

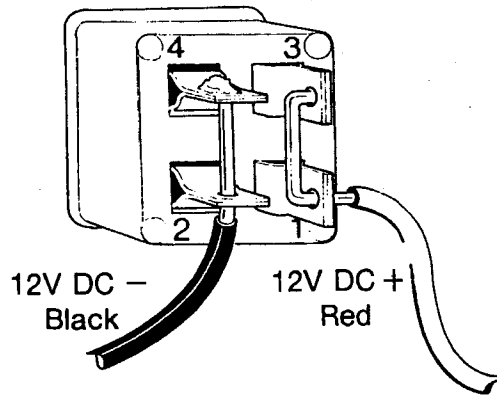
# **TPL**

## **OWNERS MANUAL**

**VHF (Hi-Band)  
POWER AMPLIFIER  
136-175 MHz**

**talk  
power  
by** **TPL** **COMMUNICATIONS INC.**

3336 SAN FERNANDO ROAD • LOS ANGELES, CALIFORNIA 90065



Since these amplifiers draw from 4 to 18 amps when operating, DC connections should be made directly to the battery if possible. *Red* goes to the *positive (+)* terminal and *black* to the *negative (-)* terminal.

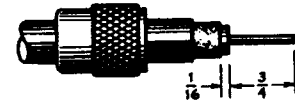
**NOTE:** Amplifiers with current requirements from 1-15 amperes use #12 gauge. All units requiring 15+ amperes should use #10 gauge wire. Keep leads as short as possible. While all units are fused internally, it is advisable to add an in-line fuse at the primary voltage source to insure user safety in the event of cable damage.

#### PL 259 Plug

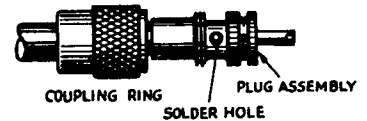
1.—Cut end of cable even. Remove vinyl jacket  $\frac{1}{4}$ "—*don't nick braid.*



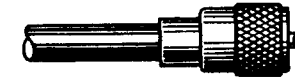
2.—Bare  $\frac{3}{8}$ " of center conductor—*don't nick conductor.* Trim braided shield  $\frac{1}{8}$ " and tin. Slide coupling ring on cable.



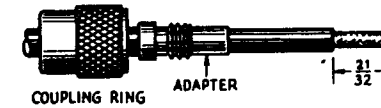
3.—Screw the plug assembly on cable. Solder plug assembly to braid through solder holes. Solder conductor to contact sleeve.



4.—Screw coupling ring on assembly.



#### PL 259 Plug with Adapters



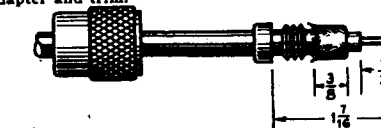
1.—Cut end of cable even. Remove vinyl jacket  $\frac{21}{32}$ "—*don't nick braid.* Slide coupling ring and adapter on cable.



2.—Fan braid slightly and fold back over cable.



3.—Compress braid around cable. Position adapter to dimension shown. Press braid down over body of adapter to dimension shown. Press braid down over body of adapter and trim.



4.—Bare  $\frac{1}{2}$ " of center conductor—*don't nick conductor.* Pre-tin exposed center conductor.

5, 6.—Same as 3 and 4 under PL-259 Plug.

talk  
power  
by **TPL** COMMUNICATIONS INC.

3336 SAN FERNANDO ROAD, LOS ANGELES, CALIFORNIA 90065

**OWNERS MANUAL**

for **OPERATION  
TUNE-UP  
SERVICE  
WARRANTY**

**OF:**

**VHF POWER AMPLIFIERS**

**PA3-1AB & -2 (302)  
PA3-1AC & -2 (502B)  
PA3-1AD & -2 (802B)  
PA3-1AE & -2 (1202B)  
PA3-1DC (502)  
PA3-1DD (802)  
PA3-1DE (1202)  
PA3-1FD (802C)  
PA3-1FE (1202C)**

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### **Radio Properties**

**Two-Way Radio: Sales, Rental, Leasing,  
Parts, Repairs and Specialized Electronics.  
Repeater Access & Vault Space.**

**KENWOOD *Authorized Sales & Service***

**Skipp May P.O. Box 192**

**Elmira, CA. 95625**

**Voice (707) 678-4187 - Fax (707) 693-8057**

**nospam4me@juno.com [www.radiowrench.com](http://www.radiowrench.com)**

## WARRANTY

**TPL Communications Inc.** has tested and found this unit to function properly and to operate within the parameters of its stated specifications.

TPL warrants that this product is free from defect in material and workmanship. If found to be defective within one year from date of purchase, the factory, at its discretion, will either repair or replace the unit at no cost provided the unit is delivered by the owner to the factory intact. Warranty does not apply to any product which has been subjected to misuse, neglect, accident, improper installations, used in violation of the instructions furnished by us, nor does it extend to units which have been repaired or altered outside our service department, nor where the serial number has been removed, defaced or changed.

To place this warranty in effect, the unit must be warranty-registered with the factory within fifteen (15) days from the date of purchase.

TPL COMMUNICATIONS INC.

GENERAL SPECIFICATIONS

Frequency Range: Broadband, 136-175 MHz

Supply Voltage: 13.8 VDC

Temperature Range: -30° to +60° C

Operating Mode: FM

MODEL	INPUT POWER	OUTPUT POWER	NOMINAL CURRENT DRAIN
PA3-1AC	1-4W	30-45W	5-8 Amps
PA3-1AC-2	5-8W	30-45W	5-8 Amps
PA3-1AD	1-4W	70-90W	13-16 Amps
PA3-1AD-2	5-8W	70-90W	13-16 Amps
PA3-1AE	1-4W	80-120W	15-18 Amps
PA3-1AE-2	5-8W	80-120W	15-18 Amps
PA3-1DC	8-15W	30-45W	4-6 Amps
PA3-1DD	8-15W	70-90W	12-15 Amps
PA3-1DE	8-15W	80-120W	15-18 Amps
PA3-1FD	15-30W	70-90W	10-12 Amps
PA3-1FE	15-40W	80-120W	12-14 Amps

<b>OPERATING VOLTAGE:</b> (At amplifier input terminals)	<table border="1"> <thead> <tr> <th>Minimum</th> <th>Typical</th> <th>Maximum</th> </tr> </thead> <tbody> <tr> <td>11 VDC</td> <td>13.8 VDC</td> <td>15 VDC</td> </tr> </tbody> </table>	Minimum	Typical	Maximum	11 VDC	13.8 VDC	15 VDC	Reduction of Power Output will occur with less than 13.8 VDC.
Minimum	Typical	Maximum						
11 VDC	13.8 VDC	15 VDC						
<b>E.I.A. DUTY CYCLE WITH NO EXTERNAL COOLING:</b>	<table border="1"> <tbody> <tr> <td>40W Output 50%</td> <td rowspan="5"><b>NOTE: Use of TPL Mobile Amplifier in use above the recommended duty cycle or in repeater application is not recommended and voids the warranty.</b></td> </tr> <tr> <td>60W Output 50%</td> </tr> <tr> <td>80W Output 40%</td> </tr> <tr> <td>100W Output 40%</td> </tr> <tr> <td>120W Output 40%</td> </tr> </tbody> </table>	40W Output 50%	<b>NOTE: Use of TPL Mobile Amplifier in use above the recommended duty cycle or in repeater application is not recommended and voids the warranty.</b>	60W Output 50%	80W Output 40%	100W Output 40%	120W Output 40%	
40W Output 50%	<b>NOTE: Use of TPL Mobile Amplifier in use above the recommended duty cycle or in repeater application is not recommended and voids the warranty.</b>							
60W Output 50%								
80W Output 40%								
100W Output 40%								
120W Output 40%								
<b>RECEIVER INSERTION LOSS:</b>	136 to 175 MHz: 1dB maximum							
<b>HARMONIC ATTENUATION:</b>	All models meet or exceed FCC specification for which these models are type accepted.							

## FUSING

An internal fuse of the following value is provided for each model amplifier.  
If an external fuse is used, the same value is recommended.

PA3-1AC	10 Amps
PA3-1AD	25 Amps
PA3-1AE	25 Amps
PA3-1DC	10 Amps
PA3-1DD	20 Amps
PA3-1DE	25 Amps
PA3-1FD	20 Amps
PA3-1FE	20 Amps

**CAUTION**

Before installation check the amplifier to see that there is no visible damage. If there is, return the amplifier to your dealer immediately.  
**TRANSISTORS AND OTHER EXPENSIVE COMPONENTS MAY BE DESTROYED IF THE AMPLIFIER IS TURNED ON IN A DAMAGED CONDITION.**

## PART LIST

MODELS PA3-1AE, PA3-1AD PRE-DRIVER  
COR, AND MISCELLANEOUS PARTS

REF. SYMBOL	TPL PART NO.	DESCRIPTION
PCB	100775	Circuit Board (Pre-Driver)
Q5	B2-100	2N2222
Q6	B2-149	2N2907
Q7		RF Transistor (Factory Select)
CR2, CR3	B3-110	1N4148 Diodes
CR4	B3-112	MR751 Diode
Z11, Z12, Z13		Microstriplines
L8, L9, L10		5T #18, Wide Spaced
L11, L12		5T #18, Chokes
L13	E1-103	3.3uh Choke
C36, C39	A1-102	15pf Unelco
C37, C38	A1-104	25pf Unelco
C40	A5-117	5pf Disc Ceramic
C41, C42, C44, C47, C48	A5-172	.001 Disc Ceramic
C43, C46	A5-244	.01 Disc Ceramic
C45	A4-119	33mf 25V Electrolytic
C49	A5-154	180 pf Mica
C50, C55	A1-118	404 Arco
C51	A1-103	20pf Unelco
C52, C53	A1-109	100pf Unelco
C56	A8-163	430pf Mica
R7	C1-364	470 Ohm 1/2W
R8	C1-372	1K Ohm 1/2W
R9	C1-759	300 Ohm 2W
K1	J1-102	VHF Relay
J1, J2	F2-122	SO239 RF Connectors
	J2-107	Fuse Holder
	F2-106	4 PIN Cinch (Female)
	100081-2	Mounting Plate
	100079	Enclosure
	100766	Heatsink

TYPE ACCEPTANCE

PARTS LIST

MODELS PA3-1AE, PA3-1DE, PA3-1AE DRIVER & FINALS  
 MODEL PA3-1FE FINAL

REF. SYMBOL	TPL PART NO.	DESCRIPTION
PCB	100007F	Circuit Board
Q1 through Q4	B2-131	RF Transistor (Factory Select)
CR1	B3-112	MR751 Diode
Z1 through Z10		Microstriplines
L1, L2, L3, L5, L6		5T #18
L4, L7	E1-103	3.3uh RF Chokes
C1, C3, C5, C25, C27	A5-172	.001 Disc Ceramic
C2, C4, C24, C28	A5-244	.01 Disc Ceramic
C6, C26	A4-119	33mf 25V Electrolytic
C7, C8, C9, C14, C15, C16, C21, C22, C23, C33, C34	A1-109	100pf Unelco
C10, C29	A8-138	43pf Mica
C11	A1-102	15pf Unelco
C12*, C17, C32	A1-106	50pf Unelco
C13, C35	A1-105	35pf Unelco
C18	A1-108	75pf Unelco
C19	A8-163	430pf Mica
C20	A1-118	404 Arco
C30	A1-101	10pf Unelco
C31	A1-104	25pf Unelco
R1, R2, R3	C1-324	10 Ohm 1/2W
J3	F1-102	4 PIN Cinch (Male)
F1		Fuse (Factory Select)

\*On the PA3-1FE C12 is a 404 Arco, TPL Part No. A1-118

TPL Communications Inc.'s commercial model amplifiers are type accepted for operation under all parts of the Land and Maritime mobile/fixed services. However, it is the responsibility of the technician installing and tuning this amplifier to hold the proper class of FCC Commercial license and to be familiar with the rules and regulations pertaining to the power output permissible under the class of station license with which the amplifier is to be used.

It is also important that the specification published by the manufacturer of the transceiver be consulted. This will insure that the proper level to which the transceiver will be amplified will not invalidate its type acceptance because of spurious content or frequency stability.

For any further detail or questions, it is suggested that the technician consult the FCC publications regarding these regulations.

ADDITIONAL TYPE ACCEPTANCE INFORMATION

The content of spurious harmonic signals generated by this amplifier is attenuated in excess of that required by the FCC under all parts for which it is accepted. The attenuation of these spurious signals is guaranteed through good engineering design and the use of a seven pole low-pass filter on the output of the amplifier.

In the event that the manufacturer's specifications or independent tests indicate that the spurious responses of the transceiver are not sufficiently suppressed for use with the power amplifier, TPL makes a band-pass filter for insertion at the input of the power amplifier. These filters can be easily installed either at the factory or in the field. The band-pass is such that if the transceiver meets type acceptance at its power level, it will more than exceed FCC requirements at the amplifier power level.

## INSTALLATION INSTRUCTIONS

Determine location for amplifier and length of cable to be used. The best place to mount amplifier is close to the antenna and as close to the battery as possible. If your antenna is trunk-mounted, we suggest you mount the amplifier in the trunk and use No. 10 wire connected directly to the battery terminals.

Always hook up red wire to positive (+) and black wire to negative (-).

For directions on hook-up of DC plug to DC cable, refer to inside front cover of this manual.

Hook up radio transceiver to "RF Input" Terminal and Antenna to "RF Output" Terminal on amplifier. It is sometimes easier with trunk-mounted antennas to simply cut the antenna lead in the trunk and place the amplifier in line at this point. The reason for this is that it is better to absorb the power loss between the radio and the amplifier (RF Input) than to absorb the power loss between the amplifier and the antenna (RF Output).

## PARTS LIST MODELS PA3-1FD, PA3-1DD, PA3-1AD DRIVER AND FINALS

REF. SYMBOL	TPL PART NO.	DESCRIPTION
PCB	100007F	Circuit Board
Q1, Q2, Q4	B2-131	RF Transistor (Factory Select)
CR1	B3-112	MR751 Diode
Z1 through Z10		Microstriplines
L1, L2, L3, L5, L6		5T #18
L4, L7	E1-103	3.3uh RF Chokes
C1, C3, C5, C25, C27	A5-172	.001 Disc Ceramic
C2, C4, C24, C28	A5-224	.01 Disc Ceramic
C6, C26	A4-119	33mf 25V Electrolytic
C7, C8, C9, C21, C22,		
C23, C33, C34	A1-109	100pf Unelco
C10*, C29	A8-138	43pf Mica
C11	A1-102	15pf Unelco
C12*, C31	A1-104	25pf Unelco
C18	A1-118	404 Arco
C19	A8-163	430pf Mica
C20	A1-100	5pf Unelco
C30	A1-101	10pf Unelco
C32	A1-106	50pf Unelco
C35	A1-105	35pf Unelco
R1	C1-324	10 Ohm 1/2W
J3	F1-102	4 PIN Cinch (Male)
F1		Fuse (Factory Select)

\*On the PA3-1FD C10 is a 120pf Mica, TPL Part No. A8-150

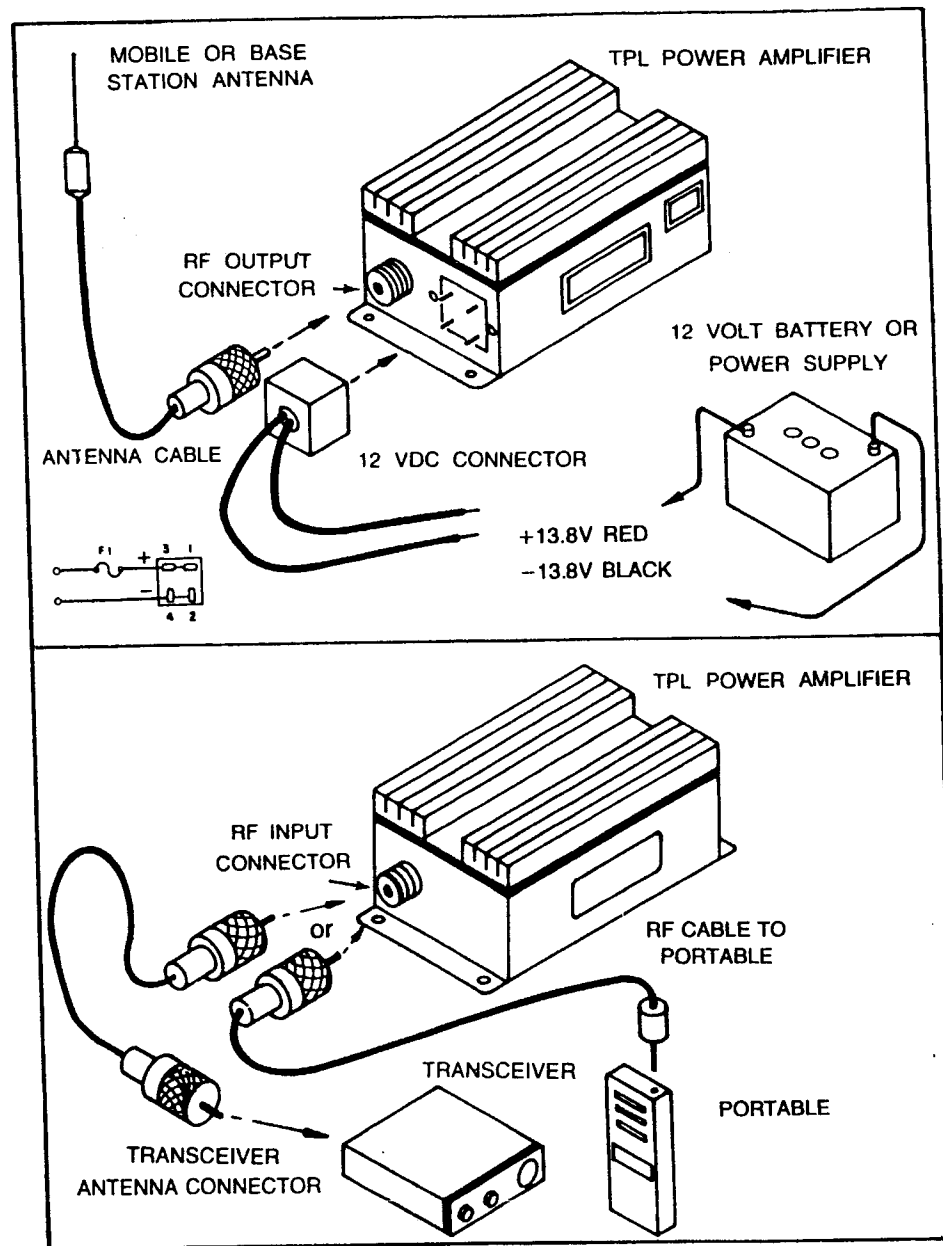
\*On the PA3-1FD C12 is a 404 Arco, TPL Part No. A1-118



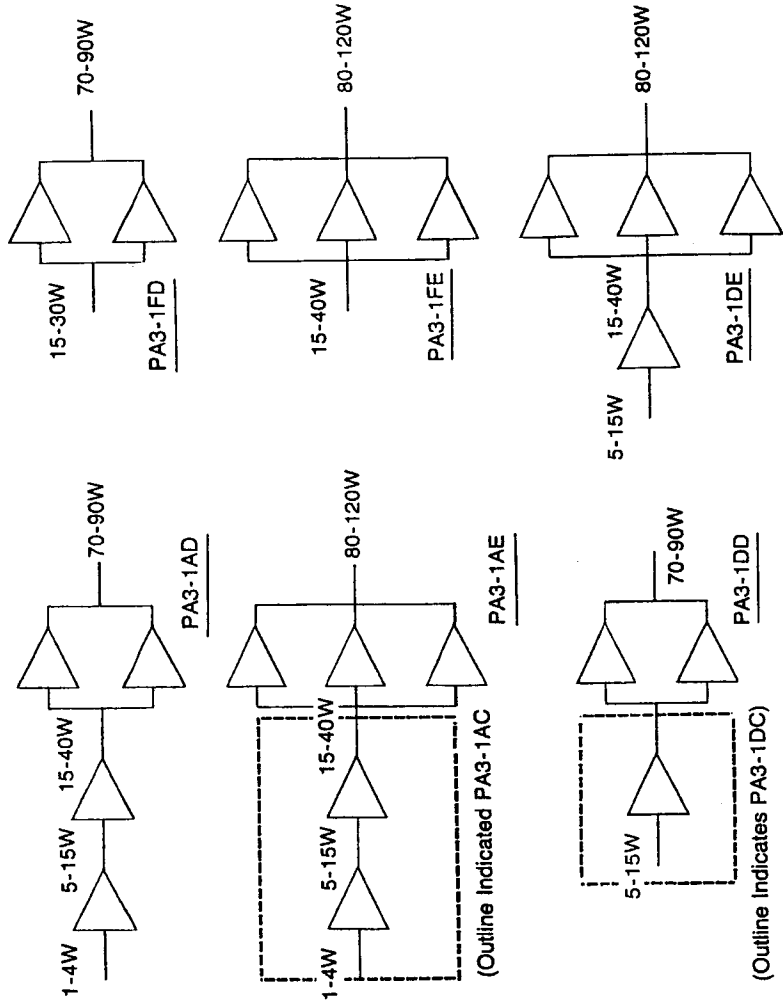
**PARTS LIST**  
**MODELS: PA3-1AC, PA3-1DC**

REF. SYMBOL	TPL PART NO.	DESCRIPTION
PCB	100778	Circuit Board
Q1*	B2-149	2N2907 Transistor
Q2	B2-100	2N222 Transistor
Q3]	B2-151	RF Transistor (factory select)
Q4	B2-131	RF Transistor (factory select)
CR1, CR2*	B3-112	MR751 Diode
CR3, CR4, CR5	B3-110	1N4148 Diode
Z1 through Z6		Striplines
L1, L2, L3		5T #18 (Wide Spaced)
L4*, L5*, L7, L8		5T #18 (Close Spaced)
L6*, L9	E1-103	3.3uh RF Chokes w/bead
C1, C2*, C7*, C8*, C10*		
C14, C15, C17, C18	A5-172	.001 Disc Ceramic
C3, C6	A1-102	15pf Unelco
C4, C5, C31	A1-104	25pf Unelco
C9*, C11*, C16, C19	A5-244	.01 Disc ceramic
C13	A5-117	5pf Disc ceramic
C20	A4-105	33 mf 25V Electrolytic
C21*	A8-154	180pf Mica
C22*	A1-116	402 Arco
C23*	A1-103	20pf Unelco
C24*, C25*, C32, C34	A1-109	100 pf Unelco
C27*, C35	A1-118	404 Arco
C28*	A8-163	430pf Mica
C29, C36	A8-138	43pf Mica
C30	A1-101	10pf Unelco
C33	A1-106	50pf Unelco
R1*	C1-164	470 Ohm 1/4W
R2*	C1-172	1K Ohm 1/4W
R3*	C1-754	180 Ohm 2W
K1	J1-102	VHF Relay
J1, J2	F2-122	SO239 RF connectors
J3	F1-102	4 Pin cinch (male)
F1	J2-102	Fuse 10 amp
	J2-107	Fuse holder
	F2-106	4 Pin cinch (female)
	100015	Mounting Plate
	100010	Enclosure
	100005	Heatsink

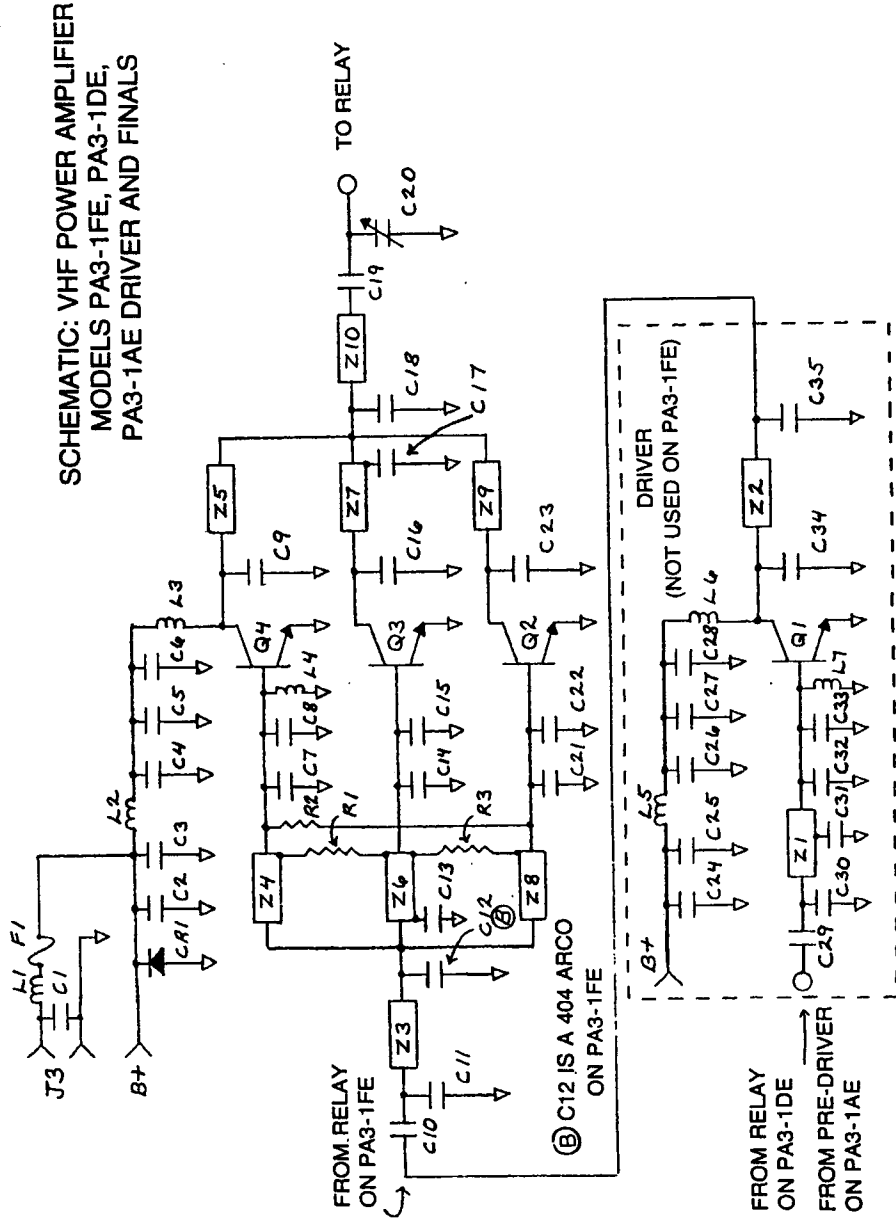
\*Indicates parts not used on PA3-1DC  
 C12 and C26 are not used.



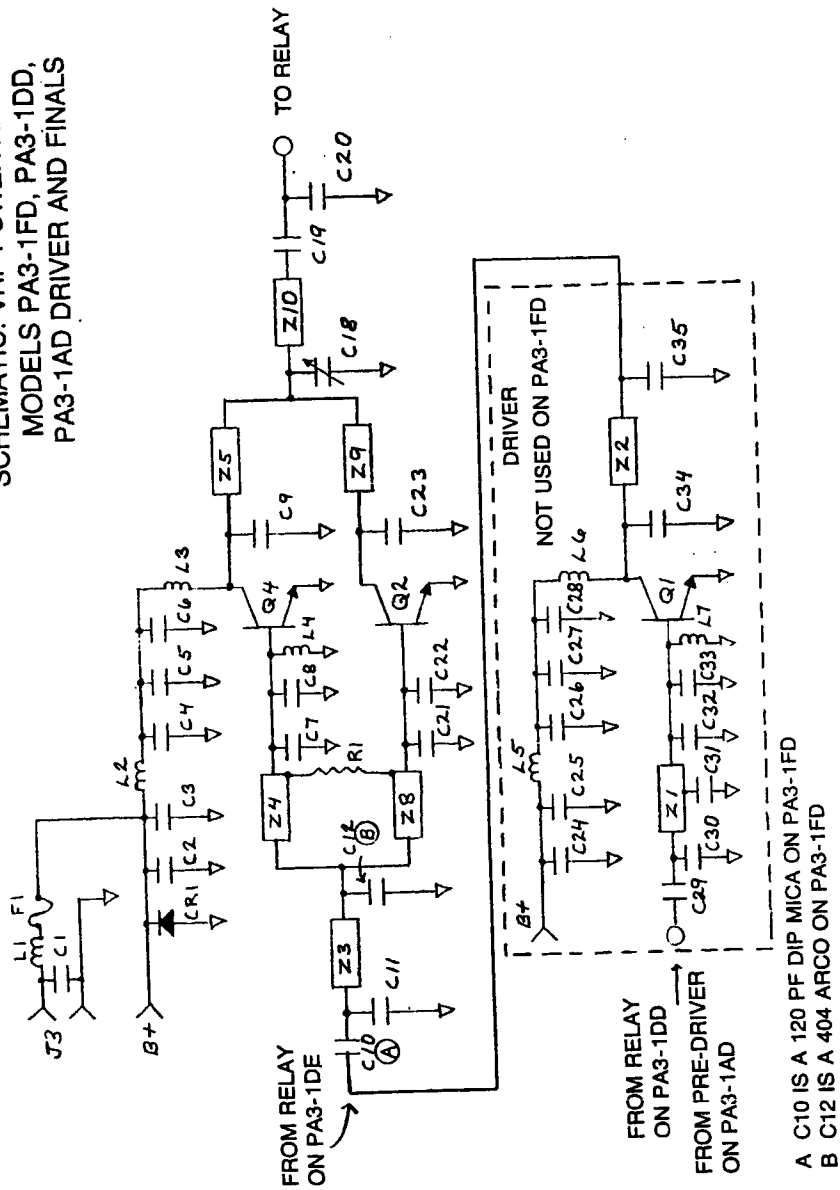
**AMPLIFIER INSTALLATION**



BLOCK DIAGRAMS



SCHEMATIC: VHF POWER AMPLIFIER  
MODELS PA3-1FD, PA3-1DD,  
PA3-1AD DRIVER AND FINALS



A C10 IS A 120 PF DIP MICA ON PA3-1FD

B C12 IS A 404 ARCO ON PA3-1FD

CIRCUIT DESCRIPTION  
MODELS PA3-1AC, PA3-1DC

The model PA3-1AC uses circuit board 100778. The board includes a driver and a final transistor, a bias circuit for the driver, the low pass filter, and the transmit-receive relay. All of this is in a compact package providing up to 45 watts of R.F. power output throughout the frequency range of 136 to 175 MHz with no need for tuning.

D.C. voltage is applied to the unit through J3 connector. F1 is the fuse and CR1 is the reverse polarity protection diode.

R.F. drive power is applied at connector J1. When there is no D.C. voltage applied to the unit, any R. F. present at J1 is routed through the relay to the low pass filter and on to J2, the antenna connector. With D.C. voltage applied, R.F. presence at J1 is sensed by capacitor C13, and a small amount of R.F. is coupled to diodes CR3 and CR4. The R.F. is then rectified into D.C. voltage and applied to the base of Q2, the keying transistor for the relay.

When the relay keys, the R.F. from J1 is routed to the input of the driver transistor Q3, and the R.F. output from final transistor Q4 is routed through the relay, the low pass filter, and then on to J2, the antenna connector.

The input and output of both the driver and the final sections is 50 ohms. The driver is matched to 50 ohms by capacitors C21, C22, C23, C24, and C25 as well as by Z1 and Z2 stripline inductors. On the output, matching is done with Z3 and Z4 striplines along with C26, C27, and C28 capacitors.

Driver transistor Q3 has a bias circuit which supplies Q3 with bias voltage during transmit only. The bias circuit consists of Q1, R1, C2, R2, R3, C7, and CR2 components. PNP transistor Q1 has voltage applied to its emitter and base. The base is also connected to the collector of Q2 keying transistor. When the collector of Q2 goes low, to ground, the voltage at the base of Q1 bias transistor is also removed, thereby allowing voltage to appear at the collector of Q1, which in turn is routed to the base of the driver Q3. The bias voltage is limited in current by R3 and in voltage by CR2.

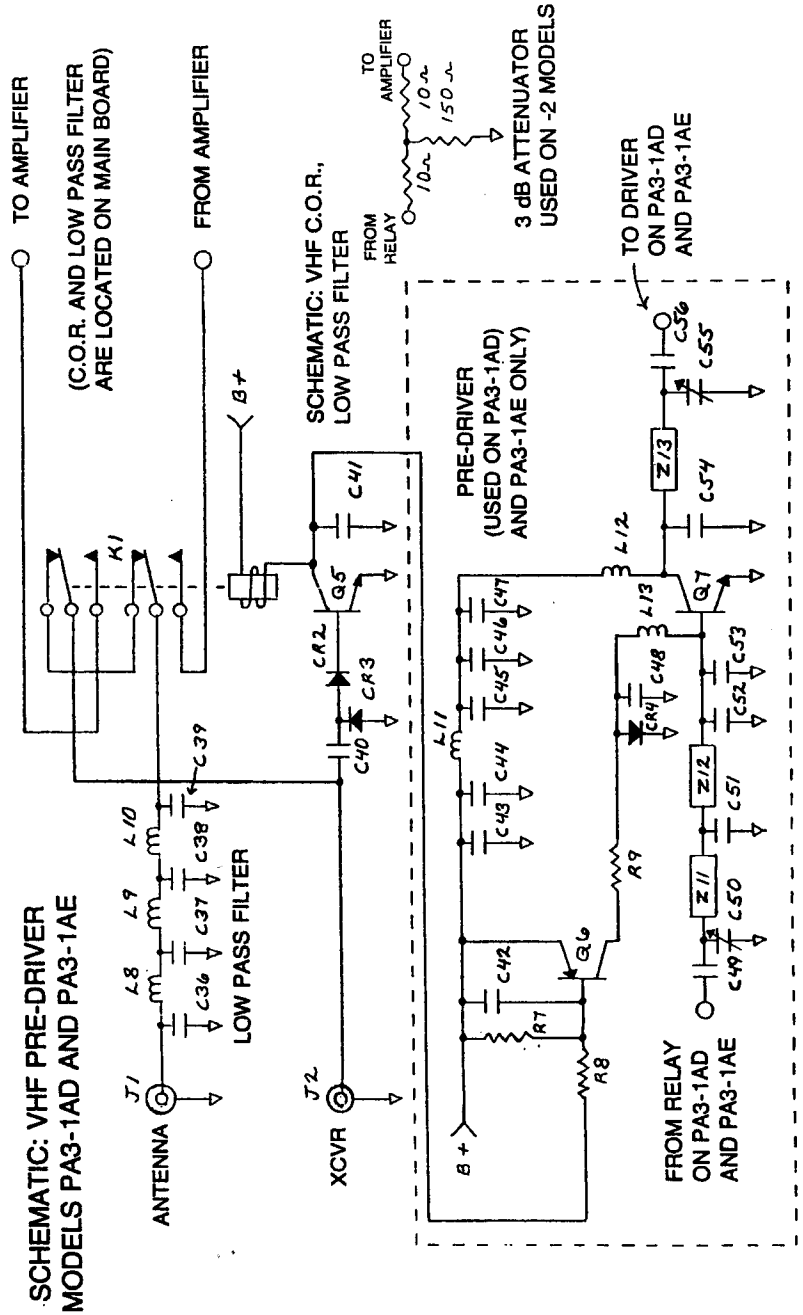
Final transistor Q4 is matched to 50 ohms with Z4 and Z5 striplines and with capacitors C29, C30, C31, C32 and C33 on the input. The output is matched by the use of capacitors C34, C35, and C36 with Z6 stripline inductor.

D.C. voltage is supplied to transistors Q3 and Q4 through R. F. chokes L4, L5, L7, and L8. C8, C9, C10, C11, C12, C16, C17, C18, C19, and C20 are used as R. F. bypass capacitors.

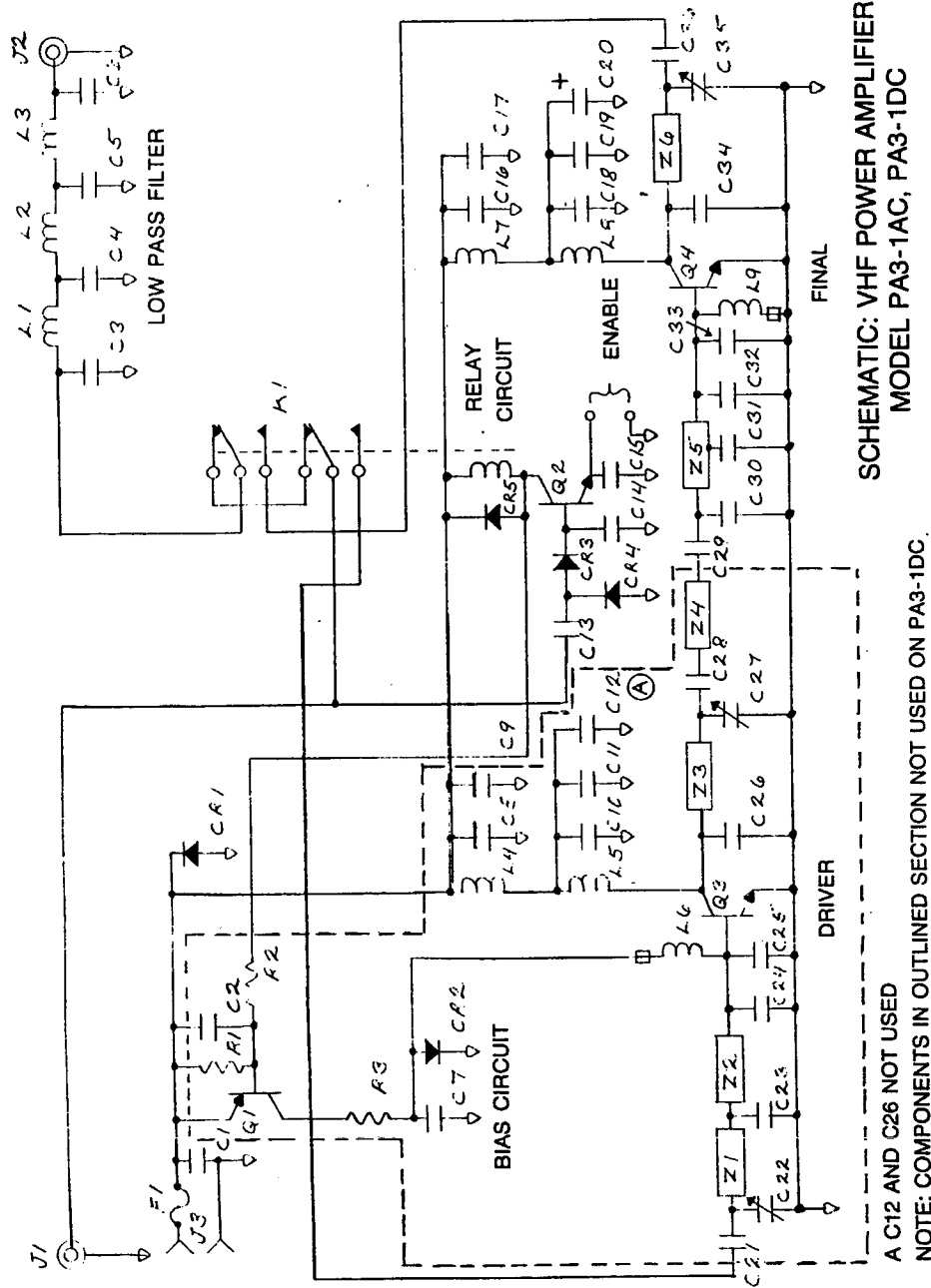
L1, L2, and L3 inductors, along with capacitors C3, C4, C5, and C6 form the low pass filter circuit.

The model PA3-1DC uses the same circuit board as the PA3-1AC. The difference is that the PA3-1DC does not use the driver transistor or the bias circuit. Please see the schematic for models PA3-1AC and PA3-1DC, which indicates the parts used in each unit.

The PA3-1DC will accept up to 15 watts of R.F. input power and will provide up to 45 watts of R.F. power output. The frequency range is 136 to 175 MHz with no need for tuning.



CIRCUIT DESCRIPTION  
 MODELS PA3-1FD, PA3-1DD, PA3-1AD



SCHEMATIC: VHF POWER AMPLIFIER  
 MODEL PA3-1AC, PA3-1DC

A C12 AND C26 NOT USED  
 NOTE: COMPONENTS IN OUTLINED SECTION NOT USED ON PA3-1DC

The models above all use the same printed circuit board. The PA3-1FD uses the final stages on the board only. The PA3-1DD uses the final and driver stages. The PA3-1AD uses a separate board as a pre-driver in addition to the final and driver stages.

The PA3-1FD uses two RF power transistors to achieve its rated power output. The two transistors, Q2 and Q4, are matched to 50 ohms at both the input and the output. Microstriplines Z3, Z4, and Z8, in combination with capacitors C7, C8, C10, C11, C12, C21, and C22, are used to match the bases of Q2 and Q4 to 50 ohms. R1 is used as a balancing resistor between Q2 and Q4 bases. Capacitors C9, C18, C19, C20, and C23, as well as microstriplines Z5, Z9, and Z10, are used to match the collectors to 50 ohms.

DC voltage is supplied through L1, L2, and L3 with C1, C2, C3, C4, C5, and C6 used as RF bypass capacitors. Included are F1, the fuse, and CR1, a diode, to protect against reverse DC voltages being applied.

The PA3-1DD uses the final circuits plus a driver, Q1. The driver is matched to 50 ohms on the input through stripline Z1 and capacitors C29, C30, C31, C32, and C33. The output of the driver uses Z2 stripline along with C34 and C35 capacitors to match it to 50 ohms. RF chokes L5 and L6 supply DC voltage to the driver with C24, C25, C26, C27, and C28 used to bypass any RF to ground.

The PA3-1AD includes the circuitry of the final and driver stages plus a pre-driver. Q7 power transistor has an input and output impedance of 50 ohms. Z11, Z12, C49, C50, C51, and C53 are used on the input to match it to 50 ohms. On the output, Z13, C54, C55, and C56 are used. Q7 is biased on during transmit by switching transistor Q6 at the same time as the COR circuit. The bias circuit includes Q6, R7, R8, R9, C42, C48, CR4, and L13. L11, L12, C43, C44, C45, C46, and C47 are in the DC voltage supply circuit of Q7.

CIRCUIT DESCRIPTION  
 MODELS PA3-1FE, PA3-1DE, PA3-1AE

The models above all use the same printed circuit board. The PA3-1FE uses the final output stage only. The PA3-1DE uses the final and the driver stages. The PA3-1AE uses a separate board as a pre-driver in addition to the driver and final stages.

The PA3-1FE uses three RF power transistors to achieve its rated power output. The three transistors, Q2, Q3, and Q4, are matched to 50 ohms at the input via microstriplines Z3, Z4, Z6, and Z8, along with capacitors C7, C8, C10, C11, C12, C13, C14, C15, C21, and C22. Resistors R1, R2, and R3 are used to balance the bases of the three transistors. The outputs of Q2, Q3, and Q4 are matched to 50 ohms by the use of capacitors C9, C16, C17, C18, C19, C20, and C23 in combination with microstriplines Z5, Z7, Z9, and Z10.

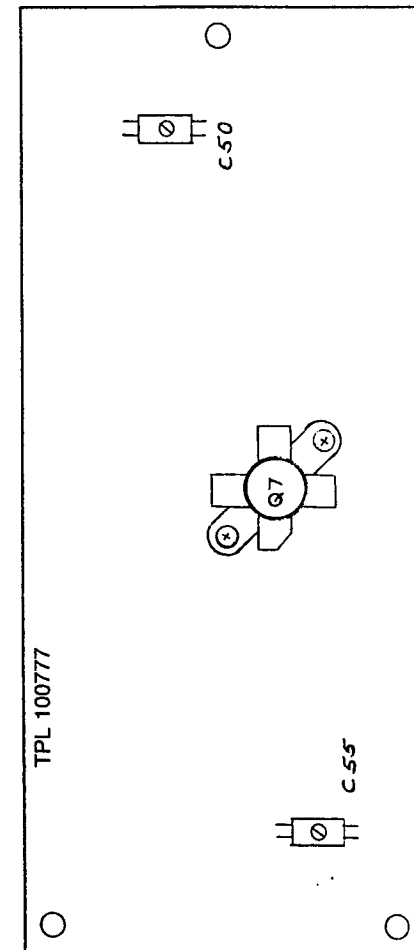
DC voltage is applied to the finals through RF chokes L1, L2, and L3. Capacitors C1, C2, C3, C4, C5, and C6 are bypass capacitors.

F1 is the fuse, and CR1 is a reverse DC voltage protection diode.

The PA3-1DE uses a driver in addition to the final stages described above. The driver, Q1, has an input and an output impedance of 50 ohms. The input is matched to 50 ohms through microstripline Z1 and with capacitors C29, C30, C31, C32, and C33. The output uses microstripline Z2 and capacitors C34 and C35 to match it to 50 ohms. DC voltage is applied to Q1 through L5 and L6. C24, C25, C26, C27, and C28 are RF bypass capacitors.

The PA3-1AE uses the final and driver stages plus a separate board for Q7, the pre-driver. The input is matched to 50 ohms through microstriplines Z11 and Z12. C49, C50, C51, C52, and C53 are also used on the input matching network. Q7 power transistor is biased on during transmit by transistor Q6 being switched at the same time as the COR circuit. The bias circuit includes Q6, R7, R8, R9, C42, C48, CR4, and L13. Z13, C54, C55, and C56 are used to match the output of Q7 to 50 ohms. L11 and L12 supply DC voltage to Q7. C43, C44, C45, C46, and C47 are bypass capacitors.

PRE-DRIVER  
 TUNING COMPONENTS LOCATION  
 MODELS PA3-1AE AND PA3-1AD



TUNING ADJUSTMENT PROCEDURE  
FOR MODELS  
PA3-1FE, PA3-1DE, PA3-1AE

STEP	ADJUST	FUNCTION	INSTRUCTIONS
1			
2	C20	Output	Adjust C20 for maximum RF power output and minimum current. See Page 19 for Step 2 pictorial.
*3	C55	Output Tuning	Adjust C55 for maximum RF power output and minimum current.
*4	C50	Input Tuning	Adjust C50 for minimum input reflected power.
**5	C12	Input Tuning	Adjust C12 for minimum input reflected power See Page 19 for Step 5 pictorial
6		Overall Tuning	Repeat steps 2 and 3 until best performance is achieved.

\*NOTE: Steps 3 and 4 are for model PA3-1AE only.

\*\*NOTE: Step 5 is for model PA3-1FE only.

NOTICE: If an RF sweep tuning test set-up is available, the same adjustments are made, except tuning is done so as to achieve maximum flatness throughout the desired frequency range on both power output and minimum input reflected power.

CIRCUIT DESCRIPTION  
LOW PASS FILTER, COR

All models include a seven pole low pass filter made up of inductors L8, L9, and L10 plus capacitors C36, C37, C38, and C39. The filter attenuates harmonics which may be in excess of FCC specifications under which this unit is type accepted.

A COR circuit is also included in all models unless a unit is ordered without one. A signal at connector J2 goes through relay K1, then to connector J1, and finally to the antenna whenever there is no DC voltage applied to the amplifier. When DC voltage is applied to the unit, a signal at input connector J2 is routed through the relay and on to the input of the amplifier. The output of the amplifier is also taken through the relay, then through the low pass filter and on to J1, the antenna connector. The COR circuit is made up of transistor Q5, diodes CR2 and CR3, relay K1, and capacitors C40 and C41.

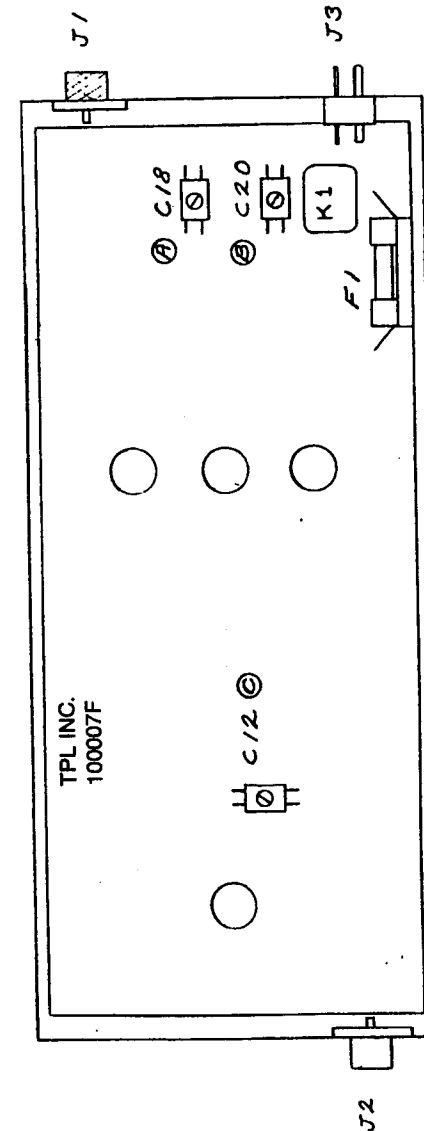
The bias circuit used on the pre-driver for models PA3-1AD and PA3-1AE is normally keyed by connecting the base of PNP transistor Q6 to the collector of COR circuit keying transistor Q5.

## TUNE UP INSTRUCTIONS

- (1) Set the transceiver or portable radio to the center of the desired frequency range.
- (2) If possible adjust the power amplifier in a test set-up similar to that shown.
- (3) The following equipment will be needed for proper alignment:
  - a. Bird 43 thru line watt meter (2)
  - b. 5 or 10 watt and 100 or 250 watt element covering proper frequency range.
  - c. Regulated power supply
  - d. Insulated tuning tool
  - e. Dummy load

**Note:** These amplifiers do not normally require any adjustment for use within the frequency range of 136 to 175 MHz.  
 It may be necessary to retune a unit if a component has been replaced.  
 If it becomes necessary to retune an amplifier, it should be done with a sweep generator to achieve factory band width specifications.  
 If sweep tuning is not possible, an amplifier may be tuned to a specific frequency by using the following procedures.

### TUNING COMPONENTS LOCATION ALL MODELS EXCEPT PA3-1AC AND PA3-1DC



- Ⓐ C18 IS A VARIABLE ON PA3-1FD, PA3-1DD and PA3-1AD ONLY
- Ⓑ C20 IS A VARIABLE ON PA3-1FE, PA3-1DE and PA3-1AE ONLY
- Ⓒ C12 IS A VARIABLE ON PA3-1FD AND PA3-1FE ONLY



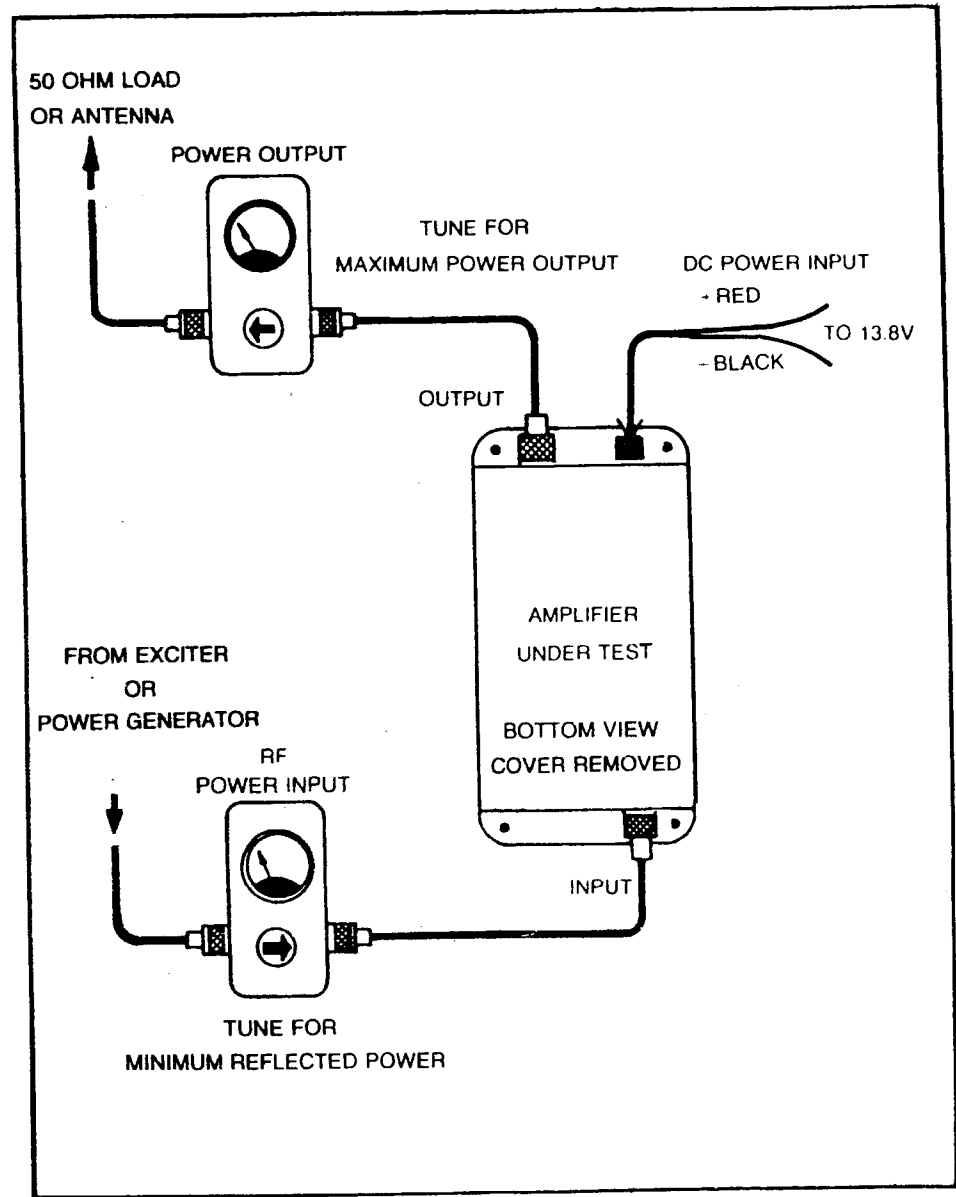
**TUNING ADJUSTMENT PROCEDURE  
FOR MODELS  
PA3-1FD, PA3-1DD, PA3-1AD**

STEP	ADJUST	FUNCTION	INSTRUCTIONS
1			Set up amplifier in accordance with test set-up diagram. Apply DC voltage and minimum specified RF power at the desired
2	C18	Output	Adjust C18 for maximum RF power output and minimum current.
*3	C55	Output Tuning	Adjust C55 for maximum RF power output and minimum current.
*4	C50	Input Tuning	Adjust C50 for minimum input reflected power
**5	C12	Input Tuning	Adjust C12 for minimum input reflected power.
6		Overall Tuning	Repeat all steps until best performance is achieved.

\*NOTE: Steps 3 and 4 are for Model PA3-1AD only. See Page 21 for Steps 3 and 4 pictorial.

\*\*NOTE: Step 5 is for model PA3-1FD only.

NOTICE: if an RF sweep tuning test set-up is available, the same adjustments are made, except tuning is done so as to achieve maximum flatness throughout the desired frequency range on both power output and minimum input reflected power.



AMPLIFIER TEST SET UP

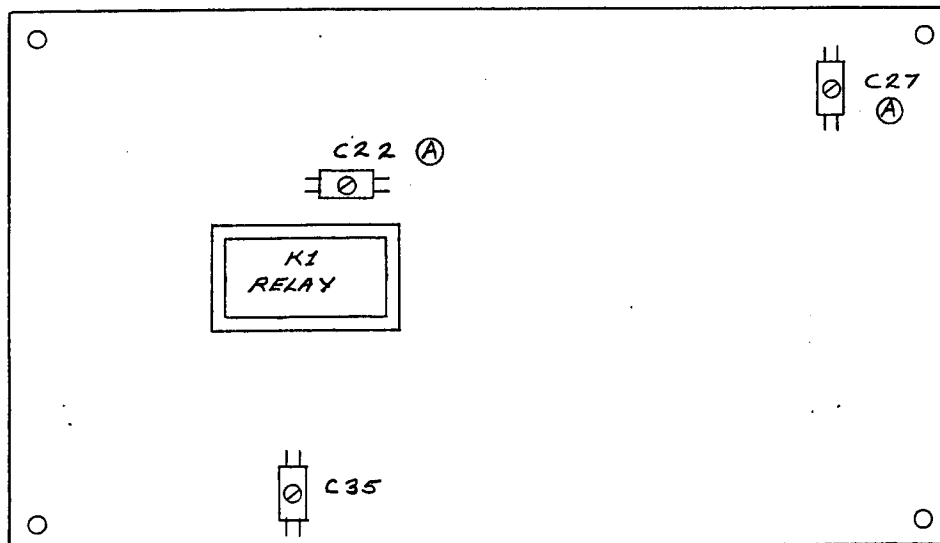
**TUNING ADJUSTMENT PROCEDURE  
FOR MODELS  
PA3-1AC and PA3-1DC**

STEP	ADJUST	FUNCTION	INSTRUCTIONS
1			Set up amplifier in accordance with test set-up diagram. Apply DC voltage and minimum specified RF power at the desired
2	C35	Output Tuning	Adjust C35 for maximum RF power output and minimum current.
*3	C27	Output Tuning	Adjust C27 for maximum RF power output and minimum current.
*4	C22	Input Tuning	Adjust C22 for minimum input reflected power
5		Overall Tuning	Repeat all steps until best performance is achieved.

\* NOTE: Steps 3 and 4 are for model PA3-1AC only.

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**TUNING COMPONENTS LOCATION  
MODELS: PA3-1AC AND PA3-1DC**



Ⓐ C22 AND C27 NOT USED ON PA3-1DC

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