MOTOROLA INC.
Communications
Sector

FINAL POWER AMPLIFIER DECK (FPA)

MODEL TTF1212B (928-944 MHZ)
MODEL TTF1213A (944-960 MHZ)

1. GENERAL

The *PURC 5000* Final Power Amplifier (FPA) is designed for continuous duty operation over the full -30°C to +60°C range of ambient temperatures. The amplifier employs ceramic hybrid modules with 50-ohm interfaces between all stages. Figure 1 shows a typical Final Power Amplifier Deck and its input/output cabling. Figure 2 shows the components mounted on the heat sink.

2. THEORY OF OPERATION

2.1 The input signal to the FPA comes from the DPA. Under nominal operating conditions, the input level of the FPA is 50 to 75 W. This rf signal is divided into two 3-way splitters. The 6-way split signal is applied to six final amplifier modules. The combined outputs of the modules deliver 125 to 190 W to the output cable. A directional coupler/power detector for power control and sensing output power (forward and reflected) is incorporated on the combiner board.

2.2 Isolation resistors (TRN9060A, 64A) under the splitter and combiner boards minimize the interaction between modules. In the event of a module failure or degradation, the resulting mismatch will be isolated from the other modules. See paragraph 3.9 for testing procedures.

2.3 Operating temperature of the FPA is sensed by a thermistor located under the combiner board. The thermistor (RT501) senses the air temperature directly above the heat sink backplane. The temperature information is used by the power control circuit to control the station power output under elevated ambient temperature.

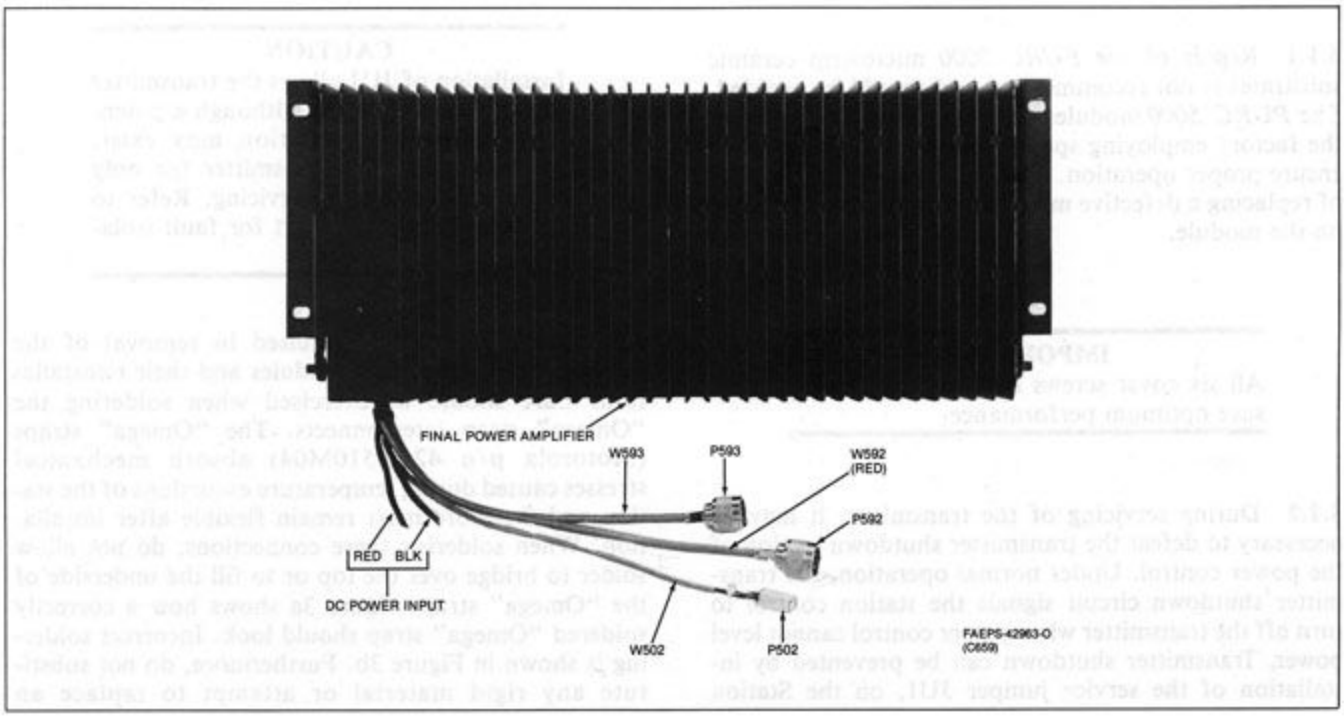


Figure 1. Front View of Final Power Amplifier Deck

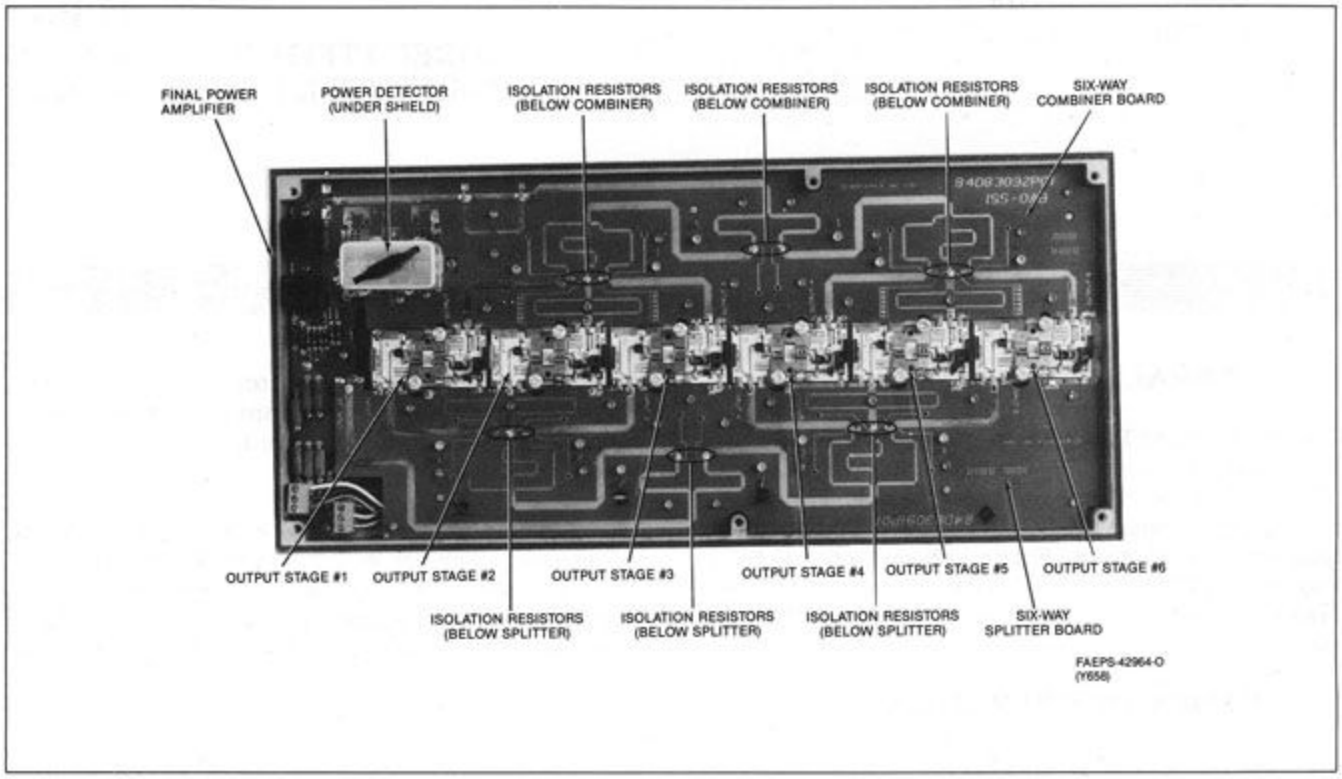


Figure 2. Rear View (Cover Removed) of Final Power Amplifier Deck

3. SERVICING

3.1 GENERAL

3.1.1 Repair of the *PURC 5000* microstrip ceramic substrates is not recommended and should be avoided. The *PURC 5000* modules are built, tuned and tested at the factory employing special fixtures and processes to ensure proper operation. The repair procedure consists of replacing a defective module rather than components on the module.

IMPORTANT

All six cover screws must be tight to ensure optimum performance.

3.1.2 During servicing of the transmitter, it may be necessary to defeat the transmitter shutdown section of the power control. Under normal operation, the transmitter shutdown circuit signals the station control to turn off the transmitter when power control cannot level power. Transmitter shutdown can be prevented by installation of the service jumper JU1, on the Station Control board. This allows the serviceman to make measurements in the areas of power control, IPA, and both power amplifier decks regardless of conditions in the transmitter.

CAUTION

Installation of JU1 allows the transmitter to continue to operate, although a potentially damaging condition may exist. Therefore, key the transmitter for only short periods during servicing. Refer to the troubleshooting chart for fault isolation.

3.1.3 Care should be exercised in removal of the "Omega" straps between modules and their reinstallation. Care should be exercised when soldering the "Omega" strap interconnects. The "Omega" straps (Motorola p/n 42-84510M04) absorb mechanical stresses caused during temperature excursions of the station and therefore must remain flexible after installation. When soldering these connections, do not allow solder to bridge over the top or to fill the underside of the "Omega" strap. Figure 3a shows how a correctly soldered "Omega" strap should look. Incorrect soldering is shown in Figure 3b. Furthermore, do not substitute any rigid material or attempt to replace an "Omega" strap by "solder bridging". If proper soldering techniques are not observed during installation of

"Omega" straps, premature failure of the hybrid module can result.

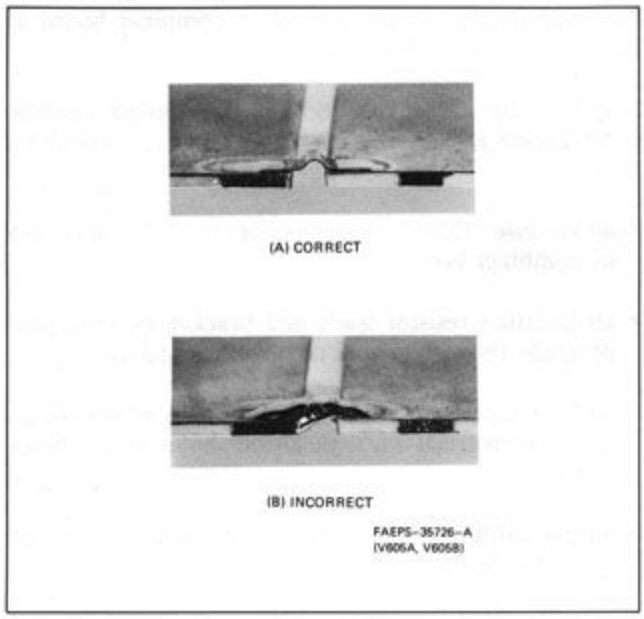


Figure 3.
"Omega" Strap Replacement Soldering Technique

IMPORTANT
Power measurements of the individual final power amplifier deck modules should *not* be attempted. The splitter and combiner circuits serve to prevent imbalances in drive and output of the final amplifier stages. If input or output connections to the individual final modules are broken, power measurements will be incorrect.

3.2 MODULE REPLACEMENT PROCEDURE

The *PURC 5000* rf power modules consist of an rf power transistor and associated circuits bonded to a copper heat spreader.

Step 1. Locate defective module (see power amplifier deck troubleshooting procedures in the Transmitter Introduction section, 68P81072E33).

Step 2. Disconnect power from deck to be repaired.

Step 3. Unsolder all seven "Omega" straps on module to be replaced from adjacent circuit boards.

Step 4. Remove the two screws holding the module to the heat sink.

Step 5. Remove module. Thermal compound between module and heat sink may cause module to stick to heat sink. A gentle "rocking" force is usually sufficient to free a stuck module.

Step 6. Clean old thermal compound from heat sink surface.

Step 7. Apply a *thin* film of new thermal compound to heat sink in module location.

Step 8. Position new module on heat sink, checking for proper orientation of module ("O" on module goes to Output port on adjacent circuit board; "I" on module goes to Input port on opposite circuit board).

Step 9. Carefully screw down module to heat sink.

Step 10. Solder all seven "Omega" straps to adjacent circuit boards. See paragraph 3.1.3 on proper "Omega" strap soldering technique.

Step 11. Reconnect power to deck.

3.3 COMBINER BOARD REMOVAL PROCEDURE

Refer to Figure 4 for major component locations.

Step 1. Remove the FPA deck cover (6 screws).

Step 2. Remove power detector shield.

Step 3. **IMPORTANT** — Unsolder isolation resistor leads from combiner board (8 places). At this time, isolation resistors should be checked for resistance value — approximately 100 ohms between *any* two leads. Defective units should be replaced.

Step 4. Unsolder power amplifier output cable (2 ground straps and center conductor) from the combiner board.

Step 5. Unsolder all "Omega" strap connections between combiner board and all modules (18 places).

Step 6. Unsolder feedthru capacitors in power detector area from combiner board (4 places).

Step 7. Unscrew isolation resistor brackets from heat sink (6 screws).

Step 8. Unscrew combiner board from heat sink (20 screws).

Step 9. Remove combiner board from heat sink with isolation resistors suspended below the board by the iso-

lation resistor bracket locating pins (see Figure 6). It may be necessary to free the isolation resistor brackets from the heat sink due to thermal compound under the brackets; this should be done by using a long nose pliers to pull up gently on the isolation resistor bracket locating pins until the brackets are free. **NEVER PULL ON THE ISOLATION RESISTOR LEADS.**

3.4 COMBINER BOARD INSTALLATION PROCEDURE

Refer to Figure 4 for reference.

Step 1. Check to see that ferrite beads are on feedthru capacitors C571, C572 and C573 (*not* on C574) in interconnect pocket area of heat sink.

Step 2. Clean old thermal compound off of heat sink surface in isolation resistor locations.

Step 3. Apply a *thin* film of new thermal compound to heat sink in isolation resistor locations.

Step 4. Suspend isolation resistors beneath combiner board by the isolation load resistor bracket locating pins, with the isolation resistor leads protruding thru the appropriate holes in the combiner board. Isolation resistor leads should *not* be soldered to combiner board at this time. Refer to Figure 6.

Step 5. Slip the combiner board/isolation resistor combination into position on the heat sink, checking for:

- all module "Omega" straps (3 per module) lie on top of combiner board.
- all isolation resistor leads and bracket locating pins protrude through proper combiner board holes.
- all four feedthru capacitor terminals in power detector area protrude through proper holes in combiner board.
- output cable is properly positioned in slot at end of combiner board.

Step 6. After proper positioning of combiner board, screw board down to heat sink (20 screws).

Step 7. Solder four feedthru capacitors in power detector area to combiner board.

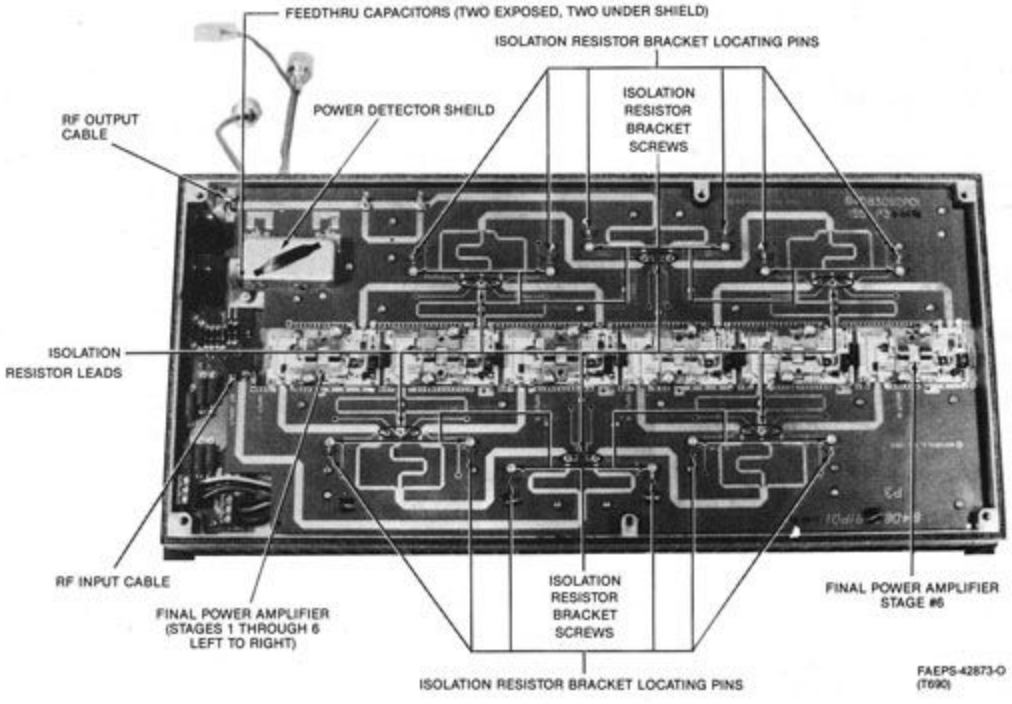


Figure 4. Rear View (Cover Removed) Of Final Power Amplifier Deck

Step 8. Solder power amplifier output cable to combiner board (2 ground straps and center conductor).

Step 9. Solder all "Omega" straps from modules to combiner board (3 per module). See paragraph 3.1.3 on proper "Omega" strap soldering technique.

Step 10. **IMPORTANT** — Screw isolation resistor brackets to heat sink before proceeding to next step (6 screws).

Step 11. Solder all isolation resistor leads to combiner board (8 places).

Step 12. Reinstall power detector shield.

Step 13. Reinstall the FPA cover (6 screws).

3.5 SPLITTER BOARD REMOVAL PROCEDURE

Refer to Figure 4 for reference.

Step 1. Remove the FPA deck cover (6 screws).

IMPORTANT
Unsolder isolation resistor leads from splitter board (8 places).

Step 2. At this time, isolation resistors should be checked for resistance value — approximately 100 ohms between *any* two leads. Defective units should be replaced.

Step 3. Unsolder the power amplifier input cable from the splitter board (2 ground straps and center conductor).

Step 4. Unsolder all "Omega" strap connections between splitter board and all modules (24 places).

Step 5. Remove dc feed wires from J506 and J507 on dc distribution board (screwdriver required).

Step 6. Unscrew isolation resistor brackets from heat sink (6 screws).

Step 7. Unscrew splitter board from heat sink (18 screws).

Step 8. Remove splitter board from heat sink with isolation resistors suspended below the board by the isolation resistor bracket locating pins (see Figure 6). It may be necessary to free the isolation resistor brackets from the heat sink due to thermal compound under the brackets; this should be done by using a long nose pliers to pull up gently on the isolation resistor bracket locating pins until the brackets are free. **NEVER PULL ON THE ISOLATION RESISTOR LEADS.**

3.6 SPLITTER BOARD INSTALLATION PROCEDURE

Refer to Figure 4 for reference.

Step 1. Properly dress all dc feed wires in their harnesses and route individual wires through isolation resistor brackets where required. Refer to Figure 5.

Step 2. Clean old thermal compound off of heat sink surface in isolation resistor locations.

Step 3. Apply a *thin* film of new thermal compound to heat sink in isolation resistor locations.

Step 4. Suspend isolation resistors beneath splitter board by the isolation resistor bracket locating pins, with the isolation resistor leads protruding through the appropriate holes in the splitter board. Isolation resistor leads should *not* be soldered to the splitter board at this time. Refer to Figure 6.

Step 5. Slip the splitter board/isolation resistor/dc wire harness combination into position on the heat sink, checking for:

- all module "Omega" straps (4 per amplifier module) lie on top of splitter board.
- all isolation resistor leads and bracket locating pins protrude through proper holes in splitter board.
- all dc feed wires are properly positioned and clear of heat sink standoffs and bottom side of isolation resistor brackets so as not to get pinched when assembly is screwed to heat sink.
- input cable is properly positioned in slot at end of splitter board.

Step 6. After proper positioning of splitter board assembly, screw board down to heat sink (18 screws).

Step 7. **IMPORTANT** — Screw isolation resistor brackets to heat sink before proceeding further (6 screws).

Step 8. Reconnect dc feed wires to J506 and J507 on dc distribution board, following color code shown on board legend (screwdriver required).

Step 9. Solder all isolation resistor leads to splitter board (8 places).

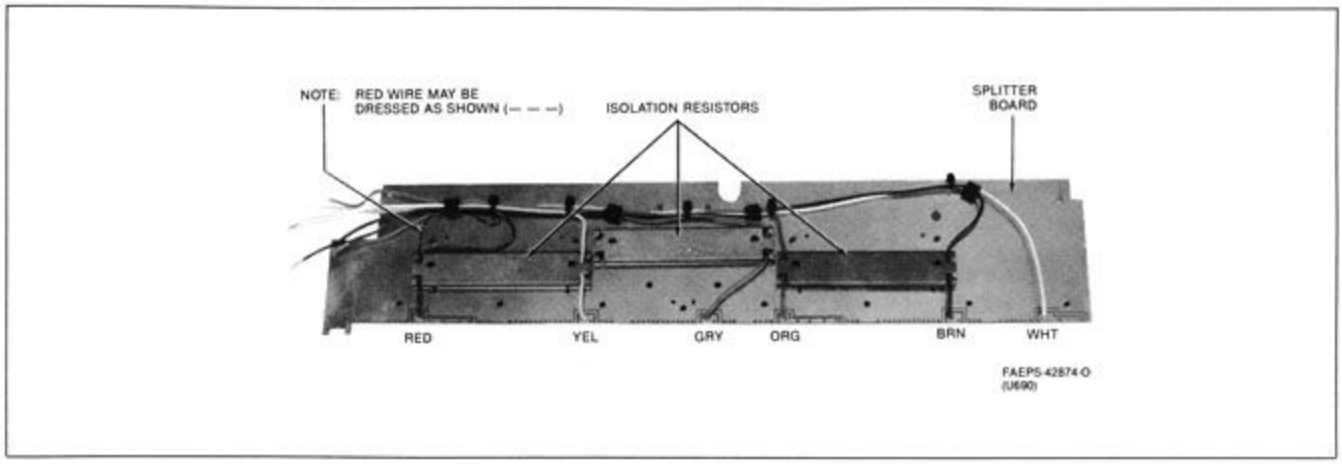


Figure 5. Splitter Board Wiring Harness Dress

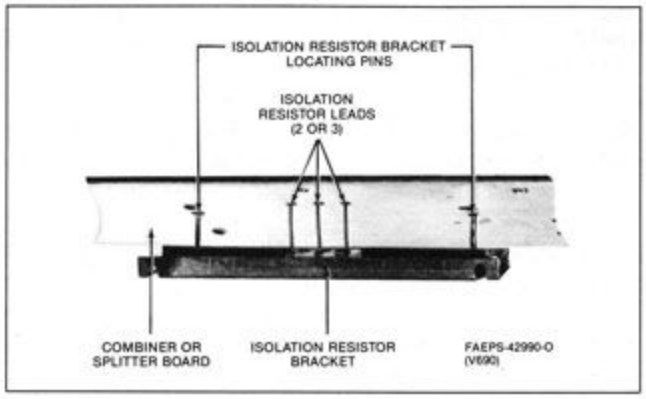


Figure 6. Isolation Resistor-Splitter/ Combiner Interface

Step 10. Solder input cable to the splitter board (2 ground straps and center conductor).

Step 11. Solder all "Omega" straps from all modules to splitter board (24 places).

Step 12. Reinstall power amplifier deck cover (6 screws).

3.7 POWER AMPLIFIER THERMISTOR REPLACEMENT

Step 1. Remove combiner board to expose thermistor board.

Step 2. Unscrew thermistor board from heat sink.

Step 3. Replace thermistor and trim leads on back of board as short as possible to prevent shorting to heat sink.

Step 4. Screw thermistor board to heat sink, taking care to dress brown wire properly. (See Figure 7.)

Step 5. Reinstall combiner board.

3.8 ISOLATION RESISTOR REPLACEMENT PROCEDURE

Refer to Figure 6 for reference.

Step 1. Remove appropriate splitter or combiner board.

Step 2. Remove defective isolation resistor from board by disengaging isolation resistor bracket locating pins from holes in board. No unsoldering should be required if proper board removal procedure was followed.

Step 3. Insert new isolation resistor into board by routing isolation resistor leads and isolation resistor bracket locating pins into appropriate holes in board. Bend the tip of each isolation resistor bracket locating pin at a right angle (90°) at the indent near the tip of the locating pin (use a long nose pliers). The isolation resistor should hang freely from the board by the isolation resistor bracket locating pins.

Step 4. If isolation resistor is under the splitter board, properly dress dc feed wires through isolation resistor brackets as required (refer to Figure 5).

Step 5. Install splitter or combiner board.

3.9 ISOLATION RESISTOR CHECKING PROCEDURE

A defective isolation resistor can usually be found by performing the following tests.

3.9.1 Intermittent Isolation Resistor Test

Step 1. Connect meter cable to J504 or J505 depending upon which isolation resistor is being tested as shown below:

Isolation Resistor Position		Connect Meter Cable To
Opposite Modules	1, 2 & 3	J504
	4,5, & 6	J505
Center Isolation Resistors		J504 then J505

Step 2. With the transmitter keyed, and while monitoring meters 1, 2 and 3, perform the following procedure. Using an **insulated** tuning tool, apply downward pressure on the splitter or combiner board directly above the isolation resistor. The insulated end of the tuning tool should contact the board **between** rf runners. Any change in meters 1, 2 or 3 greater than 3 μA as pressure is applied and relieved is indicative of a defective isolation resistor which should be replaced.

CAUTION

Use only an **insulated** probe to apply pressure to the splitter or combiner board. Under **no** circumstances should any metalic object directly contact the splitter or combiner board during this procedure.

3.9.2 Defective Isolation Resistor Test

Step 1. Unsolder all leads of the isolation resistor to be tested from the splitter or combiner board.

Step 2. Measure the resistance between all combinations of any two leads of the isolation resistor (1 measurement on 2-way resistor TRN9060A; 3 measurements on 3-way resistor TRN9064A). Resistance should measure between 90 ohms and 110 ohms in all cases. Any resistance outside of this range is indicative of a defective isolation resistor.

Step 3. Resolder isolation resistor to board if it is not found to be defective, otherwise replace.

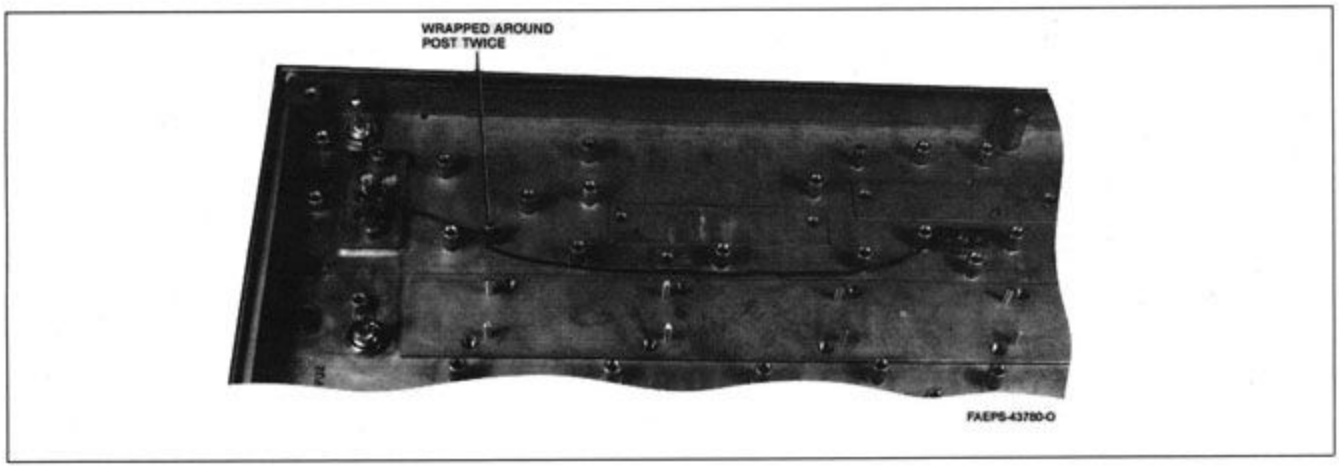


Figure 7. FPA Route of Thermistor Board Output Wire

FPA

TROUBLESHOOTING PREREQUISITES

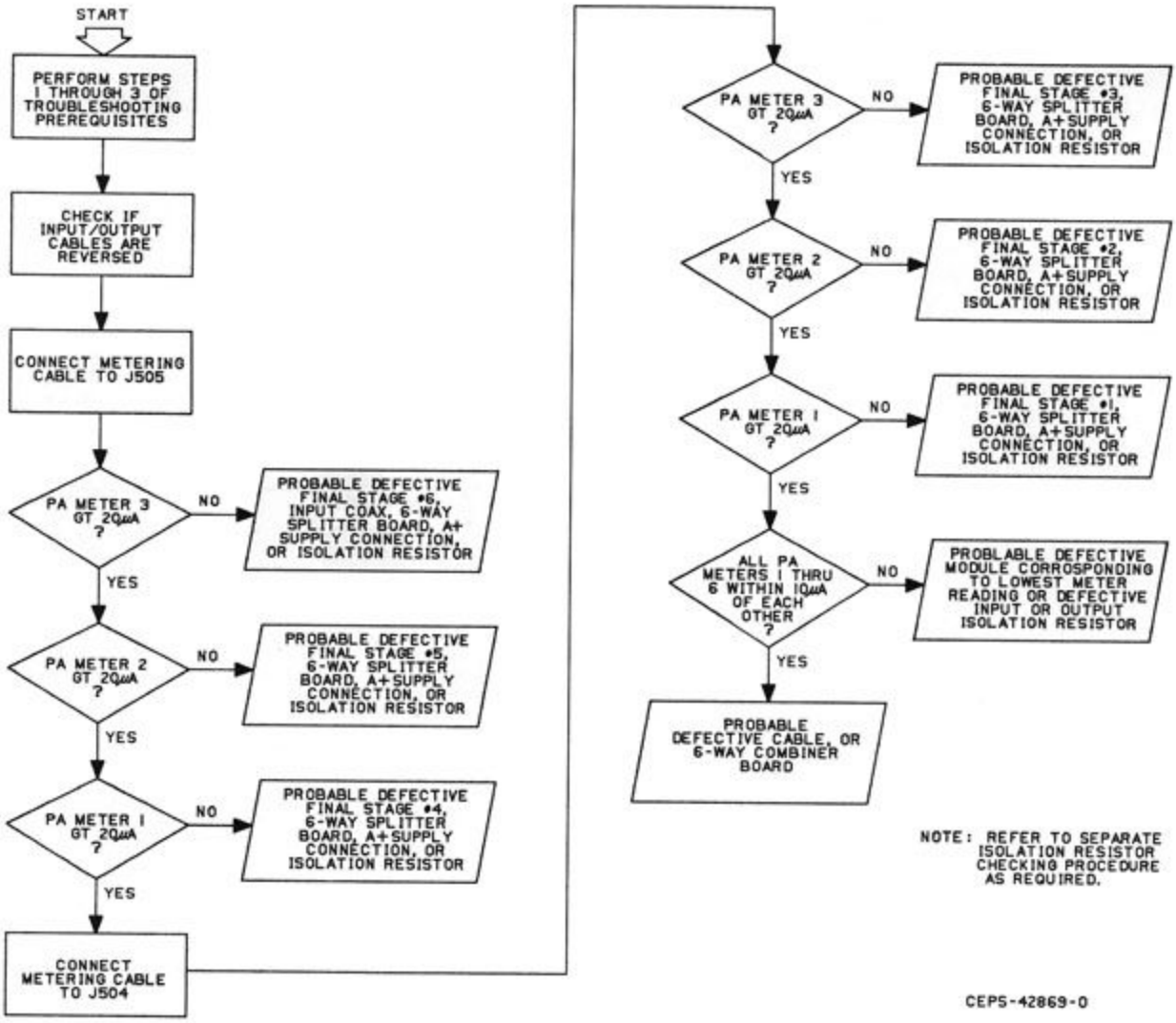
Step 1. Install station control board service jumper (JU1) onto its service installation position.

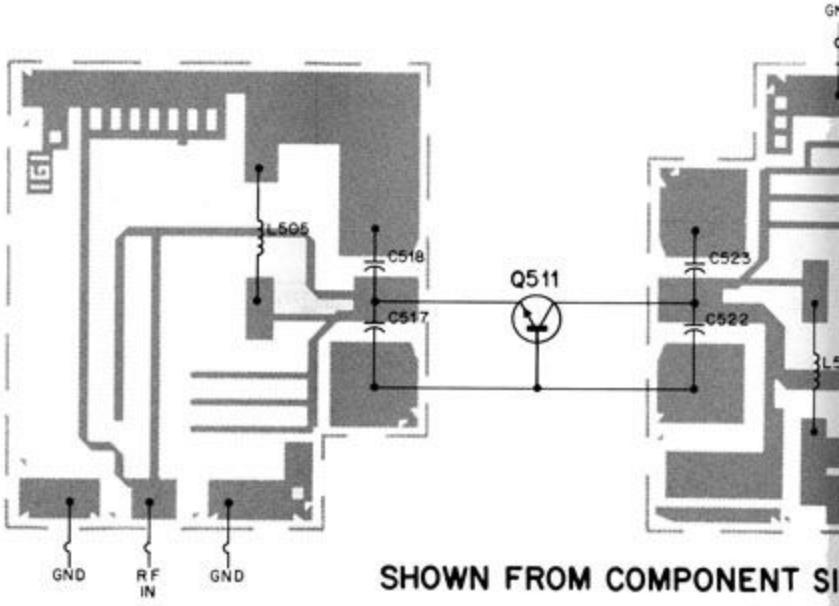
IMPORTANT
When troubleshooting is completed, return JU1 to its original position.

Step 2. Disconnect the FPA output cable by unscrewing P593 from the circulator.

Step 3. Connect the FPA output cable to a wattmeter terminated in a 50-ohm load. Be sure the wattmeter and load are rated for use at 900-1000 MHz. Make sure the load can handle 250 W.

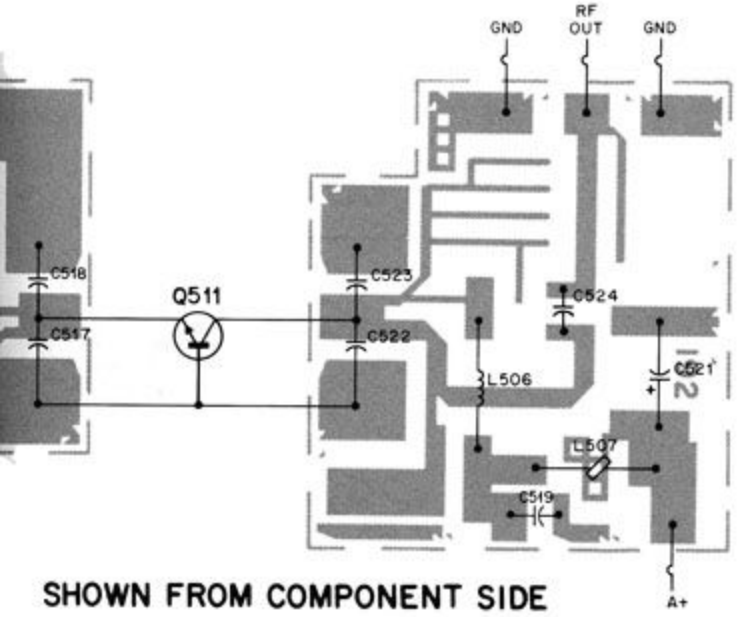
TROUBLESHOOTING CHART





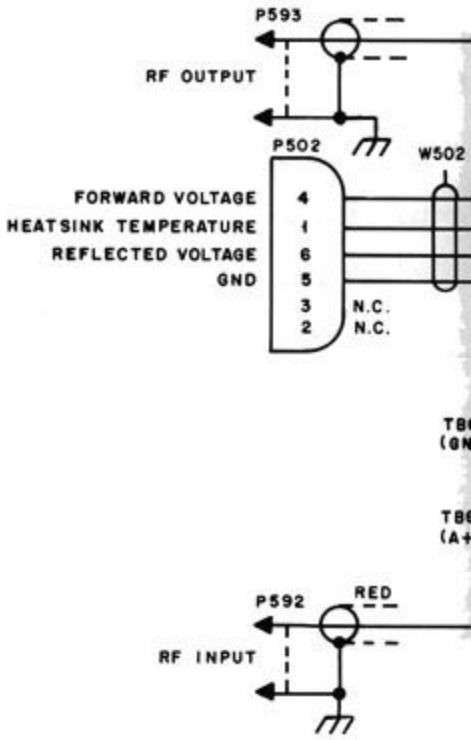
Final Power Amplifier Deck
Circuit Board Details
Motorola No. ***PEPS-42960-B***
(Sheet 1 of 3)

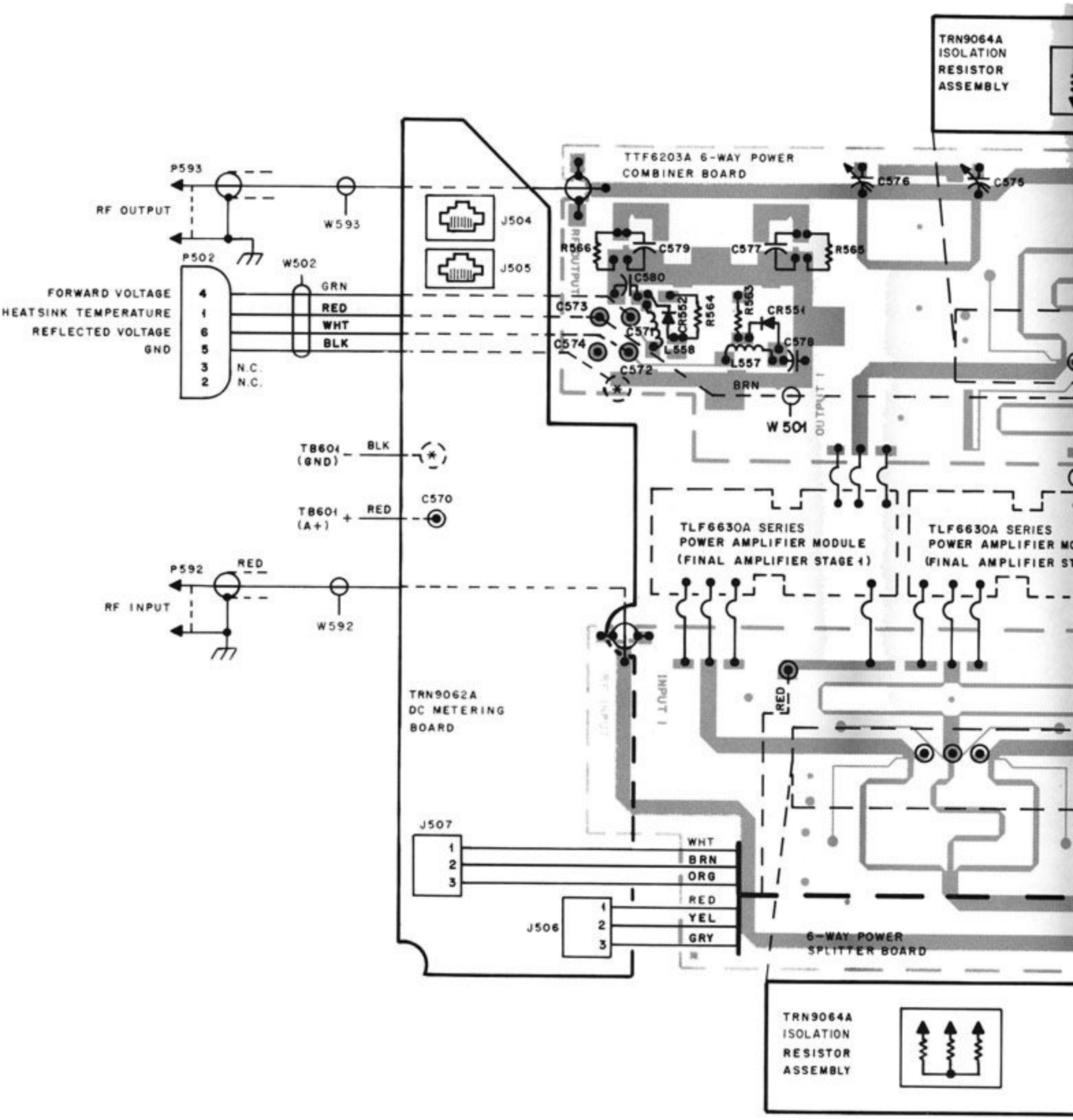
ERIES POWER AMPLIFIER MODULE



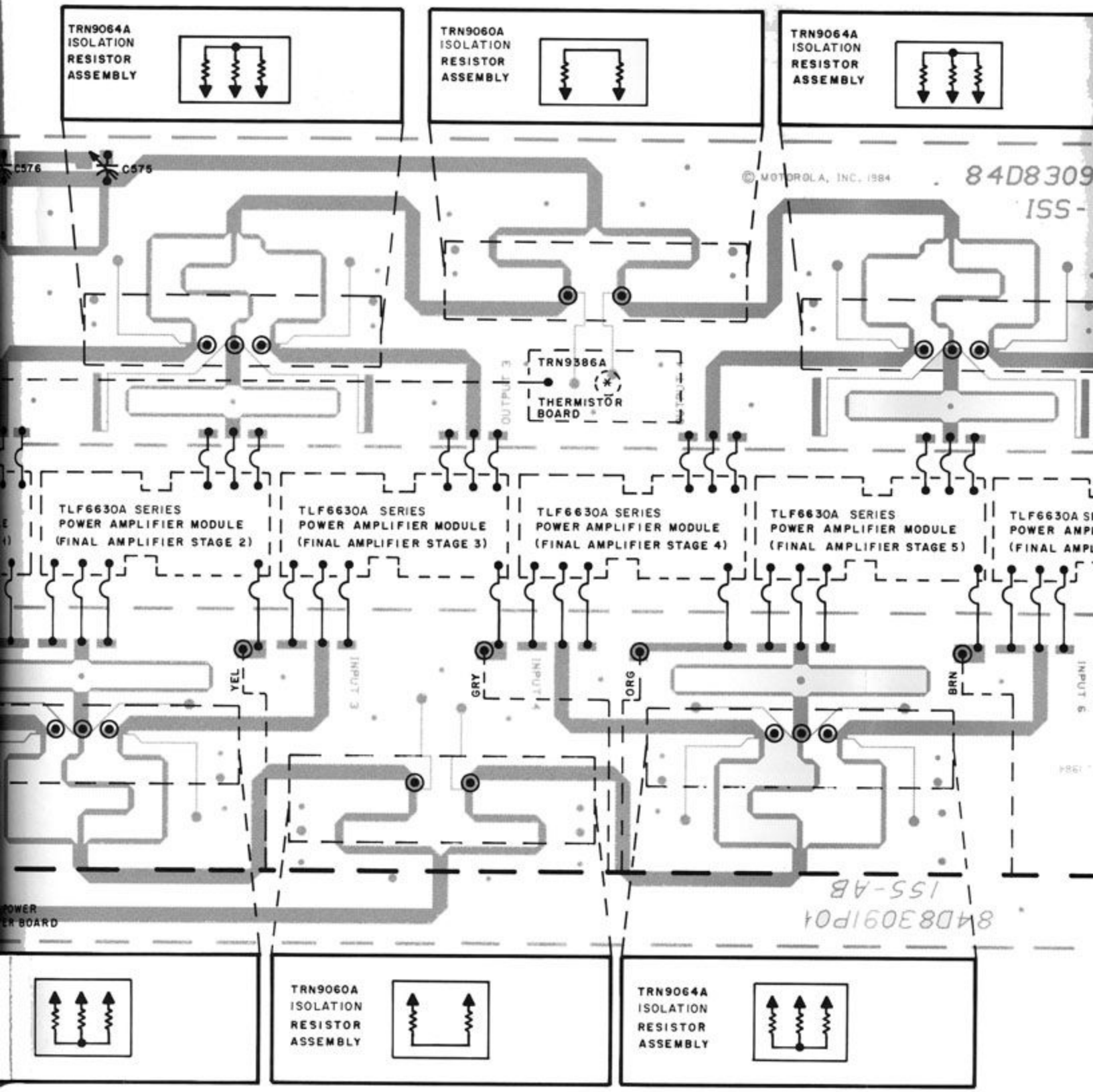
SHOWN FROM COMPONENT SIDE

BD-BEPS-43728-0
OL-BEPS-43729-0



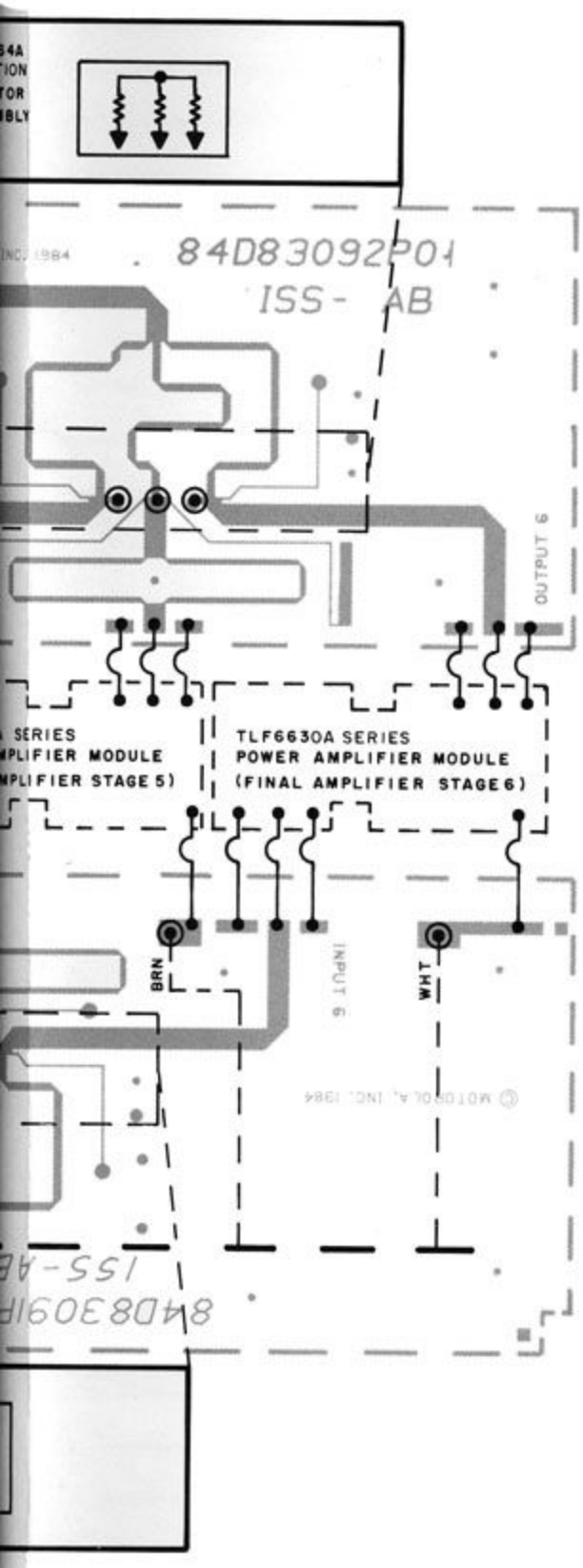

TRN9064A
ISOLATION
RESISTOR
ASSEMBLY
TTF6203A 6-WAY POWER
COMBINER BOARD
P593
RF OUTPUT
W593
J504
J505
P502
W502
FORWARD VOLTAGE
HEATSINK TEMPERATURE
REFLECTED VOLTAGE
GND
GRN
RED
WHT
BLK
N.C.
N.C.
C576
C575
R566
C579
C577
R565
C580
C573
C571
CR552
R564
R563
CR551
C574
L558
L557
C578
C572
BRN
W501
OUTPUT
TB604
(GND)
BLK
TB601
(A+)
RED
C570
TLF6630A SERIES
POWER AMPLIFIER MODULE
(FINAL AMPLIFIER STAGE)
TLF6630A SERIES
POWER AMPLIFIER MO
(FINAL AMPLIFIER ST
P592
RED
RF INPUT
W592
INPUT
TRN9062A
DC METERING
BOARD
J507
WHT
BRN
ORG
J506
RED
YEL
GRY
6-WAY POWER
SPLITTER BOARD
TRN9064A
ISOLATION
RESISTOR
ASSEMBLY

FINAL POWER AMPLIFIER DECK



COMPONENT SIDE ● 8D-CEPS-38898-O
OL-DEPS-38899-A

SHOWN FROM COMPONENT SIDE



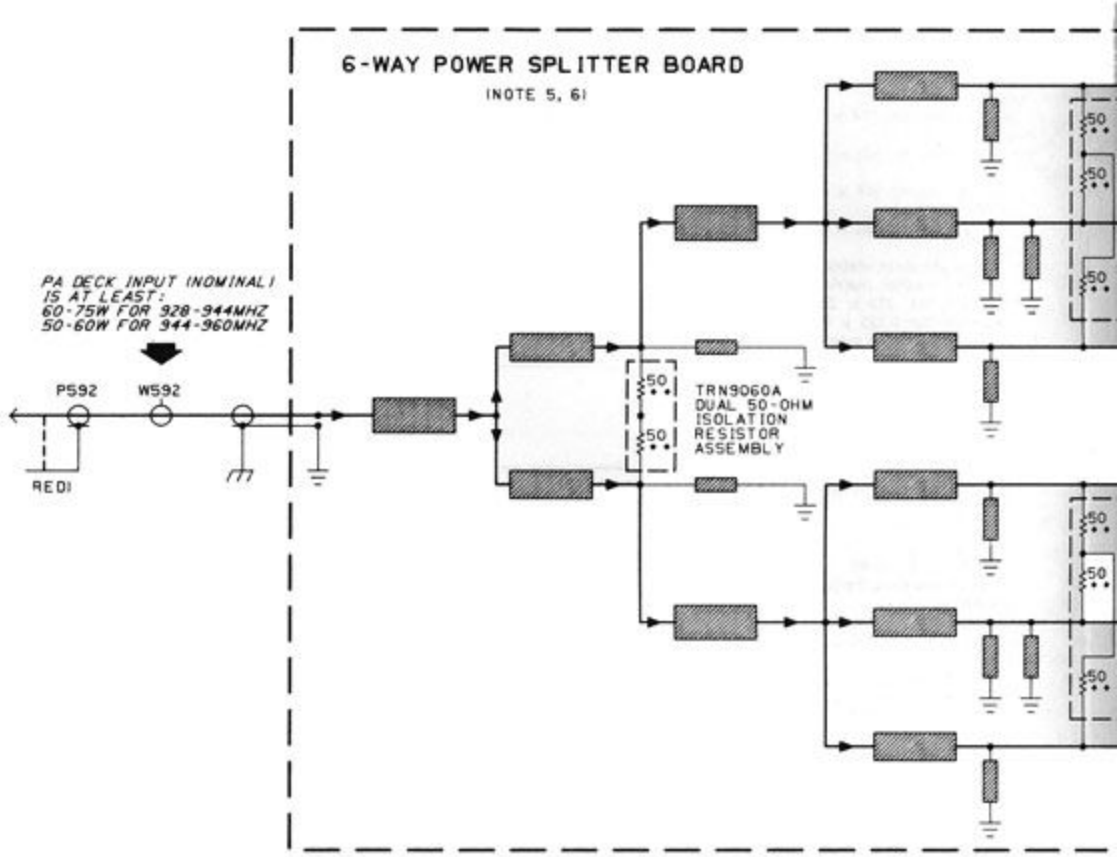
LEGEND:

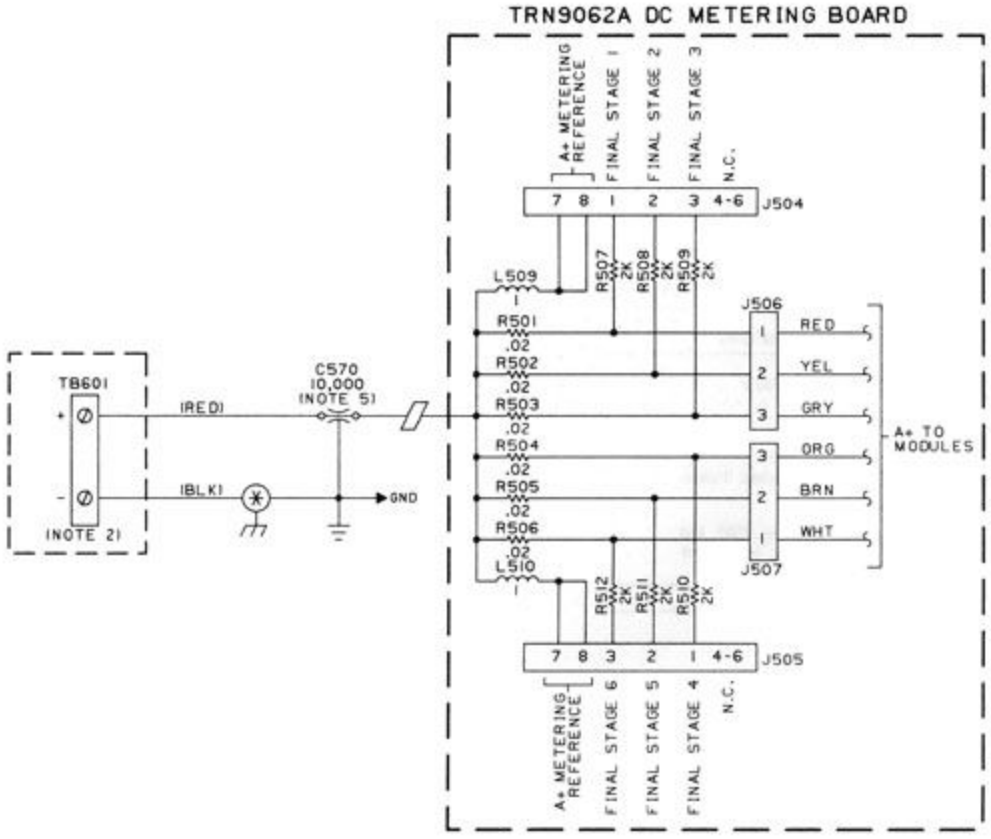
- * OMEGA STRAP (SEE NOTE)
- * SOLDERED COMPONENT LEAD OR LUGGED WIRE END
- * SLOTTED STAR SCREW

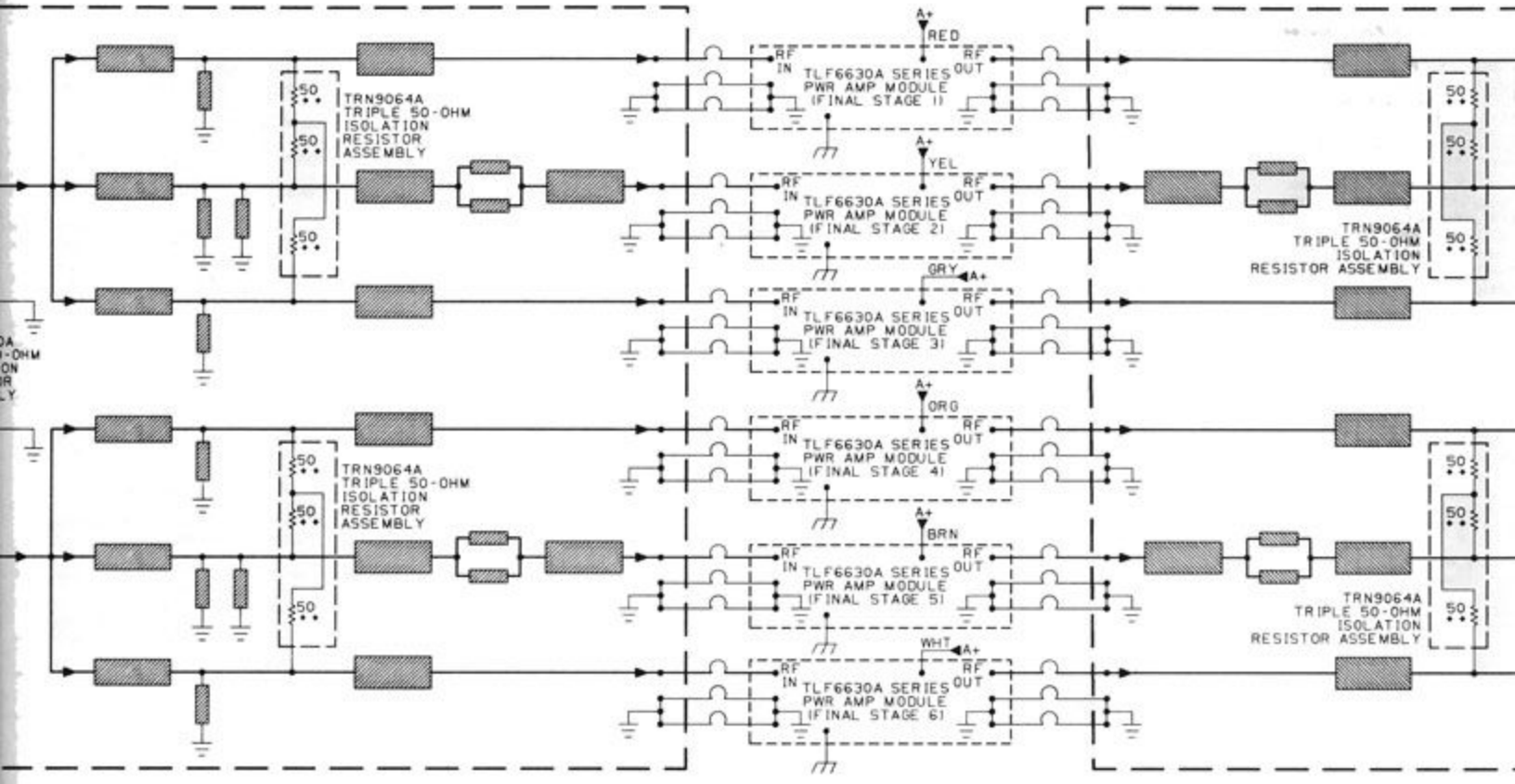
NOTE:

OMEGA STRAPS PART OF MODULE ASSEMBLIES. REFER TO MODULE DETAILS.

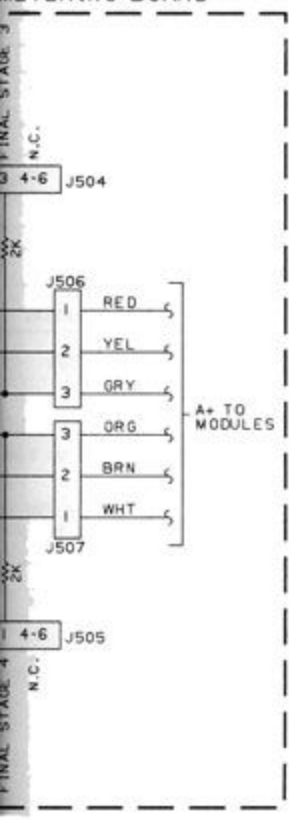
COMPONENT SIDE

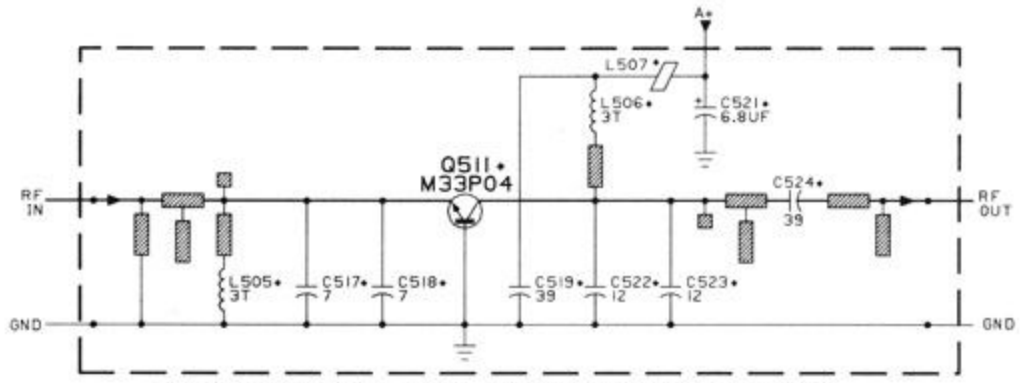

6-WAY POWER SPLITTER BOARD
(NOTE 5, 6)
PA DECK INPUT (NOMINAL)
IS AT LEAST:
60-75W FOR 928-944MHZ
50-60W FOR 944-960MHZ
P592
W592
RED
50
50
TRN9060A
DUAL 50-OHM
ISOLATION
RESISTOR
ASSEMBLY
50
50
50
50
50
50


TRN9062A DC METERING BOARD
A+ METERING REFERENCE
FINAL STAGE 1
FINAL STAGE 2
FINAL STAGE 3
N.C.
7 8 1 2 3 4-6
J504
L509
1
R507 2K
R508 2K
R509 2K
J506
R501 .02
R502 .02
R503 .02
R504 .02
R505 .02
R506 .02
1 RED
2 YEL
3 GRY
3 ORG
2 BRN
1 WHT
J507
A+ TO MODULES
L510
1
R512 2K
R511 2K
R510 2K
7 8 3 2 1 4-6
J505
A+ METERING REFERENCE
FINAL STAGE 6
FINAL STAGE 5
FINAL STAGE 4
N.C.
TB601
+
-
(NOTE 2)
(RED)
(BLK)
C570
10,000
(NOTE 5)
GND

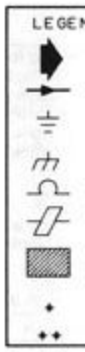


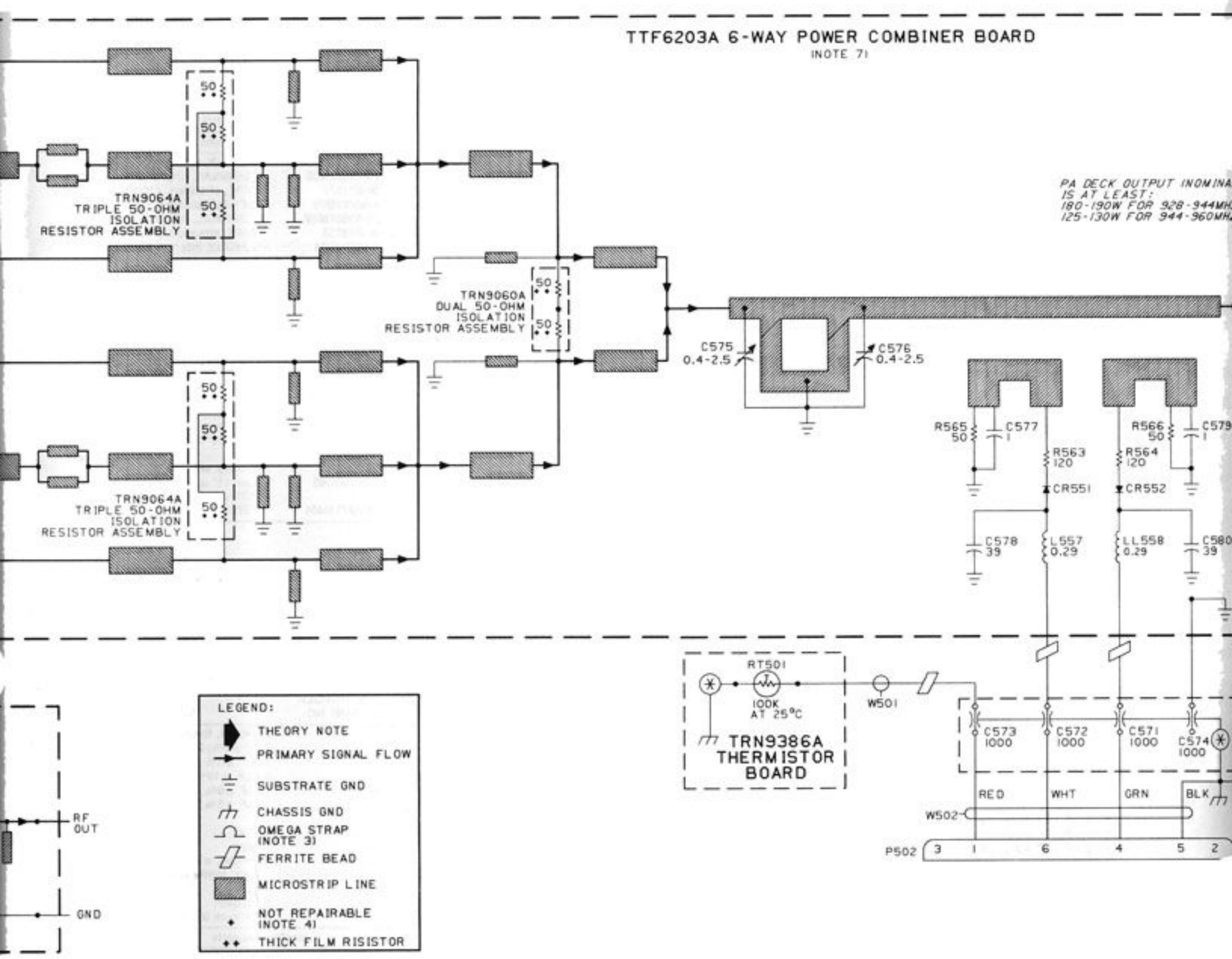
METERING BOARD



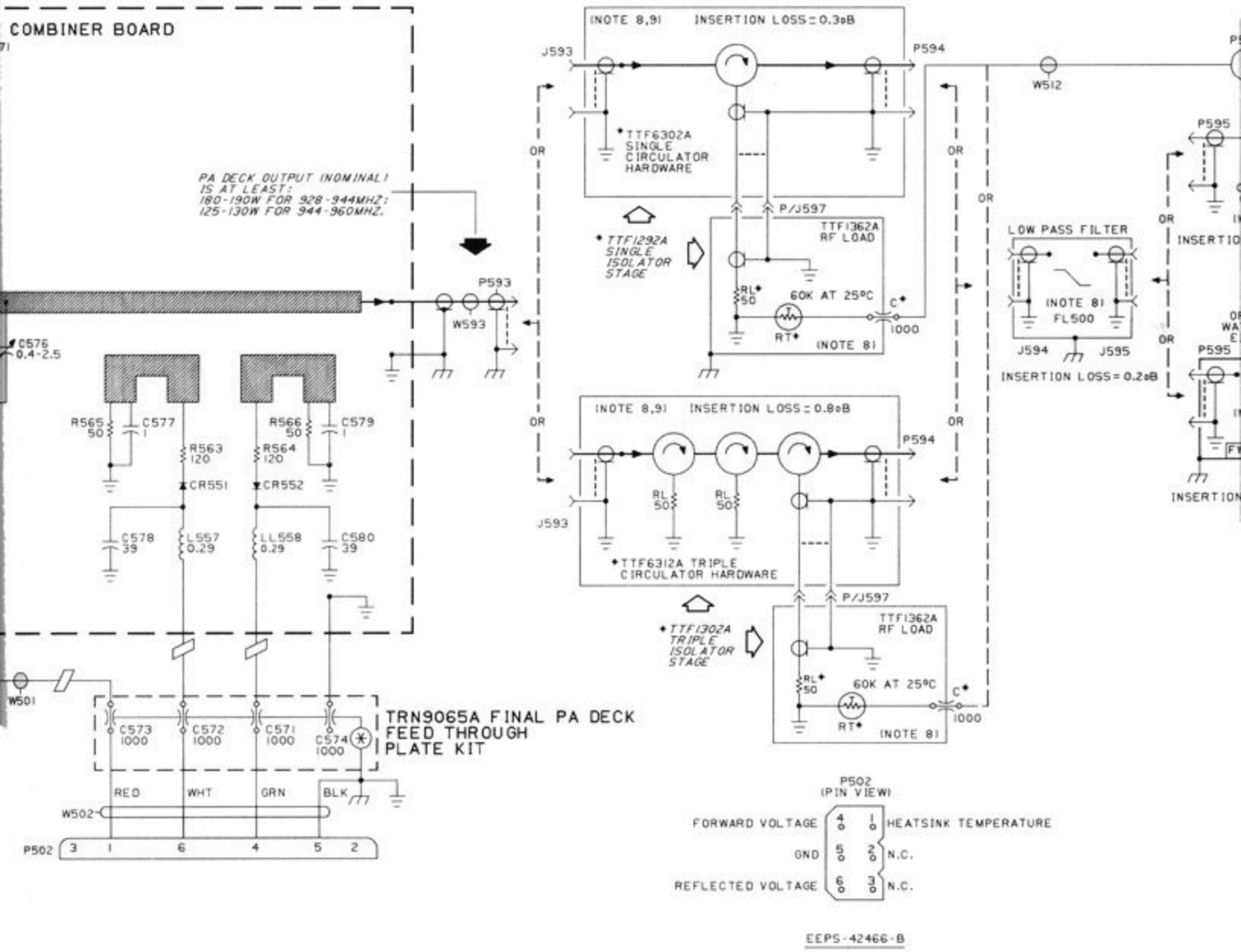


TLF6630A SERIES FINAL AMPLIFIER MODULE DETAIL

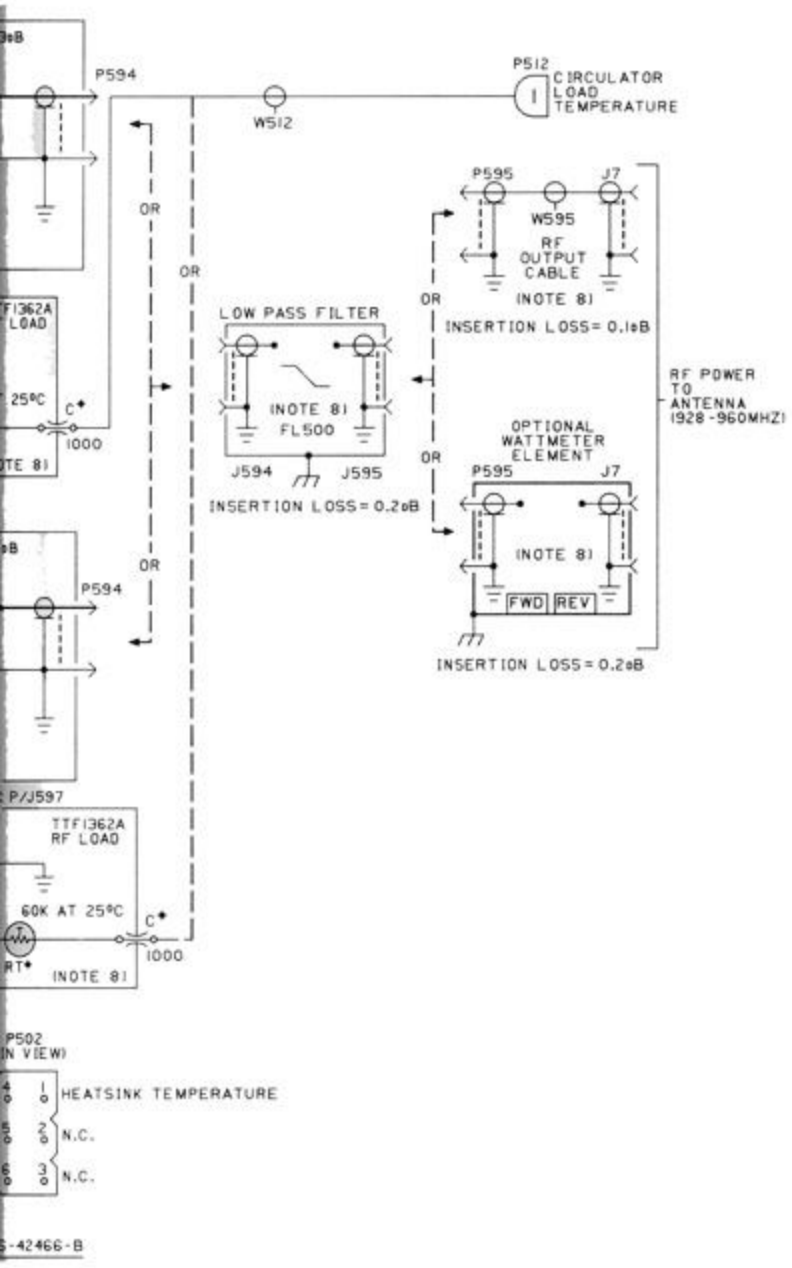



TTF6203A 6-WAY POWER COMBINER BOARD
(NOTE 7)
TRN9064A
TRIPLE 50-OHM
ISOLATION
RESISTOR ASSEMBLY
TRN9060A
DUAL 50-OHM
ISOLATION
RESISTOR ASSEMBLY
TRN9064A
TRIPLE 50-OHM
ISOLATION
RESISTOR ASSEMBLY
50
C575
0.4-2.5
C576
0.4-2.5
R565
50
C577
1
R563
120
CR551
C578
39
L557
0.29
R566
50
C579
1
R564
120
CR552
LL558
0.29
C580
39
PA DECK OUTPUT (NOMINA
IS AT LEAST:
180-190W FOR 928-944MH
125-130W FOR 944-960MH

RT501
100K
AT 25°C
TRN9386A
THERMISTOR
BOARD
W501
C573
1000
C572
1000
C571
1000
C574
1000
RED
WHT
GRN
BLK
W502
P502
3
1
6
4
5
2
RF
OUT
GND
LEGEND:
THEORY NOTE
PRIMARY SIGNAL FLOW
SUBSTRATE GND
CHASSIS GND
OMEGA STRAP
(NOTE 3)
FERRITE BEAD
MICROSTRIP LINE
NOT REPAIRABLE
(NOTE 4)
THICK FILM RISISTOR


COMBINER BOARD
PA DECK OUTPUT (NOMINAL) IS AT LEAST: 180-190W FOR 928-944MHZ; 125-130W FOR 944-960MHZ.
P593
W593
C576 0.4-2.5
R565 50
C577 1
R563 120
CR551
R566 50
C579 1
R564 120
CR552
C578 39
L557 0.29
LL558 0.29
C580 39
W501
C573 1000
C572 1000
C571 1000
C574 1000
TRN9065A FINAL PA DECK FEED THROUGH PLATE KIT
RED
WHT
GRN
BLK
W502
P502 3 1 6 4 5 2
(NOTE 8,9) INSERTION LOSS = 0.3dB
J593
P594
*TTF6302A SINGLE CIRCULATOR HARDWARE
OR
*TTF1292A SINGLE ISOLATOR STAGE
P/J597
TTF1362A RF LOAD
RL 50
60K AT 25°C
RT
C 1000
(NOTE 8)
W512
LOW PASS FILTER
(NOTE 8) FL500
J594
J595
INSERTION LOSS = 0.2dB
P595
(NOTE 8,9) INSERTION LOSS = 0.8dB
*TTF6312A TRIPLE CIRCULATOR HARDWARE
*TTF1302A TRIPLE ISOLATOR STAGE
P502 (PIN VIEW)
FORWARD VOLTAGE
GND
REFLECTED VOLTAGE
HEATSINK TEMPERATURE
N.C.
N.C.

EEPS-42466-B



NOTES

1. Unless otherwise specified, resistor values are in ohms, capacitor values are in picofarads, and inductor values are in microhenries.
2. Terminal board TB601 is located on the power supply and is not part of the power amplifier.
3. The Greek symbol Omega denotes an "Omega Strap," which is used to provide circuit connections between the PA substrates, and provide the necessary strain relief for thermal expansion and contraction.
4. COMPONENTS MARKED WITH AN ASTERISK (*) are not repairable and are shown for reference purposes only.
5. Part of Final PA Hardware Kit
6. Transmission line lengths between the power splitter stage outputs and final amplifier stages inputs are critical to proper amplifier operation. Do not insert test instruments (wattmeter, load termination, etc.) at those locations.
7. Transmission line lengths between the power combiner stage inputs and final amplifier stages outputs are critical to proper amplifier operation. Do not insert test instruments (wattmeter, load termination,e tc.) at these locations.
8. Not part of PA deck assembly.
9. Repair and/or tuning of the circulator stage(s) or load (s) should not be attempted because of the need for special fixtures and test equipment. Repair should be by replacement only.

Model Complement of Final PA Decks

Model	Description
TKN8975B	Final PA Deck Cabling Kit
TLF6630A Series	Power Amplifier Module (Driver/Final), 6 used
TRN9060A	Dual 50-Ohm Isolation Resistor Assembly, 2 used
TRN9062A	DC Metering Board
TRN9063B	Final PA Hardware Kit
TRN9064A	Triple 50-Ohm Isolation Resistor Assembly, 4 used
TRN9065A	Final PA Deck Feedthru Plate Kit
TRN9386A	Thermistor Board
TTF6203A	6-Way Power Combiner Board

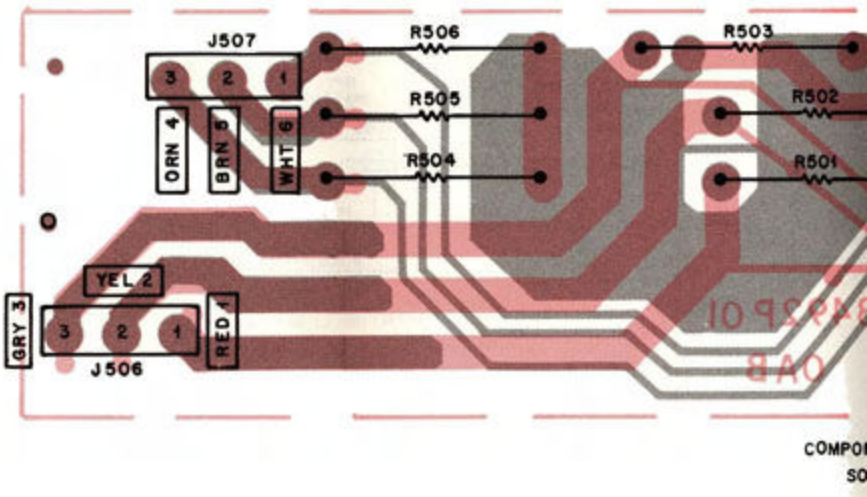
Model Complement of TTF1292A Single Isolator Stage

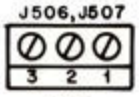
Model	Description
TTF1362A	RF Circulator Load
TTF6302A	Single Circulator Hardware Kit

Model Complement of TTF1302A Triple Isolator Stage

Model	Description
TTF1362A	RF Circulator Load
TTF6312A	Triple Circulator Hardware Kit

Final Power Amplifier Deck Schematic Diagram Motorola No. ***PEPS-42960-B*** ***(Sheet 2 of 3)***



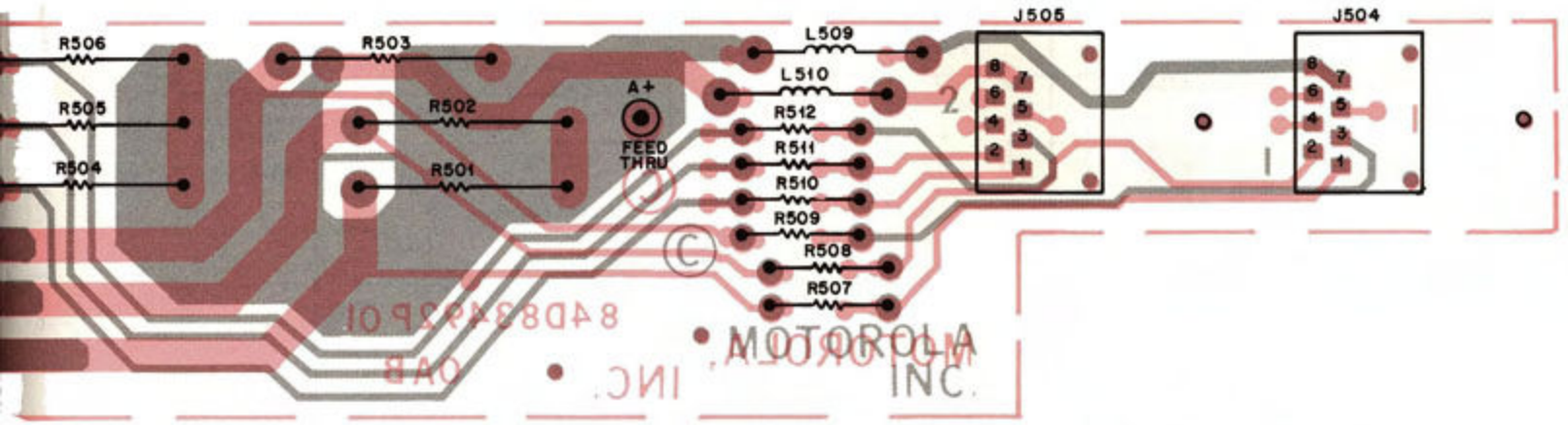


A+ DISTRIBUTION

PIN	J506	J507
1	STAGE 1	STAGE 6
2	STAGE 2	STAGE 5
3	STAGE 3	STAGE 4

Final Power Amplifier Deck
DC Metering Circuit Board Detail and FPA Parts Lists
Motorola No. ***PEPS-42960-B***
(Sheet 3 of 3)

TRN9062A DC METERING BOARD

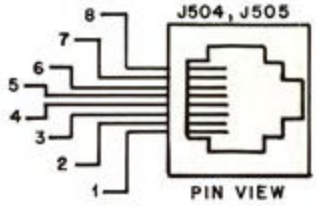


COMPONENT SIDE - BD-BEPS-42064-O
SOLDER SIDE - BD-BEPS-42065-O
OL-CEPS-42066-O

SHOWN FROM COMPONENT SIDE

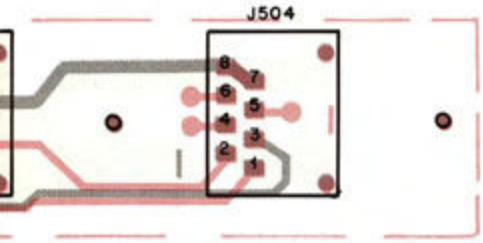
A+ DISTRIBUTION

J506	J507
STAGE 1	STAGE 6
STAGE 2	STAGE 5
STAGE 3	STAGE 4



PA METERING

PIN	J504	J505
1	STAGE 1	STAGE 4
2	STAGE 2	STAGE 5
3	STAGE 3	STAGE 6
4	NOT USED	NOT USED
5	NOT USED	NOT USED
6	NOT USED	NOT USED
7	A+ REF	A+ REF
8	A+ REF	A+ REF



COMPONENT SIDE

PA METERING

PIN	J504	J505
1	STAGE 1	STAGE 4
2	STAGE 2	STAGE 5
3	STAGE 3	STAGE 6
4	NOT USED	NOT USED
5	NOT USED	NOT USED
6	NOT USED	NOT USED
7	A+ REF	A+ REF
8	A+ REF	A+ REF

parts list

TKN8975B Final PA Deck Cabling Kit — PL-9775-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		connector, plug:
P592, 593	28-84476G01	male, single contact
		cable, assembly:
W592	1-80777D95	rf input; color coded RED; includes: P592, and
	30-84173E01	CABLE, coaxial; 16.5" used
	43-83152N02	BUSHING, cable
W593	1-80705E35	rf output; no color code; includes: P593
	30-84173E01	CABLE, coaxial; 12" used
	43-83152N02	BUSHING, cable
		non-referenced items
	1-80781D77	ASSEMBLY, external DC-; includes:
	29-82907N05	TERMINAL, ring; color coded YEL
	30-831572	WIRE, stranded; #10 BLK; 8.5" used
	1-80781D78	ASSEMBLY, external DC +; includes:
	29-83897M02	TERMINAL, receptacle
	30-813233	WIRE, stranded; #10 RED; 9.5" used
	1-80783D64	ASSEMBLY, internal DC distribution; includes:
	29-83818P01	TERMINAL, plug; wire crimp-on; 6 used
	42-35424B01	TIE, cable; 4 used

TRN9386A Thermistor Board — PL-9777-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		thermistor:
RT501	6-83600K05	100k @ 25°C
		assembly, wire:
W501	1-80783D63	sense; 11" used (BRN); includes: RT501, and
	29-82713M01	TERMINAL

IMPORTANT

Field repair of this kit is not recommended. *It should be replaced in its entirety.* The following parts are listed for reference purposes only.

TLF6630A Series Power Amplifier Module (Driver/Final) — PL-9771-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed:
C517, 518	—	7 pF ±5%; 250 V
C519	—	39 pF ±5%; 50 V
C521	—	6.8 uF ±10%; 35 V
C522, 523	—	12 pF ±5%; 250 V
C524	—	39 pF ±5%; 50 V
		coil, rf:
L505, 506	—	3 turns
L507	—	assembly, wire & bead; includes
	—	core, ferrite bead
		transistor:
Q511	—	NPN; type 95P04
		mechanical parts
	—	SHROUD
	—	CLIP, retainer; 2 used
	—	STRAP, PA; 7 used
	—	PLATE

PL-9775-A

DESCRIPTION
nector, plug:
e, single contact
le, assembly:
nput; color coded RED; includes:
2, and
CABLE, coaxial; 16.5" used
SUSHING, cable
utput; no color code; includes: P593
CABLE, coaxial; 12" used
SUSHING, cable
ced items
SEMBLY, external DC-; includes:
TERMINAL, ring; color coded YEL
WIRE, stranded; #10 BLK; 8.5" used
SEMBLY, external DC +; includes:
TERMINAL, receptacle
WIRE, stranded; #10 RED; 9.5" used
SEMBLY, internal DC distribution;
ncludes:
TERMINAL, plug; wire crimp-on;
6 used
TIE, cable; 4 used

PL-9777-O

DESCRIPTION
rmistor:
k @ 25°C
sembly, wire:
ise; 11" used (BRN); includes:
501, and
TERMINAL

TANT

ecommended. *It should be re-*
wing parts are listed for refer-

Driver/Final) PL-9771-A

DESCRIPTION
pacitor, fixed:
pF ±5%; 250 V
pF ±5%; 50 V
uF ±10%; 35 V
pF ±5%; 250 V
pF ±5%; 50 V
il, rf:
turns
sembly, wire & bead; includes
core, ferrite bead
nsistor:
PN; type 95P04
cal parts
SHROUD
CLIP, retainer; 2 used
STRAP, PA; 7 used
PLATE

TTF6203A 6-Way Power Combiner Board PL-9773-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed: pF; 50 V: unless otherwise state
C575, 576	19-82749G02	variable: 0.4-2.5
C577	21-11059E34	1 ±0.25%
C578	21-84736E12	39 ±5%
C579	21-11059E34	1 ±0.25%
C580	21-84736E12	39 ±5%
		diode: (see note)
CR551, 552	48-84616A01	hot carrier
		coil, rf:
L557, 558	24-82723H40	choke: 0.29 uH (YEL)
		resistor, fixed:
R563, 564	6-11009C27	120 ±5%; 1/4 W
R565, 566	6-83854P01	50 ±5%; 35 V (chip)

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

TRN9060A Dual 50-Ohm Isolation Resistor Assembly PL-9778-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	7-83683P02	BRACKET, resistor
	7-84102N01	FRAME

TRN9064A Triple 50-Ohm Isolation Resistor Assembly PL-9616-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	7-83683P02	BRACKET, resistor
	7-84102N01	FRAME

TRN9062A DC Metering Board PL-9772-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		connector, receptacle:
J504, 505	9-83365N01	female; 8-contact
J506, 507	31-84425P01	terminal board; 3-position
		coil, rf:
L509, 510	24-82835G14	choke; 1 uH (BRN-BLK)
		resistor, fixed:
R501 thru 506	17-82620B04	.02 ±3%; 3W
R507 thru 512	6-124A56	2k ±5%; 1/4 W

TTF6302A Single Circulator Hardware Kit PL-9615-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	3-83498N07	SCREW, tapping: M4 x 0.7 x 40mm; 2 used
	7-84190P01	BRACKET, circulator mounting
	58-83843P03	ASSEMBLY, single circulator

TRN9063B Final PA Hardware Kit

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		capacitor:
C570	21-84211B01	0.01 uF; GMV; 500 V (A + feedthru
		mechanical parts
	2-8364	NUT, hex; 3/8-32 × 1/2 × 3/32"; 2
	2-115968	NUT, hex; 1/4-28 × 3/8 × 1/8"
	3-10943M10	SCREW, tapping: TT3 × 0.5 × 8 m used
	3-10943R68	SCREW, tapping: TT4 × 0.7 × 13 used
	3-83498N05	SCREW, tapping: M4 × 0.7 × 12 used
	3-83498N14	SCREW, tapping: M4 × 0.7 × 18 used
	3-83678N03	SCREW, tapping: M3 × 0.5 × 9 m used
	3-83812P01	SCREW, shoulder, metric; 12 used
	3-83812P02	SCREW, shoulder, metric; 12 used
	4-7557	WASHER, flat; .172 × .375 × .33"
	4-7607	WASHER, flat; 0.125 × 0.281 × 0.
	4-7657	LOCKWASHER, #8; external
	4-7670	LOCKWASHER, 1/4"; internal
	4-7691	LOCKWASHER, 3/8"; internal; 2 us
	4-51143	WASHER, insulator; 3/8 × .136 × 6 used
	7-83990P01	BRACKET, PA mounting; right han
	7-83990P02	BRACKET, PA mounting; left hand
	14-84520P01	INSULATOR
	15-83178N02	COVER, PA; interconnect
	15-83684P01	COVER, PA
	26-83400P03	HEAT SINK, PA
	26-84809E01	SHIELD
	32-82796H02	GASKET; 49.25" used
	32-83140N02	GASKET, feedthru; 6-position
	42-10217A04	STRAP, tie
	42-82387D08	CLIP, cable
	42-84430P01	CLIP, board mounting guide; 4 us
	55-84300B03	HANDLE
	76-84069B04	CORE, ferrite bead
	84-xxxxxxxx	PCB, 6-way power splitter

TRN9458A RF Load Hardware Kit

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		connector, plug:
P512	—	consists of:
	15-10183B07	HOUSING, single contact
	29-84706E05	TERMINAL, crimp; male
P597	28-84186P01	coaxial
		cable, assembly:
W512	—	circulator sense (BRN); 17" used; includes: P512
		non-referenced items
	3-10943J49	SCREW, tapping: 2.5 × 0.45 × 6 4 used
	3-10943J78	SCREW, tapping: 3.5 × 0.6 × 22 2 used
	3-83498N05	SCREW, tapping: 4 × 0.7 × 12m 2 used
	15-84134P01	COVER, circulator load
	26-84059P01	HEAT SINK, circulator
	29-845081	LUG, ring

TRN9065A Final PA Deck Feedthru Plate Kit

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed:
C571 thru C574	21-82812H03	1000 pF + 100-0%; 500 V
		connector, plug:
P502	—	consists of:
	15-84953L01	housing, 6-position
	29-84706E06	terminal, crimp socket; 6 used
		cable, assembly:
W502	1-80779D97	final control; includes: P502, and
	30-854104	cable, 4-conductor; 16.5" used
	42-10217A02	strap, tie
		mechanical parts
	4-83755H01	WASHER, shoulder; 4 used
	29-3046	LUG, soldering
	42-10217A02	STRAP, tie; 2 used
	64-83542P01	PLATE, feedthru; 4-position

ware Kit — PL-9774-A

OTOROLA ART NO.	DESCRIPTION
	capacitor:
4211B01	0.01 uF; GMV; 500 V (A + feedthru)
	mechanical parts
64	NUT, hex; 3/8-32 × 1/2 × 3/32"; 2 used
5968	NUT, hex; 1/4-28 × 3/8 × 1/8"
943M10	SCREW, tapping: TT3 × 0.5 × 8 mm; 38 used
943R68	SCREW, tapping: TT4 × 0.7 × 13 mm; 2 used
498N05	SCREW, tapping: M4 × 0.7 × 12 mm; 9 used
498N14	SCREW, tapping: M4 × 0.7 × 18 mm; 6 used
678N03	SCREW, tapping: M3 × 0.5 × 9 mm; 8 used
812P01	SCREW, shoulder, metric; 12 used
812P02	SCREW, shoulder, metric; 12 used
57	WASHER, flat; .172 × .375 × .33"
07	WASHER, flat; 0.125 × 0.281 × 0.027
57	LOCKWASHER, #8; external
70	LOCKWASHER, 1/4"; internal
91	LOCKWASHER, 3/8"; internal; 2 used
143	WASHER, insulator; 3/8 × .136 × .022"; 6 used
990P01	BRACKET, PA mounting; right hand
990P02	BRACKET, PA mounting; left hand
4520P01	INSULATOR
3178N02	COVER, PA; interconnect
3684P01	COVER, PA
3400P03	HEAT SINK, PA
4809E01	SHIELD
2279H02	GASKET; 49.25" used
3146N02	GASKET, feedthru; 6-position
0217A04	STRAP, tie
2387D08	CLIP, cable
4436P01	CLIP, board mounting guide; 4 used
4300B03	HANDLE
4069B04	CORE, ferrite bead
xxxxxxx	PCB, 6-way power splitter

dware Kit — PL-9789-B

MOTOROLA PART NO.	DESCRIPTION
	connector, plug:
	consists of:
0163B07	HOUSING, single contact
4706E05	TERMINAL, crimp; male
4186P01	coaxial
	cable, assembly:
	circulator sense (BRN); 17" used; includes: P512
	non-referenced items
943J49	SCREW, tapping: 2.5 × 0.45 × 6mm; 4 used
943J78	SCREW, tapping: 3.5 × 0.6 × 22mm; 2 used
498N05	SCREW, tapping: 4 × 0.7 × 12mm; 2 used
4134P01	COVER, circulator load
4059P01	HEAT SINK, circulator
5061	LUG, ring

k Feedthru Plate Kit — PL-9790-O

MOTOROLA PART NO.	DESCRIPTION
	capacitor, fixed:
2812H03	1000 pF +100-0%; 500 V
	connector, plug:
	consists of:
4953L01	housing, 6-position
4706E06	terminal, crimp socket; 6 used
	cable, assembly:
0779D97	final control; includes: P502, and
854104	cable, 4-conductor; 16.5" used
0217A02	strap, tie
	mechanical parts
3755H01	WASHER, shoulder; 4 used
3046	LUG, soldering
0217A02	STRAP, tie; 2 used
3542P01	PLATE, feedthru; 4-position

TFF6072A Low-Pass Filter — PL-9651-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		filter, rf:
FL500	91-84224N02	LOW-PASS

TRN9797A RF Output Cable Kit — PL-9784-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		connector, receptacle:
J7	9-83213K01	female, single contact: N type; bulk lead mount
		connector, plug:
P595	28-84476G01	male; single contact
		cable, assembly:
W595	1-80700E18	output, rf; includes ref. items J7, P595, and
	3-84173E01	CABLE, shielded coaxial; 3.5" used
		mechanical parts
	3-83498N02	SCREW, tapping; M3 x 0.5 x 5mm
	3-83498N10	SCREW, tapping: M3.5 x 0.6 x 14mm; 4 used
	7-84190P01	BRACKET, circulator load mounting
	42-75826	CLIP, harmonic filter mounting

TTF6312A Tripler Circulator Hardware Kit — PL-9787-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	3-83498N07	SCREW, tapping: M4 x 0.7 x 40mm; 2 used
	7-84190P01	BRACKET, circulator mounting; 2 used
	58-83843P0	ASSEMBLY, triple

TRN9816A Triple Circulator Adapter Hardware Kit — PL-9921-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	28-817985	ADAPTER, rf; right-angle type