	INPUT/COMMENTS
genesis @ <Suite_Id>:	**cd /w/config** ENTER .
genesis @ <Suite_Id>:	**vi ipg_stage** ENTER .
aH	**l** *(The lower case letter "L") This will move the cursor over one space to right.*
aH	**x [ESC]** . *This will delete the "H" to de−emulate the RF Amp.*
a	**:wq** ENTER . *This will save the text and quit.*
:wq	
genesis @ <Suite_Id>:	**exit** ENTER . *This will close the C Shell.*

10. Turn OFF power to ERBTEC Amplifier, circuit breaker, CB1. This will prevent static discharge problems to the amplifier. It will also download and reset motor positions within the amplifier.

11. Reconnect cables at J2, J3, J6, & J7 at rear of Power Monitor.

12. Disconnect the serial cable (46−320252P1) or serial cable (46−244710G23) and Breakout Box (46−320005P1) from Breakout Box Kit (46−306668G1/G2) between the Sun computer's service serial port, CC1−A2−J8, and the Erbtec RF Amplifier's serial port, P2204.

13. Turn ON power to ERBTEC Amplifier, circuit breaker, CB1. ERBTEC Amplifier may take 7 − 8 minutes to reset.

14. Select **[Reset TPS]**. This is needed to activate the changes to the "ipg_stage" file.

2−7−11 Reading The A/D Registers

First we'll tell you how to read the A/D registers and then give the cross−reference charts for explaining what each register is and also a hex to decimal conversion chart.

1. Hook−up Host Computer serial port as you did in the AFT procedure.
2. Hook−up Dummy load if desired (you can use same commands as in AFT to bring amplifier up to operate).
3. Use the command **R (desired register)** <CR> as follows: (Refer to Table 2−3 for registers and their constants).

OUTPUT/PROMPTS	INPUT/COMMENTS
	R0F<CR> (100V Supply Register)
B2	(value in hex that terminal responded with) B2 converted from hex to decimal = 178 178 x .613 (Erbtec's constant for that register) = 109.11V

2−7−11 Reading The A/D Registers (continued)

TABLE 2−3
ERBTEC A/D CONVERSION TABLE

ADDRESS	CONVERSION FORMULA (arg = The value converted to decimal from hex when the A/D code is read)	SIGNAL NAME	RESULT
00	(arg*.049) * (arg*.049) / 50.0	IPA FWD PWR	KW
01	(arg * 4.0)	IPA GRID I	mA
02	(arg* .117)	IPA V BIAS	V
03	NOT VALID	FAN AIR 1	V
04	(arg*9.96)	IPA PLATE I	mA
05	(arg*5.0/256.0)	HS MON	V
06	(arg*.061)	+ UNREG	V
07	(arg*5.0/256.0)	PA TUNE	V
08	(arg*.155) * (arg*.155) /50	PA FOR PWR	KW
09	(arg*4.0)	PA GRID I	mA
0A	(arg*.234)	PA V BIAS	V
0B	NOT VALID	FAN AIR 2	V
0C	(arg*39.09)	PA PLATE I	mA
0D	(arg*5.0/256.0)	SCM CAB MON	V
0E	(arg*5.0/256.0)	IPA TUNE	V
0F	(arg*.613)	+100V MON	V
10	(arg*.049) * (arg*.049)/50.0	IPA REF PWR	KW
11	(arg*15.9)	IPA HV	V
12	(arg*19.6)	IPA HTR MON	mA
13	(arg*5.0/256.0)	IPA ANODE RF	V
14	(arg*15/256 − 10)	−5V MON	V
15	NOT VALID	MTR DRIVE 1	V
16	NOT VALID	SS AMP I MON	mA
17	(arg*.376)	+48V MON	V
18	(arg*.155) * (arg*.155)/50	PA REF PWR	KW
19	(arg*31.9)	PA HV	V
1A	(arg*196.0)	PA HTR MON	mA
1B	(arg*5.0/256.0)	TUBE AIR 2	V
1C	(arg*.196)	+32V MON	V
1D	NOT VALID	MTR DRIVE 2	V
1E	(arg*.0196)	+2.5V REF	V
1F	(arg*.117)	+24V MON	V

2−7−11 Reading The A/D Registers (continued)

Below is the highest, lowest, and average A/D values of a number of sites read. These values were taken in a stand−by condition. The HV Supplies should not vary by more than a bit during a series of reads. The values you see here are taken from sites that are in normal operation.

TABLE 2−4
AVERAGE A/D VALUES

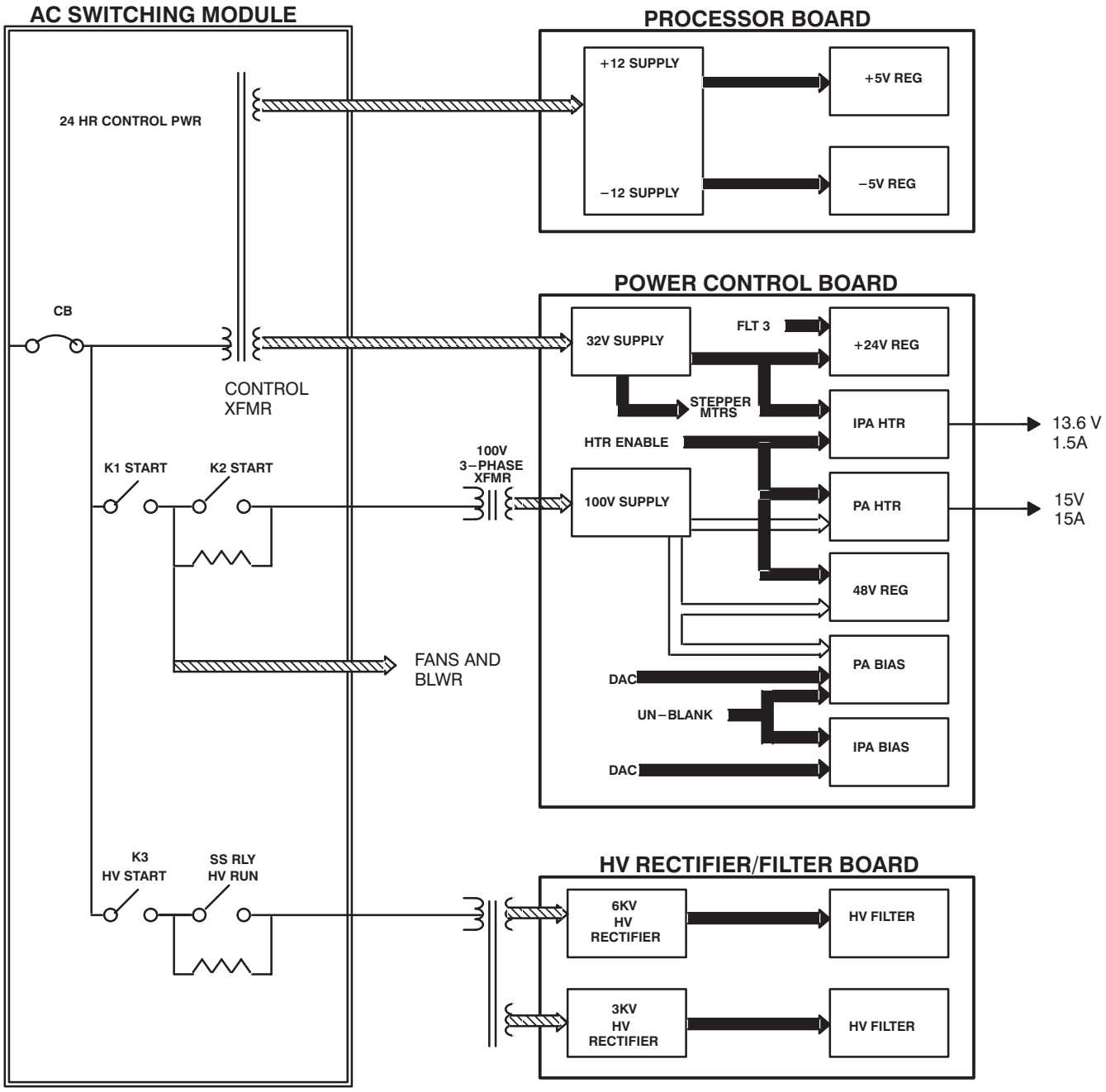
A/D REGISTER	SIGNAL	LOWEST READ	HIGHEST READ	AVERAGE (HEXDECIMAL/DECIMAL)
00	IPA FWD PWR	00	01	0 KWATTS
01	IPA GRID I	00	01	0 ma
02	IPA CATHODE BIAS	23	A9	73/18.43V
04	IPA PLATE I	01	01	01/9.96ma
05	SS AMP HEAT SINK	79	90	89/137.4
06	+UNREG	C3	C8	C5/12.04V
07	PA TUNE	80	81	80/2.5V
08	PA FWD PWR	00	01	0 KWATTS
09	PA GRID I	00	01	0 ma
0A	PA CATHODE BIAS	71	C9	B6/87.36V
0B	FAN AIR 2	NA	NA	NOT VALID
0C	PA PLATE I	00	02	01/39.09ma
0D	SCM INTERLOCK	04	06	05/NO CONVERSION
0E	IPA TUNE	81	82	81/2.53
0F	100V SUPPLY	B0	B5	B2/109.11
10	IPA REFL PWR	00	01	0 KWATTS
11	+3 KV SUPPLY	CB	CC	CC/3238.3V
12	IPA HTR I	49	4C	4B/1466.08ma
13	IPA ENV	00	01	00/NO CONVERSION
14	−5V SUPPLY	55	57	55/−4.96V
15	MTR DR 1	NA	NA	NOT VALID
16	SS AMP FET BIAS	NA	NA	NOT VALID
17	48V SUPPLY	7C	7E	7D/47.30V
18	PA REFL PWR	00	01	0 KWATTS
19	+6 KV SUPPLY	CD	CF	CE/6563.42V
1A	PA HTR I	43	48	46/13.64 A
1B	TUBE AIR 2	00	00	00
1C	+32V SUPPLY	92	99	95/29.25
1D	MTR DR 2	NA	NA	NOT VALID
1E	+5V SUPPLY	7C	81	7F/2.489
1F	+24V SUPPLY	C7	CE	CC/23.84V

2−7−11 Reading The A/D Registers (continued)

TABLE 2−5
DECIMAL TO HEXADECIMAL CONVERSION CHART

DEC	HEX	DEC	HEX	DEC	HEX	DEC	HEX	DEC	HEX	DEC	HEX	DEC	HEX	DEC	HEX
0	0	33	21	66	42	99	63	132	84	165	A5	198	C6	231	E7
1	1	34	22	67	43	100	64	133	85	166	A6	199	C7	232	E8
2	2	35	23	68	44	101	65	134	86	167	A7	200	C8	233	E9
3	3	36	24	69	45	102	66	135	87	168	A8	201	C9	234	EA
4	4	37	25	70	46	103	67	136	88	169	A9	202	CA	235	EB
5	5	38	26	71	47	104	68	137	89	170	AA	203	CB	236	EC
6	6	39	27	72	48	105	69	138	8A	171	AB	204	CC	237	ED
7	7	40	28	73	49	106	6A	139	8B	172	AC	205	CD	238	EE
8	8	41	29	74	4A	107	6B	140	8C	173	AD	206	CE	239	EF
9	9	42	2A	75	4B	108	6C	141	8D	174	AE	207	CF	240	F0
10	A	43	2B	76	4C	109	6D	142	8E	175	AF	208	D0	241	F1
11	B	44	2C	77	4D	110	6E	143	8F	176	B0	209	D1	242	F2
12	C	45	2D	78	4E	111	6F	144	90	177	B1	210	D2	243	F3
13	D	46	2E	79	4F	112	70	145	91	178	B2	211	D3	244	F4
14	E	47	2F	80	50	113	71	146	92	179	B3	212	D4	245	F5
15	F	48	30	81	51	114	72	147	93	180	B4	213	D5	246	F6
16	10	49	31	82	52	115	73	148	94	181	B5	214	D6	247	F7
17	11	50	32	83	53	116	74	149	95	182	B6	215	D7	248	F8
18	12	51	33	84	54	117	75	150	96	183	B7	216	D8	249	F9
19	13	52	34	85	55	118	76	151	97	184	B8	217	D9	250	FA
20	14	53	35	86	56	119	77	152	98	185	B9	218	DA	251	FB
21	15	54	36	87	57	120	78	153	99	186	BA	219	DB	252	FC
22	16	55	37	88	58	121	79	154	9A	187	BB	220	DC	253	FD
23	17	56	38	89	59	122	7A	155	9B	188	BC	221	DD	254	FE
24	18	57	39	90	5A	123	7B	156	9C	189	BD	222	DE	255	FF
25	19	58	3A	91	5B	124	7C	157	9D	190	BE	223	DF	256	100
26	1A	59	3B	92	5C	125	7D	158	9E	191	BF	224	E0	257	101
27	1B	60	3C	93	5D	126	7E	159	9F	192	C0	225	E1	258	102
28	1C	61	3D	94	5E	127	7F	160	A0	193	C1	226	E2	259	103
29	1D	62	3E	95	5F	128	80	161	A1	194	C2	227	E3	260	104
30	1E	63	3F	96	60	129	81	162	A2	195	C3	228	E4	261	105
31	1F	64	40	97	61	130	82	163	A3	196	C4	229	E5	262	106
32	20	65	41	98	62	131	83	164	A4	197	C5	230	E6	263	107

2−7−12 Power Supply Check Out



POWER SUPPLY BLOCK DIAGRAM
ILLUSTRATION 2−87

2−7−12 Power Supply Check Out (continued)

Power Supply Usage:

5 VOLTS
Microprocessor board

32 VOLTS
Stepping Motors
+12V Supply Regulator Power
+24V Supply Regulator Power
IPA Tube Regulator Supply

+12 VOLTS
Power Control Board Regulator Circuits

+24 VOLTS
MRF 134 FETS on the Solid State Amplifier Board
Relay Coils in the AC Switching Module
RF Monitor Module
PA Input Board (Relay)

+100 VOLTS
PA Blanking Grid Bias
PA and IPA Grid Bias Generators
Regulated +48 Volts
PA HTR Regulator (Goes through the PA Input Board)

+48 VOLTS
MRF 148 FETS on the Solid Stae Amplifier Board
MRF 150 FETS on the Solid State Amplifier Board

TABLE 2−6
POWER CONTROL TEST POINTS

TEST POINT	SIGNAL	DESCRIPTION
TP1	+48V	TIED TO 48V SUPPLY
TP2	PA HTR−	NEG OUTPUT OF 15.2V PA TUBE HTR SUPPLY
TP3	PA HTR+	POSITIVE OUTPUT OF PA HTR SUPPLY
TP4	IPA HTR+	IPA TUBE HTR SUPPLY
TP5	IPA CATHODE	IPA CATHODE TO GRID BIAS
TP6	PA CATHODE	PA CATHODE TO GRID BIAS
TP7	+24V	TIED TO 24V SUPPLY
TP8	GROUND	POWER CONTROL BROAD GND REF

2–7–12 Power Supply Check Out (continued)

Checking Power Supply Ripple:

The power supply voltages can be sampled at any time during amplifier operation. The power supplies can be monitored using the A/D registers on the microprocessor board. The microprocessor monitors high and low limits of the power supplies but does not monitor power supply ripple. Below we have the A/D registers and average voltages along with ripple data from several sites that are working normally. To check for ripple you should sample the register several times and determine the amount of change. Again, these are normal working sites and this data can only be used as a guideline. There are only 2 regulated supplies: the +5V supply and the +24V supply.

TABLE 2–7
POWER SUPPLY RIPPLE DATA

A/D REGISTER	SIGNAL	AVERAGE (HEXDECIMAL/DECIMAL)	#BITS/RIPPLE VOLTS
06	+UNREG	C5/12.0475V	4 BITS/.244V
0F	100V SUPPLY	B2/109.11V	3 BITS/1.840V
11	+3 KV SUPPLY	CC/3238.3	1 BIT/15.9V
14	–5V SUPPLY	55/–4.96V	1 BIT/.058V
17	+48V SUPPLY	7D/47.30V	1 BIT/.376V
19	+6 KV SUPPLY	CE/6563.425V	1 BIT/31.9V
1C	32V SUPPLY	95/29.25V	6 BITS/1.176V
1E	+5V SUPPLY	7F/2.4892V	0 BITS/0V
1F	+24V SUPPLY	CC/23.84V	0 BITS/0V