

**APPENDIX B**  
**OPERATING/SERVICE/INSTRUCTION MANUAL**

Leadership by tradition.



**SERVICE  
MANUAL  
PA8-1AA  
RF POWER  
AMPLIFIER**

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L-PA8-1AA-S/L8

# POWER AMPLIFIER SPECIFICATION

## PA8-1AA

Frequency: 806-866 MHz  
Voltage: 11-16.6 VDC  
Input Power: 1-3 Watts  
Output Power: 13-25 Watts  
Mode: FM

PARAMETER	MIN	TYPICAL	MAX	CONDITIONS	METHODS OF MEASUREMENT
Frequency Range	806 MHz		866 MHz		
Standby current drain			10 mA	No Rx or TX signal	Current through DC supply line
Transmit current drain			5.0 A	3W input, 15W output	Current through DC supply line
Receive path attenuation			0.75 dB		Measured from RF output connector to RF input Connector
Carrier Output Power Rating @ 3W	15 Watts		25 Watts	3 Watts input	TIA/EIA-603 2.2.1
Carrier Output Power Rating @ 1W	12 Watts		25 Watts	1 Watt input	TIA/EIA-603 2.2.1
Transmitter Stability into VSWR	3:1				TIA/EIA-603 2.2.18
Reflected power			120mW	3 Watt input, power reflected back to the radio	

## **BRIEF THEORY OF OPERATION**

The PA8 - 1AA RF Power Amplifier is design to amplify an RF signal with a frequency range of 806 - 866 MHz from 1-3 Watts to 12-25 Watts on its output.

The amplifier is a part of a simplex system therefor in transmit mode the amplifier amplifies an output signal of a transceiver to an antenna. In the receive mode it creates a path from an antenna back to transceiver. There are no tuning components in the amplifier. It is designed to cover its specified frequency range.

## **CIRCUIT DESCRIPTION.**

The amplifier is comprised of a few main blocks ( Block Dia. #102167) - a brief description of each follows.

### **RF Sensor.**

This circuit senses a presence of an RF signal from transceiver on the input of the amplifier. When RF signal is detected by the directional coupler Z5, Z6 and an RF detector D6, D7 it activates transistors Q2 and Q1. The transistor Q1 applies a bias voltage (Vb) to the Power Amplifier module and Solid State Antenna Switch Relay.

### **RF Power Amplifier**

This stage provides approximately 10 db gain utilizing an RF hybrid module (U1) with input and output impedance of 50 Ohms. The attenuator ATT1 insures a proper drive level for the RF hybrid module U1. Pins 3 and 4 of U1 are connected to regulated voltage Vr from the Power Supply circuit and pin 2 is being controlled by voltage Vb from the Carrier Operated Solid State Relay. The voltage Vb establishes ON / Off state of U1. DC isolation is accomplished by L5, L6, L7 and by-pass capacitors C13 - C23. There are no tuning components. The Power Amplifier circuit is designed for specified broadband operation.

### **Low Pass Filter 1 (LPF1) and Low Pass Filter 2 (LPF2)**

The LPF1 (Z7, Z8, C24, C25, C35, C26) is a Chebyshev 5 pole low pass filter and LPF2 (Z9, C11, C12) is a 3 pole providing 35 - 47 dB and 15 - 25 dB respectively of attenuation of frequencies at the 2<sup>nd</sup> harmonic and above.

### **Carrier Operated Solid State Relay (Antenna Switch Relay)**

This circuit is directing the RF signal through the proper path in Tx and Rx mode. In Tx mode RF input signal from a transceiver is directed through forward biased PIN diode D1 to the Power Amplifier. The output signal from the LPF1 through also forward biased D4 is connected to RF output connector. In Rx mode there is no bias voltage applied to PIN diodes which creates a signal path through C10, Z4, Z3, C5, Z2, Z1 and C1 from antenna to transceiver.

### **Power Supply and Transient Voltage Suppression circuit**

The Power supply is providing the regulated supply voltage  $V_r$  to the rest of the circuitry. It consists of the low dropout voltage regulator U2 and high current pass transistor Q3. DC isolation of the  $V_{cc}$  voltage is accomplished through L8, C28, C34. C36, C27, C33 are by-pass. The D5 is a zener transient voltage suppressor which protects the RF Power Amplifier from high voltage, high energy transients.

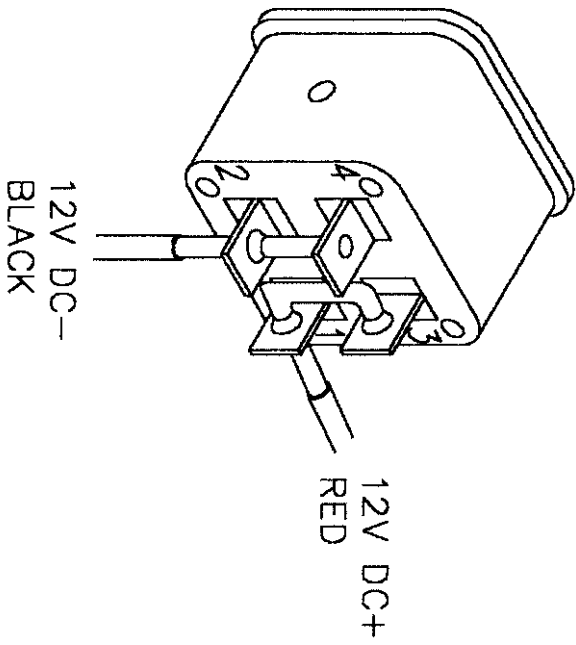


## **SERVICE**

**For service on this amplifier, contact:**

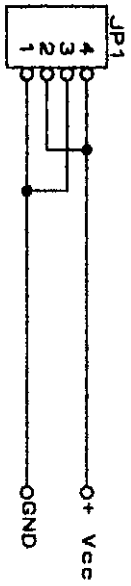
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TPL COMMUNICATIONS

TITLE		WIRING DIAGRAM DC POWER CONNECTOR OVERVIEW	
SIZE	DOCUMENT NUMBER	REV	
A	102162-2	-	
DATE	DECEMBER 1, 1998	SHEET	2 OF 2



T P L COMMUNICATIONS

Title

WIRING DIAGRAM DC POWER CONNECTOR

Size/Document Number

102162

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Date: December 1, 1998 Sheet 1 of 2

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