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Exhibit 8

HC/LE 1/26/99
TR/FC 11-25-98

January 14, 1999

Linda Elliott
FEDERAL COMMUNICATIONS COMMISSION
7435 Oakland Mills Road
Columbia, MD 21046

Re: **Reference #4902**

Dear Ms. Elliott

Following please find the service manual as requested in your fax dated November 19, 1998 for TPL Communications, Inc., FCC ID: **BBD3-2AB-A**. The original will be mailed this evening.

If you have any questions please do not hesitate to call.

Sincerely

DNB ENGINEERING, INC.

Sharon Gardner
Test Dept. Secretary

11-26-98
11-25-98

Leadership by tradition.



**SERVICE
MANUAL
AIRBAND
RS3-2AB-AIR
RS3-2AC-AIR
RF POWER
AMPLIFIERS**

PRELIMINARY

(Pending completion of final manual)

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L-RS3-2AB(AC)-S/A9

Table of Contents

POWER AMPLIFIER SPECIFICATIONS	2
RS3-2AB-AIR	2
RS3-2AC-AIR	4
Theory of Operation	6
Circuit Description	6
Amplifier Final Stage	6
Bias Circuit	6
Low Pass Filter	6
Directional Coupler	7
Carrier Operated Relay (COR)	7
Cooling Circuit	7
Splitter/Combiner	7
Appendix	8

POWER AMPLIFIER SPECIFICATIONS

RS3-2AB-AIR

Frequency: 118-136 MHz
Voltage: 24-28 VDC
Input Power: 4-6 watts
Output Power: 25 watts
Mode: AM

PARAMETER	MIN.	TYPICAL	MAX.	CONDITIONS	METHODS OF MEASUREMENT
Frequency Range	118 MHz		136 MHz		
Spurious & Harmonics		70 dBc			
Voltage	24 VDC		28 VDC		
Input/Output Impedance		50 ohms			
Power Gain	12 dB		14 dB		
Input Power Range	4 watts		6 watts		
Receive path insertion loss			<1.0 dB		Measured from RF output connector to RF input Connector
RF power output flatness	-1dB		+1dB	Between 118-136 MHz	
RF Output Power	25 watts CW			4-6 watt input	TIA/EIA-603 2.2.1
Modulation linearity (distortion)			6%	90% modulation @ 25 watts carrier power	

PARAMETER	MIN.	TYPICAL	MAX.	CONDITIONS	METHODS OF MEASUREMENT
Peak envelope power		90 watts PEP		90% modulation @ 25 watts carrier power	
Transmit current drain			3.0 amps	25 W CW output	Current through DC supply line
Standby current drain			220 mA	No Rx or Tx signal	Current through DC supply line
Duty cycle		50%			
Operating temperature	-30° C		+60° C		
Connector, Input		Type "BNC"		female I/O	
Connector, Output		Type "N"		female I/O	

POWER AMPLIFIER SPECIFICATIONS (cont'd.)

RS3-2AC-AIR

Frequency: 118-136 MHZ
Voltage: 24-28 VDC
Input Power: 4-6 watts
Output Power: 50 watts CW
Mode: AM

PARAMETER	MIN.	TYPICAL	MAX.	CONDITIONS	METHODS OF MEASUREMENT
Frequency Range	118 MHZ		136 MHZ		
Spurious & Harmonics		70 dBc			
Voltage	24 VDC		28 VDC		
Input/Output Impedance		50 ohms			
Power Gain	12 dB		14 dB		
Input Power Range	4 watts		6 watts		
Receive path insertion loss			<1.0 dB		Measured from RF output connector to RF input Connector
RF power output flatness	-1dB		+1dB	Between 118-136 MHZ	
RF Output Power	50 watts CW			4-6 watt input	TIA/EIA-603 2.2.1
Modulation linearity (distortion)			6%	90% modulation @ 50 watts carrier power	
Peak envelope power		180 watts PEP		90% modulation @ 50 watts carrier power	

PARAMETER	MIN.	TYPICAL	MAX.	CONDITIONS	METHODS OF MEASUREMENT
Transmit current drain			6.0 amps	50 W CW output	Current through DC supply line
Standby current drain			440 mA	No Rx or Tx signal	Current through DC supply line
Duty cycle		50%			
Operating temperature	-30° C		+60° C		
Connector, Input		Type "BNC"		female I/O	
Connector, Output		Type "N"		female I/O	

Theory of Operation

The VHF Airband RF Power Amplifiers are designed to amplify an Amplitude Modulated RF signal with a frequency range of 118 - 136 MHz, at four to six watts, to yield 25 W CW output for the **RS3-2AB-AIR** model and 50 W CW for model **RS3-2AC-AIR**. The amplifiers are operated as part of a half-duplex system; therefore, in transmit mode, they amplify the output signal of a transceiver to an antenna. In the receive mode, they create a path from the antenna back to the transceiver.

Circuit Description

The amplifiers described here are comprised of a few main blocks (refer to Block Diagrams #102203 and 102204, and Schematic Diagrams #1019778 and 1019778-1. A brief description of each follows:

RF Amplifier Final Stage

This stage provides approximately 13dB gain utilizing an RF power transistor Q1. The attenuator ATT1 ensures a proper drive level for this stage. Transistor Q1 is matched to 50 ohms at both the input and output. Coils L1 and L2, in combination with capacitors C2, C3, C4, C5, C6, and C7, are used to match the base of Q1 to 50 ohms.

Capacitors C10, C11, C12, and C13, as well as coils L5 and L6, are used to match Q1's collector to 50 ohms.

DC voltage is supplied through L4, with C15 and C16 functioning as RF bypass capacitors, and C34 used as a feed-through capacitor. Bias is provided by the Bias Circuit described in the next subsection.

Bias Circuit

The Bias Circuit provides the necessary bias to the base of transistor Q1. The bias current is set to provide a Class AB operation for maximum linearity with minimum distortion of the amplitude-modulated signal. Resistors R1 and R2, in combination with diode D1, supply an optimum bias. C8, C9, and C17 are the RF bypass capacitors. A high impedance of the choke L3 protects the bias circuit from an RF signal. C34 is a storage capacitor that insures a constant bias during a signal peaks.

Low Pass Filter (L.P.F.)

The L.P.F., comprised of L11, L12, L13, C24, C25, C26, C27, C28, and C19, is an Elliptic 7-pole low pass filter providing 50-60 dB of attenuation to frequencies of the second harmonic and above.

Directional Coupler DC1

The Directional Coupler DC1 utilizes a strip line design and provides approximately 30 dB of coupling of the forward and reflected power. These signals are rectified by Schottky diodes D2 and D3. DC voltages proportional to the forward and reflected power through feed-through capacitors C32 and C33 are available for external monitoring. Resistors R7 and R8 set a necessary level of V_{fwd} and V_{refl} . R5 and R6 are 50-ohm termination resistors; C30 and C31 are RF bypass capacitors.

Carrier Operated Relay (COR)

The COR is activated by RF output from the transceiver. It switches an RF signal through the power amplifier during transmission and around it during receiving.

Cooling Circuit

This circuit consists of thermostat switch SW1 and a DC-powered fan. As the temperature of the heat sink exceeds 45° C, the thermostat's contacts close, providing a DC voltage to the fan. The fan remains activated until the heat sink temperature falls below 45°C.

Splitter/Combiner (RS3-2AC-AIR only)

The input splitter (C18, C19, C23, L7, L8, and R3) and the output combiner (C20, C21, C22, L9, L10, and R4) are lumped equivalent of the Wilkinson 2-way splitter/combiner. Resistors R3 and R4 are balance resistors. Capacitors C19 and C20 are used for the fine tuning of the bandwidth.

APPENDIX

