

TPL

OWNERS MANUAL

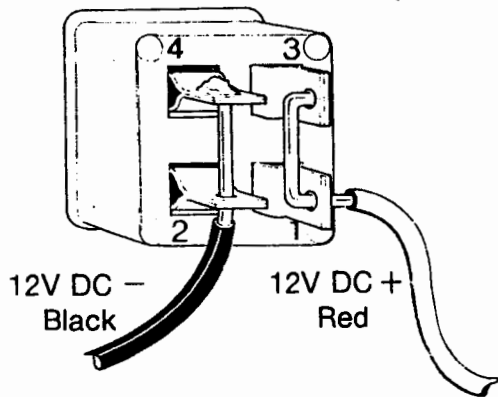
**VHF (LOW BAND)
POWER AMPLIFIERS
35-50 MHz
66-88 MHz**

talk
power
by **TPL**

COMMUNICATIONS INC.

3336 SAN FERNANDO ROAD • LOS ANGELES

CALIFORNIA 90065 • (213) 256-3000



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.

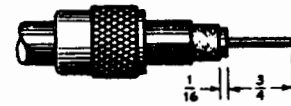
NOTE: Amplifiers with current requirements from 1-15 amperes use #12 gauge. All units requiring 15+ amperes should use #10 gauge wire. Keep leads as short as possible. While all units are fused internally, it is advisable to add an in-line fuse at the primary voltage source to insure user safety in the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

PL 259 Plug

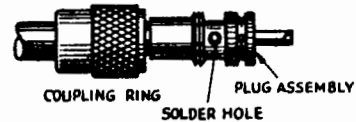
1.—Cut end of cable even. Remove vinyl jacket $1\frac{1}{4}$ "—*don't nick braid.*



2.—Bare $\frac{3}{4}$ " of center conductor—*don't nick conductor.* Trim braided shield $\frac{1}{8}$ " and tin. Slide coupling ring on cable.



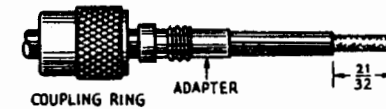
3.—Screw the plug assembly on cable. Solder plug assembly to braid through solder holes. Solder conductor to contact sleeve.



4.—Screw coupling ring on assembly.



PL 259 Plug with Adapters



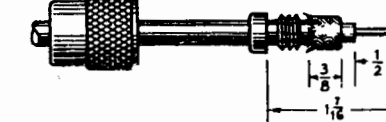
1.—Cut end of cable even. Remove vinyl jacket $2\frac{1}{32}$ "—*don't nick braid.* Slide coupling ring and adapter on cable.



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 FL-259 Plug.

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 date of purchase.

TPL COMMUNICATIONS INC.

talk
power
by **TPL** **COMMUNICATIONS INC.**
3336 SAN FERNANDO ROAD • LOS ANGELES
CALIFORNIA 90065 • (213) 256-3000

OWNERS MANUAL
FOR OPERATION
TUNE-UP
SERVICE
WARRANTY

OF
VHF (LOW BAND)
POWER AMPLIFIERS
35-50 MHz
66-88 MHz

PA1-1AC
PA1-1AE
PA1-1CF
PA1-1FE
PA2-1CD

ELECTRICAL PARTS LIST
PA1-1AC, PA1-1AE DRIVER

REF. SYMBOL	TPL PART NO.	DESCRIPTION
Q1 Q2	B2-100	Factory Select 2N2222
CR1 CR2, CR3	B3-112 B3-107	MR751 IN 4148 or IN 914
L1, L3, L6 L2, L4 L5, L7	E2-104 E2-101 E2-107	7 Turns 3 Turns 6 Turns
C1, C14 C2 (PA1-1AC) C2 (PA1-1AE) C3 C4 C5 C6, C9 C7, C8 C10, C13 C11 C12	A5-268 A8-146 A1-118 A1-120 A1-120 A8-150 A8-144 A5-148 A4-244 A5-130 A4-101	.1uF Cer. 82 pf Mica ARCO 404 ARCO 465 ARCO 465 120 pF Mica 68 pF Mica 100 pF Cer. .01 uF Cer. 18 pF Cer. 4.7 uF 25v Electrolytic
R1 R2, R3	C1-124 C1-388	10 ohms ¼W 4.7K ½W
K1	J1-102	DPDT Relay

ELECTRICAL PARTS LIST
 PA1-1CF, PA1-1FE, PA2-1CD, PA1-1AE Final

REF. SYMBOL	TPL PART NO.	DESCRIPTION
Q1, Q2 Q3	B2-100	Factory Select 2N2222
CR1, CR2 CR3, CR4	B3-112 B3-110	MR751 IN4148
L1, L2, L3 L4, L5 L6 L7, L10, L11, L12 L8, L9 L13	E1-110 E2-100 E1-103 E2-104 E2-101 E2-105	5.6 uh 2 turns 3.3 uh 7 turns 3 turns 8 turns
C1, C2, C7, C15, C16 C21, C23, C24 C3 C9, C10 C4 C5 C8 C6, C22, C12, C13 C11, C14 C12, C13 C17 C18	A5-244 A1-119 A1-120 A1-120 A1-111 A1-110 A5-172 A8-144 A1-109 A8-146 A4-102	.01 uf Ceramic ARCO 462 ARCO 465 ARCO 465 300 pf 150 pf UNELCO .002 uf Ceramic 68 pf Mica 100 pf UNELCO 80 pf Mica 5 uf 25V Electrolytic
R1, R3, R9 R2, R4 R5 R6 R7, R8 R10, R11 R12, R13, R16, R17 R14, R15	C1-724 C1-752 C1-316 C1-336 C1-324 C1-388 C1-731 C1-759	10 ohms, 2W 150 ohms, 2W 4.7 ohms, 1/2W 3.3 ohms, 1/2W 10 ohms, 1/2W Factory Select 20 ohms, 2W 300 ohms, 2W

NOTE:

PA2-1CD
 L10, L11, L12 are 4 turns
 L8, L9 are 2 turns
 L4, L5 is 1 turn
 C11, C14 are A1-106 50 pf
 C12, C13 are A1-108 75 pf

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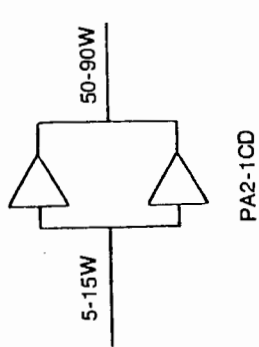
GENERAL SPECIFICATIONS

PERFORMANCE FIGURES AT 40.0 MHz

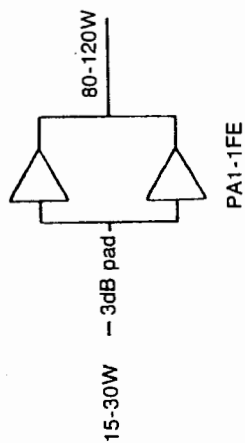
Model	Input Power	Output Power	Current Drain 13.8 VDC	Frequency Range
PA1-1AC	1-6W	20-40W	4-6 Amps	↑ 35-50 MHz ↓
PA1-1AE	1-6W	80-100W	13-16 Amps	
PA1-1CF	5-15W	80-120W	13-18 Amps	
PA1-1FE	15-30W	80-120W	13-18 Amps	

PERFORMANCE FIGURES AT 70.0 MHz

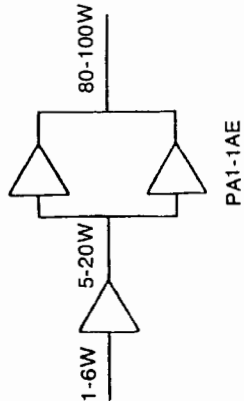
PA2-1CD	10-25W	75-100W	7-15 Amps	66-88 MHz
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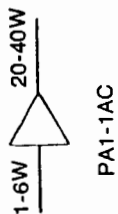
PA2-1CD



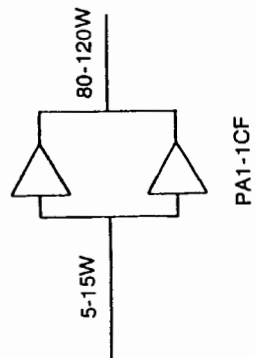
PA1-1FE



PA1-1AE



PA1-1AC



PA1-1CF

AMPLIFIER BLOCK DIAGRAMS

OPERATING VOLTAGE:

Minimum	Maximum	Typical
11 VDC	15 VDC	13.8 VDC

Reduction of Power Output will occur with less than 13.8 VDC

HARMONIC ATTENUATION:

2ND ALL HARMONICS -60 dB BELOW
 3RD CARRIER, OR GREATER
 4TH

RECEIVER INSERTION LOSS:

35 MHz
 ↑
 ↓
 90 MHz
 LESS THAN 1 dB

E.I.A. DUTY CYCLE WITH NO EXTERNAL COOLING OR ADDITIONAL HEAT SINK:

40W OUTPUT 50%
 60W OUTPUT 40%
 80W OUTPUT 40%
 100W OUTPUT 30%
 120W OUTPUT 25%

NOTE: Use of TPL Mobile Amplifier in use above the recommended duty cycle or in repeater application is not recommended and voids the warranty.

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 THIS CONDITION.*

TYPE ACCEPTANCE

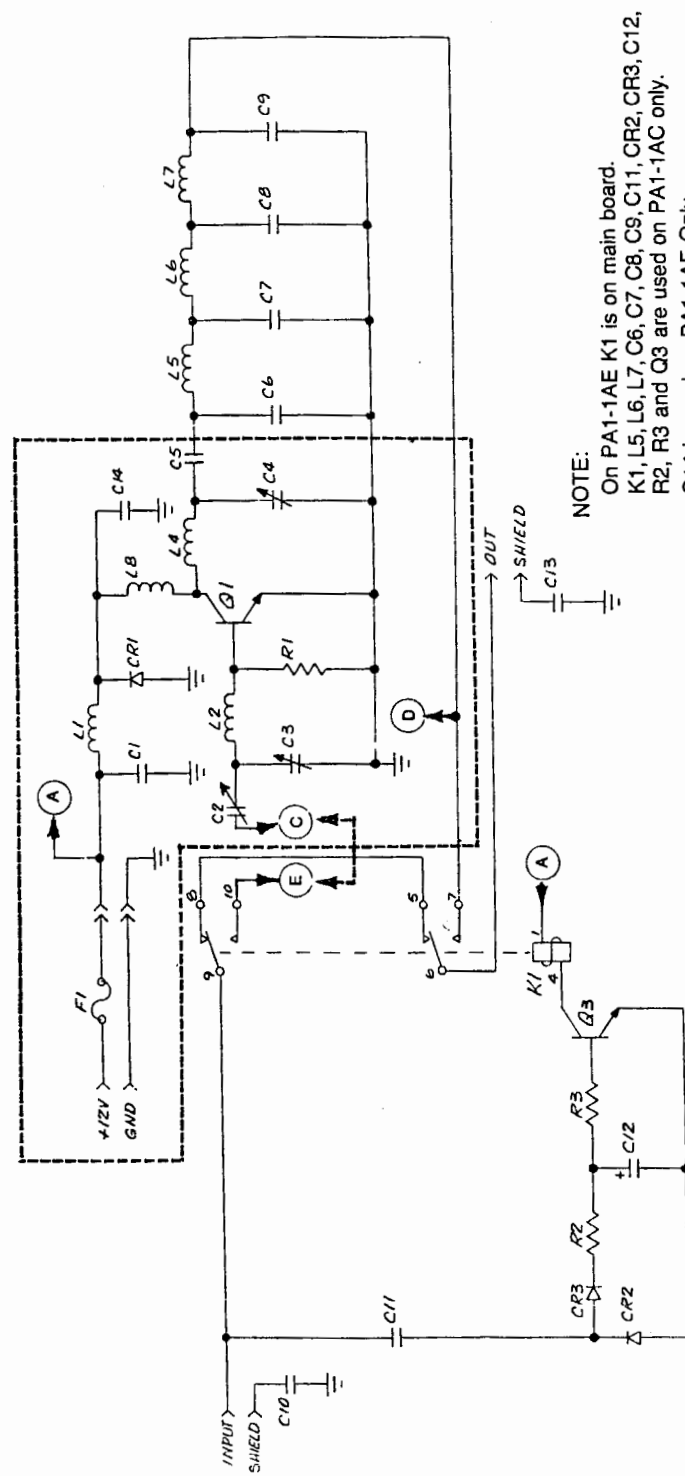
TPL Communication Inc.'s commercial model amplifiers are type accepted for operation under all parts of the Land and Maritime mobile/fixed services. However, it is the responsibility of the technician installing and tuning this amplifier to hold the proper class of FCC Commercial license and to be familiar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

It is also extremely 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 raised 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:

- (1) For all parts requiring the measurement of final input power, consult the section of the manual dealing with the Power Input/Output measurement.
- (2) The content of spurious signals generated by this amplifier (2nd, 3rd, etc.) harmonically is attenuated far 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 seven pole low-pass filter on the output of the amplifier.
- (3) The engineering design of this amplifier is such that all tuneable components can be de-tuned to create a decrease in the power output without generating spurious signals or oscillations in the amplifier.
- (4) 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 three band-pass filters 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 amplified power level.



NOTE:

On PA1-1AE K1 is on main board.
 K1, L5, L6, L7, C6, C7, C8, C9, C11, CR2, CR3, C12,
 R2, R3 and Q3 are used on PA1-1AC only.
 C14 is used on PA1-1AE Only.
 C2 variable on PA1-1AE Driver Only
On PA1-1AC Points C & E are Jumpered.

SCHEMATIC
 PA1-1AC and PA1-1AE (Driver Only)

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 positive grounded cars please notify TPL when you place your order to insure that a floating ground is used in the amplifier.

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

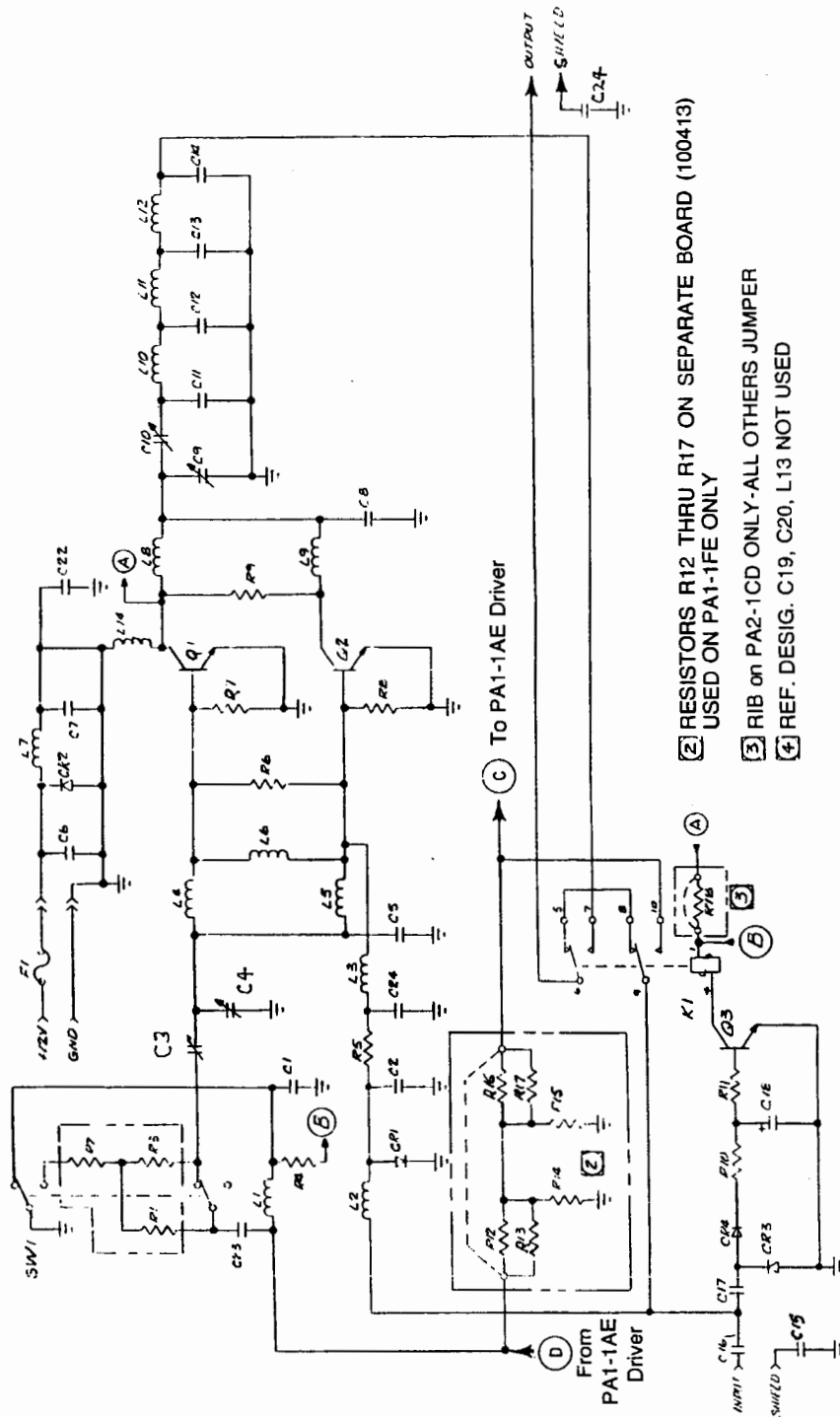
Hook up radio transceiver to "RF Input" Terminal and Antenna to "RF Output" Terminal on amplifier. It is sometimes easier with trunk-mounted antennas to simply cut the antenna lead in the trunk and place the amplifier in line at this point. The reason for this is that it is better to absorb the power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

It is recommended that the DC cable be tied down with a cable clamp as close to the amplifier as possible so that vibration or cable flexing will not cause loosening of the DC connector.

TUNE UP INSTRUCTIONS

These amplifiers come factory pre-tuned to the customer's requested frequency. However, should it be necessary to change operating frequencies, or should tuning be necessary, the following procedure is recommended.

- (1) Set the transceiver or walkie-talkie 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

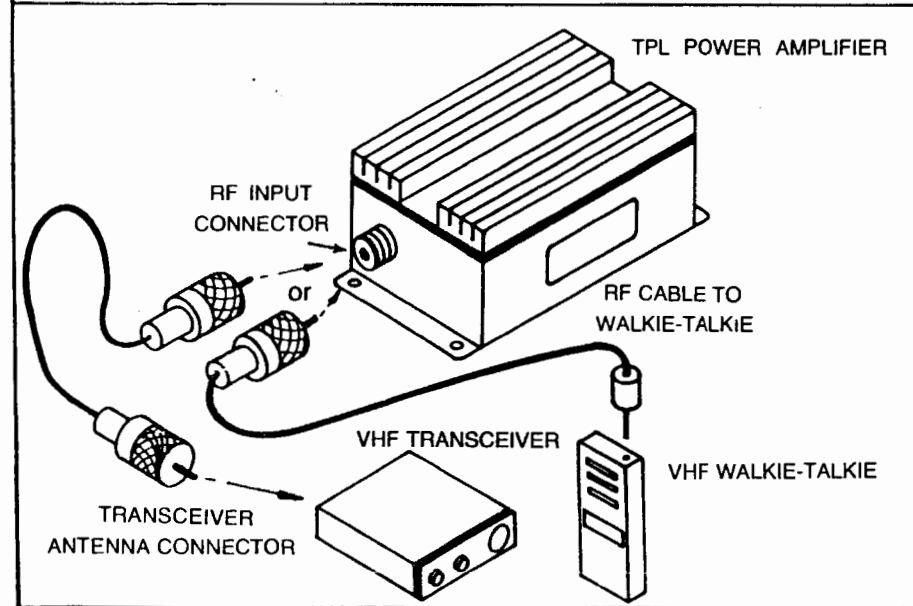
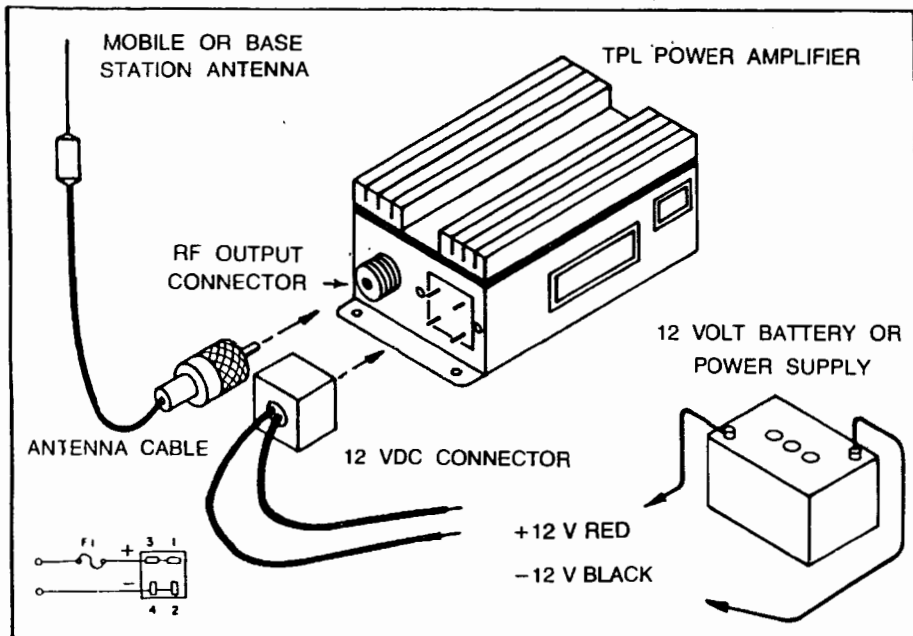


SCHEMATIC
PA1-1CF, PA1-1FE, PA2-1CD and PA1-1AE (Final Only)

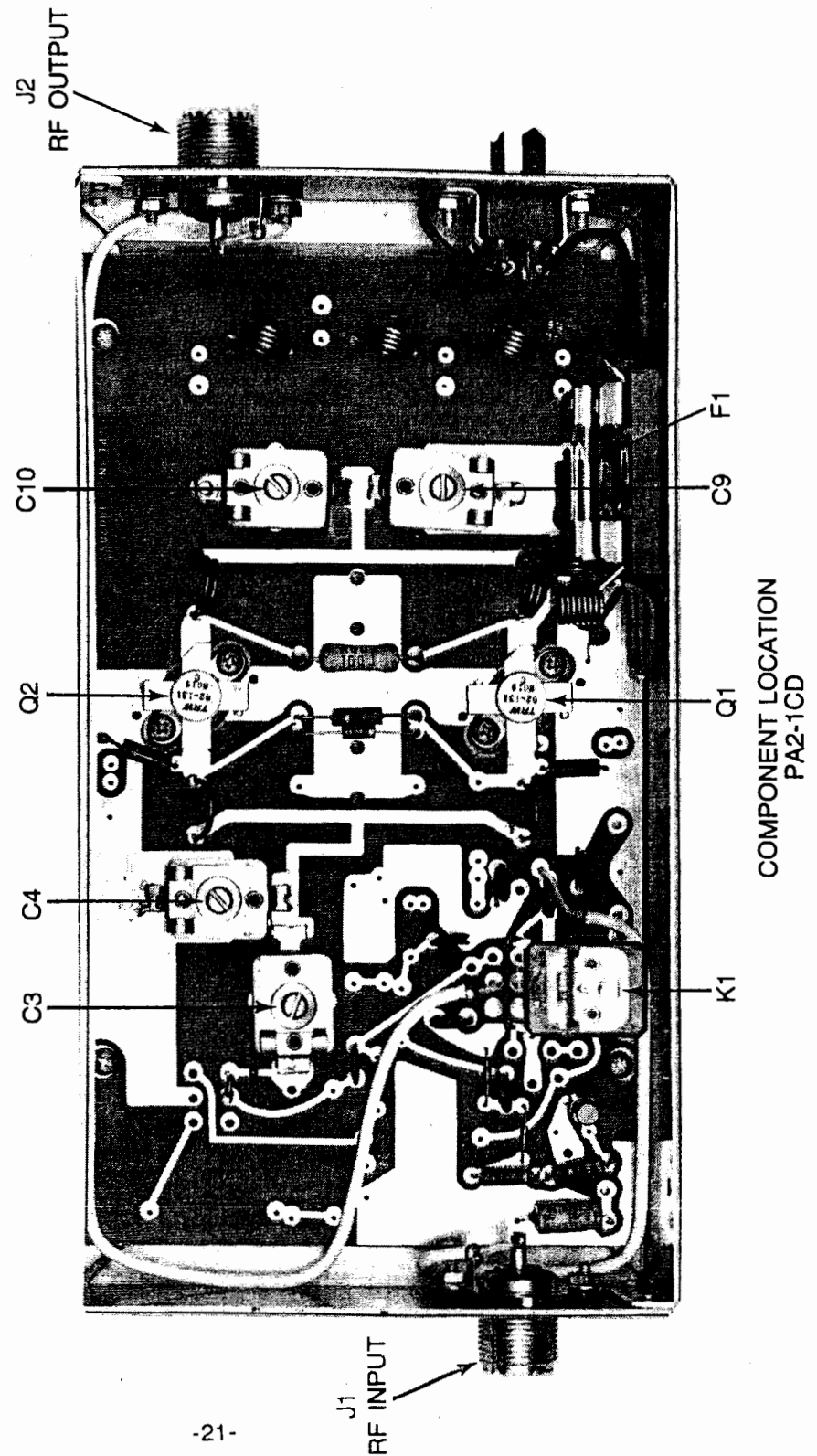
RESISTORS R12 THRU R17 ON SEPARATE BOARD (100413)
USED ON PA1-1FE ONLY

R18 ON PA2-1CD ONLY-ALL OTHERS JUMPER

REF. DESIG. C19, C20, L13 NOT USED

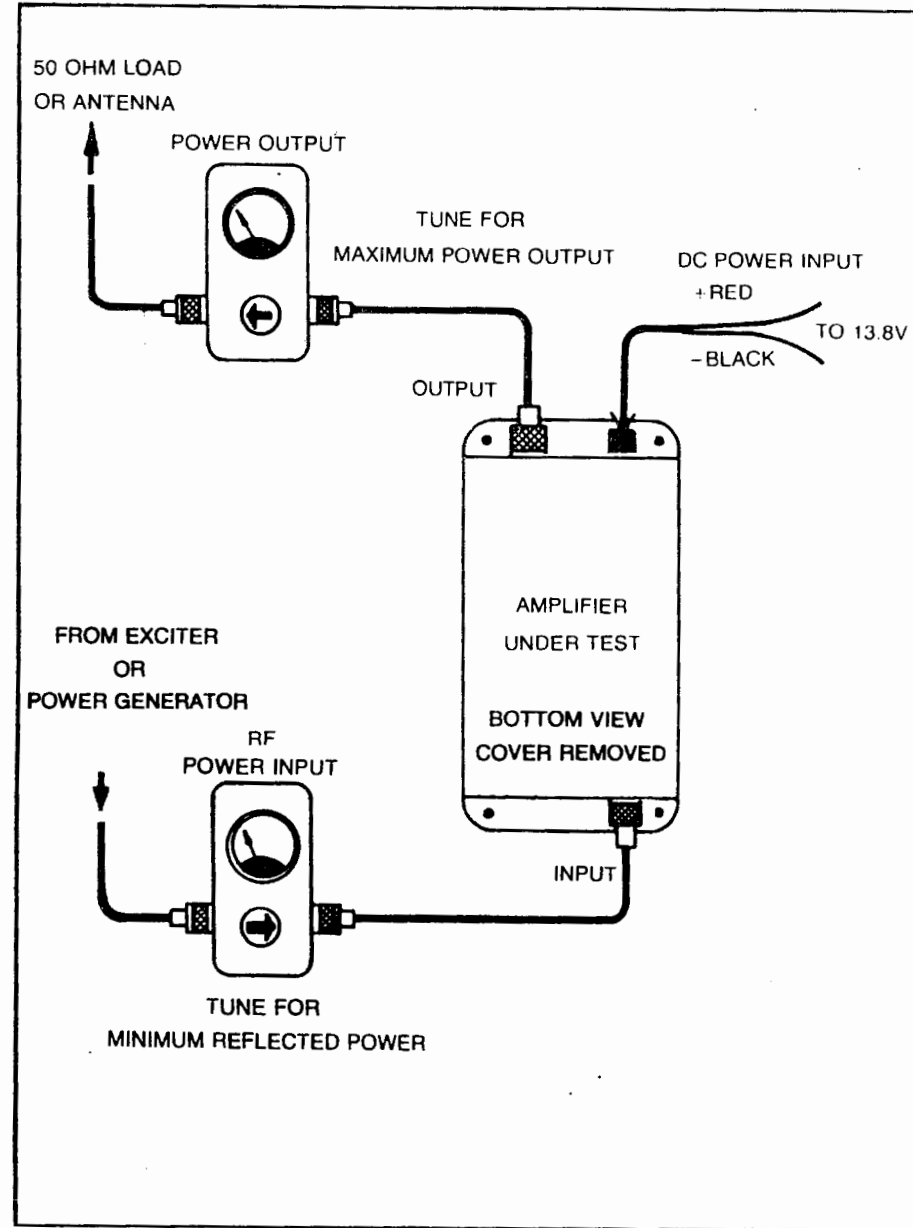


AMPLIFIER INSTALLATION



PA2-1CD
TUNE UP INSTRUCTIONS

STEP	ADJUST	FUNCTION	INSTRUCTIONS
1.	C10	Output tuning	Apply drive and tune for maximum output.
2.	C9	Output tuning	Apply drive and tune for maximum output.
3.		Output tuning	Repeat all steps until best performance is achieved.
4.	C4	Input tuning	Apply maximum drive and tune for minimum reflected power.
5.	C3	Input tuning	Apply maximum drive and tune for minimum reflected power.
6.		Input tuning	Repeat steps 4, 5 Tune for minimum reflected power.
7.			Repeat all steps until best performance is achieved.



AMPLIFIER TEST SET UP

ELECTRICAL PARTS LIST

CIRCUIT DESCRIPTION PA1-1FE, PA2-1CD, PA1-1AE Final

PA1-1AC, PA1-1AE DRIVER

This is a single stage amplifier which provides approximately 6 dB gain. The input is matched to 50 ohms by C2, C3 and L2. The output of Q1 is matched to 50 ohms through L4, C4 and C5.

PA1-1CF, PA1-1FE, PA2-1CD

These amplifiers are all two-stage units with the PA1-1FE and PA2-1CD giving approximately 7 dB gain and the PA1-1CF giving approximately 10 dB gain. The PA1-1AE provides about a 13 dB gain.

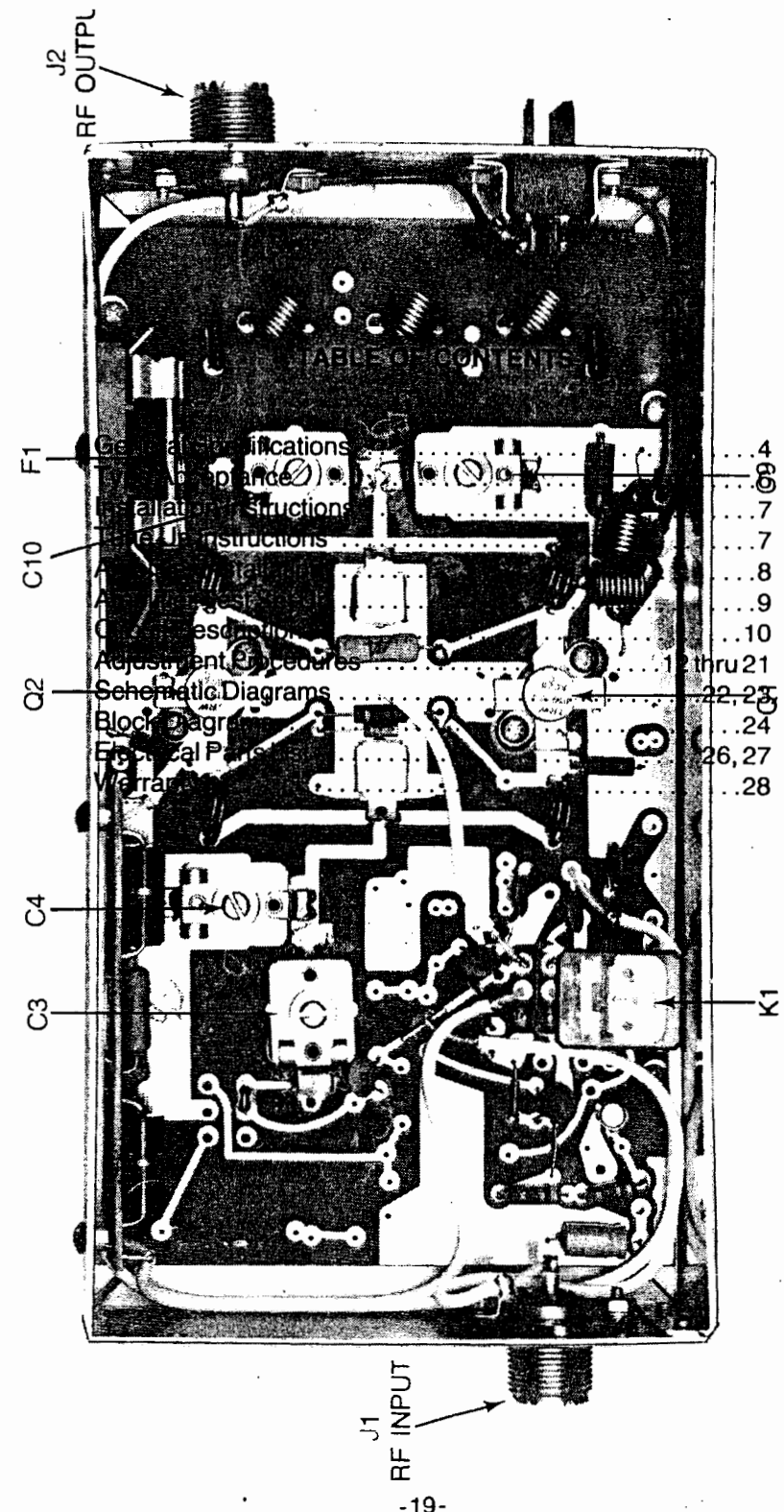
These units all have the same matching networks which consist of C3, C4, C5, and L4 and L5 to match Q1 and Q2 to 50 ohms and L8, L9, C8, C9 and C10 from Q1 and Q2 to 50 ohms.

Q3	B2-100	Factory Select 2N2222
CH1, R2 C1, R1, R2 L1, L2, L3	B3-112 B3-110 E1-110	MR751 MR148
L8, L9 L13	E2-104 E2-101 E2-105	5.6 uh 7 turns 3 turns 8 turns
C1, C2, C7, C15, C16 C21, C23, C24 C3 C9, C10 C4 C5 C8 C6, C22, C12, C13 C11, C14 C12, C13 C17 C18	A5-244 A1-119 A1-120 A1-120 A1-111 A1-110 A5-172 A8-144 A1-109 A8-146 A4-102	.01 uf Ceramic ARCO 462 ARCO 465 ARCO 465 300 pf 150 pf UNELCO .002 uf Ceramic 68 pf Mica 100 pf UNELCO 80 pf Mica 5 uf 25V Electrolytic
R1, R3, R9 R2, R4 R5 R6 R7, R8 R10, R11 R12, R13, R16, R17 R14, R15	C1-724 C1-752 C1-316 C1-336 C1-324 C1-388 C1-731 C1-759	10 ohms, 2W 150 ohms, 2W 4.7 ohms, 1/2W 3.3 ohms, 1/2W 10 ohms, 1/2W Factory Select 20 ohms, 2W 300 ohms, 2W

NOTE:

PA2-1CD

L10, L11, L12 are 4 turns
L8, L9 are 2 turns
L4, L5 is 1 turn
C11, C14 are A1-106 50 pf
C12, C13 are A1-108 75 pf



COMPONENT LOCATION
PA1-1FE

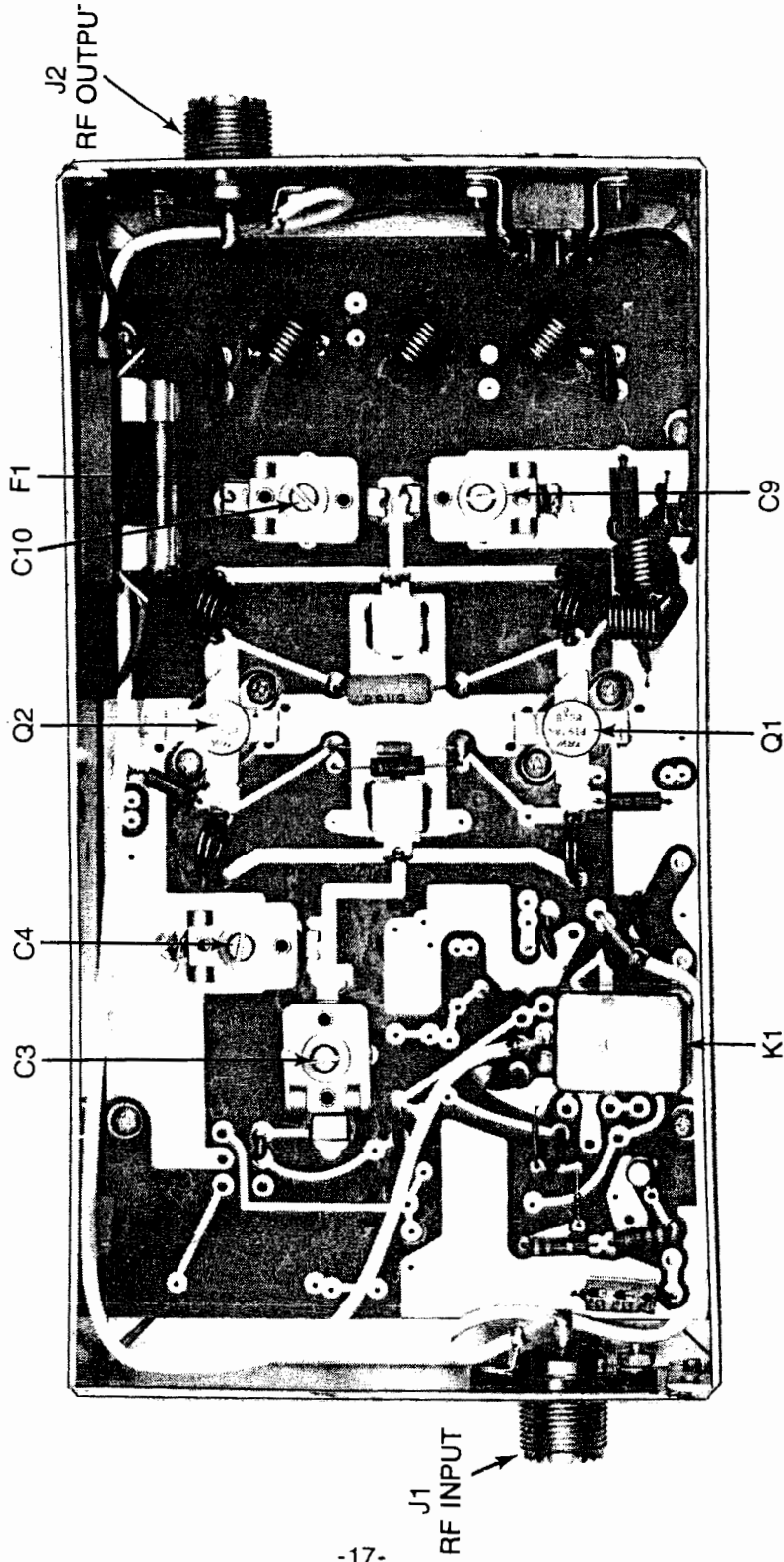
PA1-1FE
TUNE UP INSTRUCTIONS

STEP	ADJUST	FUNCTION	INSTRUCTIONS
1.	C10	Output tuning	Apply drive and tune for maximum output.
2.	C9	Output tuning	Apply drive and tune for maximum output.
3.		Output tuning	Repeat all steps until best performance is achieved.
4.	C4	Input tuning	Apply maximum drive and tune for minimum reflected power.
5.	C3	Input tuning	Apply maximum drive and tune for minimum reflected power.
6.		Input tuning	Repeat steps 4, 5 Tune for minimum reflected power.
7.			Repeat all steps until best performance is achieved.



PA1-1AC
TUNE UP INSTRUCTIONS

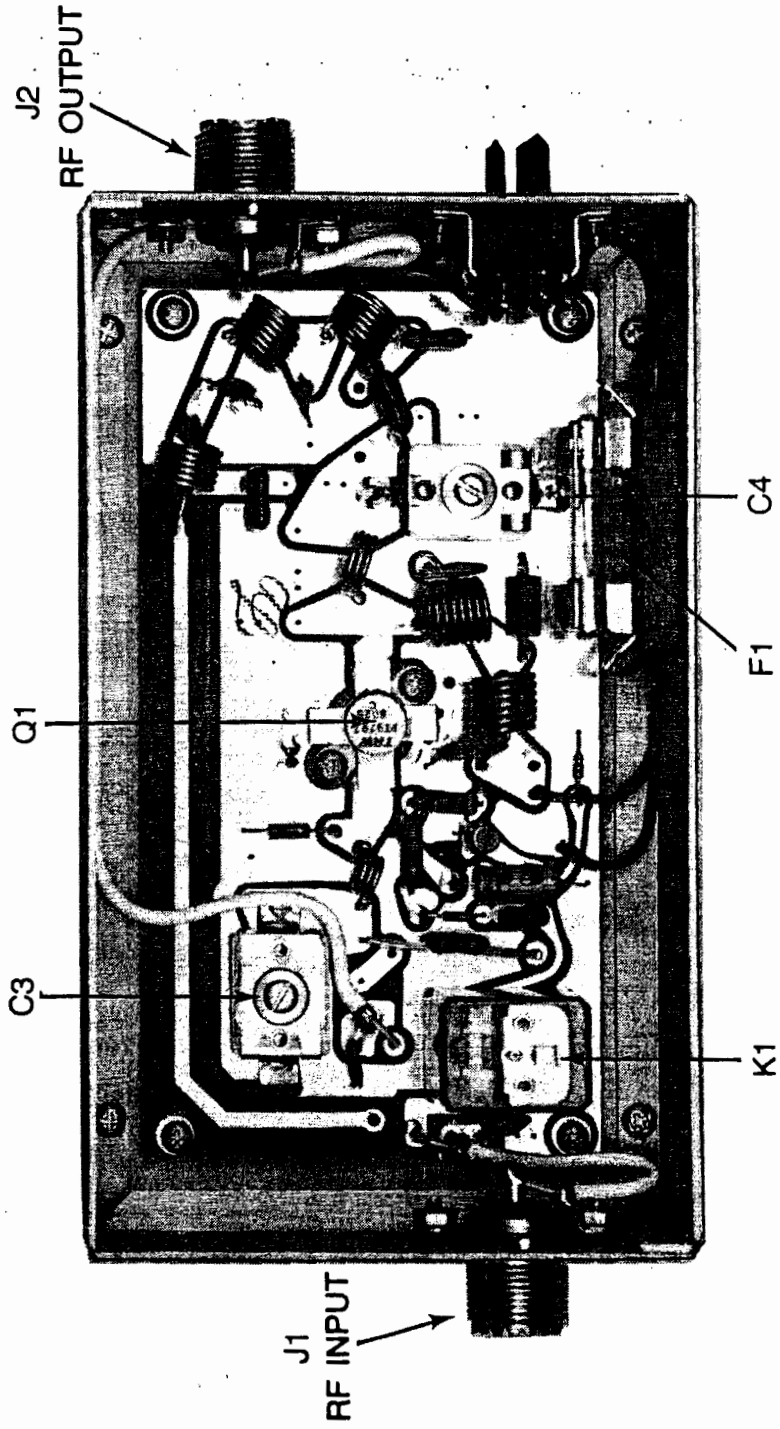
STEP	ADJUST	FUNCTION	INSTRUCTIONS
1.	C4	Output tuning	Apply drive and tune for maximum power out.
2.	C3	Input tuning	Apply minimum drive and tune for minimum reflected power.
3.			Repeat steps 1-2 until maximum power out and minimum reflected power is achieved.



COMPONENT LOCATION
PA1-1CF

PA1-1CF
TUNE UP INSTRUCTIONS

STEP	ADJUST	FUNCTION	INSTRUCTIONS
1.	C10	Output tuning	Apply drive and tune for maximum output.
2.	C9	Output tuning	Apply drive and tune for maximum output.
3.		Output tuning	Repeat all steps until best performance is achieved.
4.	C4	Input tuning	Apply maximum drive and tune for minimum reflected power.
5.	C3	Input tuning	Apply maximum drive and tune for minimum reflected power.
6.		Input tuning	Repeat, steps 4, 5 Tune for minimum reflected power.
7.			Repeat all steps until best performance is achieved.



COMPONENT LOCATION
PA1-1AC

TUNE UP INSTRUCTIONS

STEP	ADJUST	FUNCTION	INSTRUCTIONS
1.	C4	DRIVER BOARD Output tuning	Apply drive and tune for maximum power out.
2.	C2 C3	DRIVER BOARD Input tuning	Apply drive and tune for maximum power out.
3.	C10	Output tuning	Apply drive and tune for maximum output.
4.	C9	Output tuning	Apply drive and tune for maximum output.
5.		Output tuning	Repeat all steps until best performance is achieved.
6.	C4	Input tuning	Apply maximum drive and tune for minimum reflected power.
7.	C3	Input tuning	Apply maximum drive and tune for minimum reflected power.
8.		Input tuning	Repeat steps 6-7 Tune for minimum reflected power.
9.			Repeat all steps until best performance is achieved.

