OWNER'S
OPERATION
MANUAL

CUBIC MODEL 1500ZA
LINEAR AMPLIFIER

CUBIC
COMMUNICATIONS, INC.

OWNER'S OPERATION MANUAL

FOR THE

1500ZA LINEAR AMPLIFIER

ISSUE 2

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Welcome to the ranks of 1500ZA owners! This manual has been prepared to help you get the most pleasure from your Linear Amplifier. It contains information about installation, operating procedures, technical specifications, and maintenance. We urge you to read it from cover to cover before applying power to this Amplifier.

WARNING NOTE

DO NOT APPLY POWER TO THIS LINEAR AMPLIFIER UNTIL THIS MANUAL IS READ AND UNDERSTOOD.

LIMITED WARRANTY

SCOPE OF WARRANTY - FREE PARTS AND LABOR

All of the Cubic Communications, Inc. communications products are warranted against defects in material and workmanship. During the warranty period, Cubic or an authorized Cubic service station will provide to you free of charge both parts (except RF output transistors) and labor necessary to correct any defect in material or workmanship. Periodic checkups, voltage conversion are not covered by this warranty. All implied warranties, except to the extent prohibited by applicable law, shall have no greater duration than the warranty period set forth for this unit. No warranties whether express or implied, including warranties of merchantability or fitness, shall apply to this product after the warranty period has expired. Under no circumstances shall Cubic be held liable for any loss or damage, direct or consequential, arising out of the use of, or inability to use, this product.

WARRANTY PERIOD

Cubic communications products are warranted for ninety days from the date of the original purchase.

PURCHASER'S RESPONSIBILITIES

You, as the purchaser of a new Cubic communications product, must do the following to qualify for warranty service.

1. Retain your sales slip or other proof of purchase or send in your warranty registration card to avoid unnecessary difficulties in determining your eligibility for warranty work.
2. Notify your nearest authorized Cubic service center or Cubic as soon as possible after discovery of a possible defect with the model, serial, and warranty registration (if any) numbers and a detailed description of the problem, including details on the electrical connection to associated equipment and the list of all such equipment.
3. Make your Cubic product available to an authorized Cubic service center for inspection and approved warranty service or ship your Cubic product, in its original container or equivalent, fully insured and shipping charges prepaid, to Cubic.

PROPER MAINTENANCE AND USE

This warranty will not apply to any failure that Cubic determines is due to any of the following:

1. Improper maintenance or repair, including the installation of parts or accessories that do not conform to the quality and specification of the original parts.
2. Misuse, abuse, neglect, including improper installation.
3. Accidental or intentional damage.

1.0 INTRODUCTION

The Cubic Model 1500ZA is a linear R.F. power amplifier intended for H.F. use in the Amateur Radio Service. When driven by an appropriate exciter with 100 watts peak output power, the Cubic 1500ZA is capable of 1500 watts peak input power.

The 1500ZA is a multiband unit operating on 80, 40, 20 and 15 meters. It has a self-contained power supply, plate current, plate voltage and relative output metering circuits and bypass provisions to permit the antenna to be driven directly by the associated transmitter (exciter) without the amplification of the 1500ZA or the necessity to disconnect it from the antenna system. It's power transformer has a split primary winding that may be internally connected for 110-120 or 220-240 VAC operation. The unit features two 572B/T160L triodes in a grounded-grid configuration, and a wide-range Pi-network output circuit.

2.0 INSTALLATION

WARNING

DO NOT remove the cabinet or bottom cover when the line cord is connected to a voltage source. VERY HIGH VOLTAGES, that can cause severe injury or even death on contact, are generated in this unit. Before removing any covers, DISCONNECT THE LINE CORD from the power receptacle and WAIT AT LEAST ONE MINUTE for the power supply capacitors to discharge. When the covers have been removed, USE a shorting stick to discharge the power supply capacitors completely before touching any circuit components.

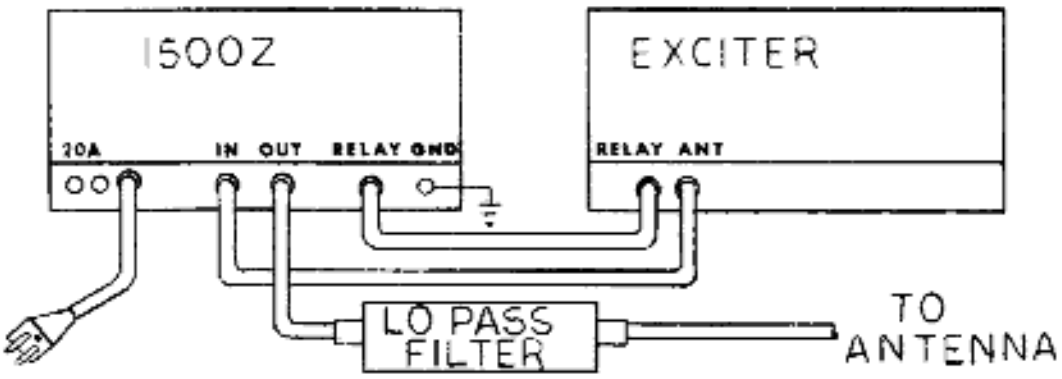


FIGURE 1, TYPICAL INSTALLATION

3.0 INSTALLATION - GENERAL

Connect a short coaxial jumper with appropriate connectors (PL-259 is standard) from the exciter output to the amplifier input. This cable should be either RG-58U or RG-8U, 50 ohm impedance and should not exceed six feet in length.

Connect a two-wire relay control jumper from the exciter to the amplifier. This jumper should have an RCA phone plug at the amplifier end and an appropriate connector at the exciter end. The relay in the 1500ZA requires a ground completion on the center pin of the phone jack for operation. Check your exciter to make sure it will provide this.

Check the jumpers at the rear of the power supply board in the 1500ZA for proper connection for the voltage you wish to use. The unit is shipped wired for operation on 110VAC to 120VAC, unless noted otherwise on the shipping carton. The jumper connections for changing primary voltage are shown on the schematic diagram at the back of this manual. The power cord is supplied with a connector for 115 VAC operation - if you wish to use 230 VAC, cut off the existing plug and install an appropriate connector on the cable. The color code on the power cable is standard - white and black are the "hot" leads, and green is the ground or "neutral" lead.

Connect a heavy ground wire on strap to the 1500ZA at the terminal provided. This must run to the closest good ground, i.e.: the nearest cold water pipe or a 6 foot ground rod driven into moist soil as close as possible to the 1500ZA. The run should be less than 15 feet if possible.

The 1500ZA does not have a built-in lowpass filter on the output. If one is found to be necessary, an external filter can be added into the antenna line.

4.0 OPERATION

A. There are three front panel tuning controls:

1. MHZ RANGE SWITCH. Sets the operating frequency range to one of four Amateur bands. This switch selects the inductance and capacity for the frequency range that will maintain the optimum L/C ratio. This switch also selects the input matching network. The panel legend indicates the lower band edge frequency.

2. PLATE. Tunes the input capacity of the Pi-network, calibrations are approximate band settings to expedite tune-up.

3. LOAD. Tunes the output capacity of the Pi-network, provides for an impedance matching adjustment to the antenna.

B. Power Switch

Controls AC power to the primary relay. When it is in the ON position, the light in the panel meter provides a visual indication that power has been applied.

C. Function Switch - Bypass/Operate

In the OPERATE position, the 1500ZA will provide linear amplification of the exciter output. In the BYPASS position, the output of the exciter is connected directly to the antenna.

D. Meter and Controls

The panel meter switch has three positions. When it is in the Ip position, the meter is reading the total plate current of the amplifier tubes. It therefore serves as a tuning meter to indicate tuning of the amplifier to resonance with a "dip" in the reading. It also indicates the loading of the antenna when the LOAD control is operated. When the switch is in the RELATIVE POWER position, the meter is measuring the voltage on the center conductor of the transmission line and, thus, is an indicator of relative power output. When in the Ep position, the meter is reading the voltage applied to the plated of the amplifier tubes.

5.0 TUNING INSTRUCTIONS

1. Set the BYPASS/OPERATE switch of the 1500ZA to the BYPASS position and the POWER switch ON. The meter lamp should light and the tube filaments should be on. The exciter is now connected directly to the antenna through the 1500ZA. Proceed with the tune up of the exciter in accordance with the manufacturer's instructions.

2. Make certain the exciter is not producing power and that its function switch is in the SSB position. Also, be certain that the carrier has been balanced out (if applicable to your exciter) and that the microphone gain is set to its minimum position. Set the meter switch to Ip position.

3. Key the exciter and note the 1500ZA panel meter reading. It should be 90 ma, $\pm$10 ma.

4. Preset the PLATE and LOAD controls in accordance with Table 1. Place the BANDSWITCH to a range that includes the frequency of the exciter output. All initial tuning should be accomplished at a lower power level to prevent damage to the final amplifier tubes. Key the exciter and adjust output power level using the carrier balance control or, if the exciter is a solid state unit place the function

switch to CW and adjust drive level to obtain a slight indication on the panel meter. Adjust PLATE tuning to obtain a dip on the meter.

TABLE 1

MHZ Range	Plate	Load
3.5	80	10 to 11 o'clock
7.0	40	10 to 11 o'clock
14.0	20	12 to 1 o'clock
21.0	15	2 to 3 o'clock

5. Place the 1500ZA meter switch to REL PWR. Key the exciter and adjust the PLATE and LOAD controls for maximum indication on the meter. Alternate adjustment of the PLATE and LOAD controls for a peak reading on the panel meter. Increase exciter drive level gradually during the tune-up to ensure that the linear amplifier is matched for maximum power transfer to the antenna.

6. When tuning-up on an antenna, you may at no time exceed 1 KW average power input. To tune for maximum peak power input, use a dummy load such as the Heathkit Cantenna. When properly tuned in this fashion, with 100 watts of drive, plate current should be about 800 ma, plate voltage should be about 1600 volts and the power output about 750 watts.

7. After completion of the tuning instructions, place the exciter in SSB and advance its microphone gain control for a peak reading of 275 ma on the 1500ZA panel meter while speaking into the microphone.

CAUTION

Exercise great care in setting the microphone gain control. It is quite easy to produce higher meter readings but flat-topping and distortion will result.

6.0 TECHNICAL SPECIFICATIONS

A. Frequency Coverage

3.5 - 4.0 MHz (80 meters)
7.0 - 7.3 MHz (40 meters)
14.0 - 14.35 MHz (20 meters)
21.0 - 21.45 MHz (15 meters)

B. Power Ratings

SSB: 1500 watts peak input with 100 watts peak drive power.

CW: 1000 watts input at 60-70 watts drive power.

C. Spectral Purity

All harmonics are down at least 43dB from full peak output on all bands.

D. Output Impedance

50 ohms nominal 2.0 to 1 SWR maximum.

E. Input Impedance

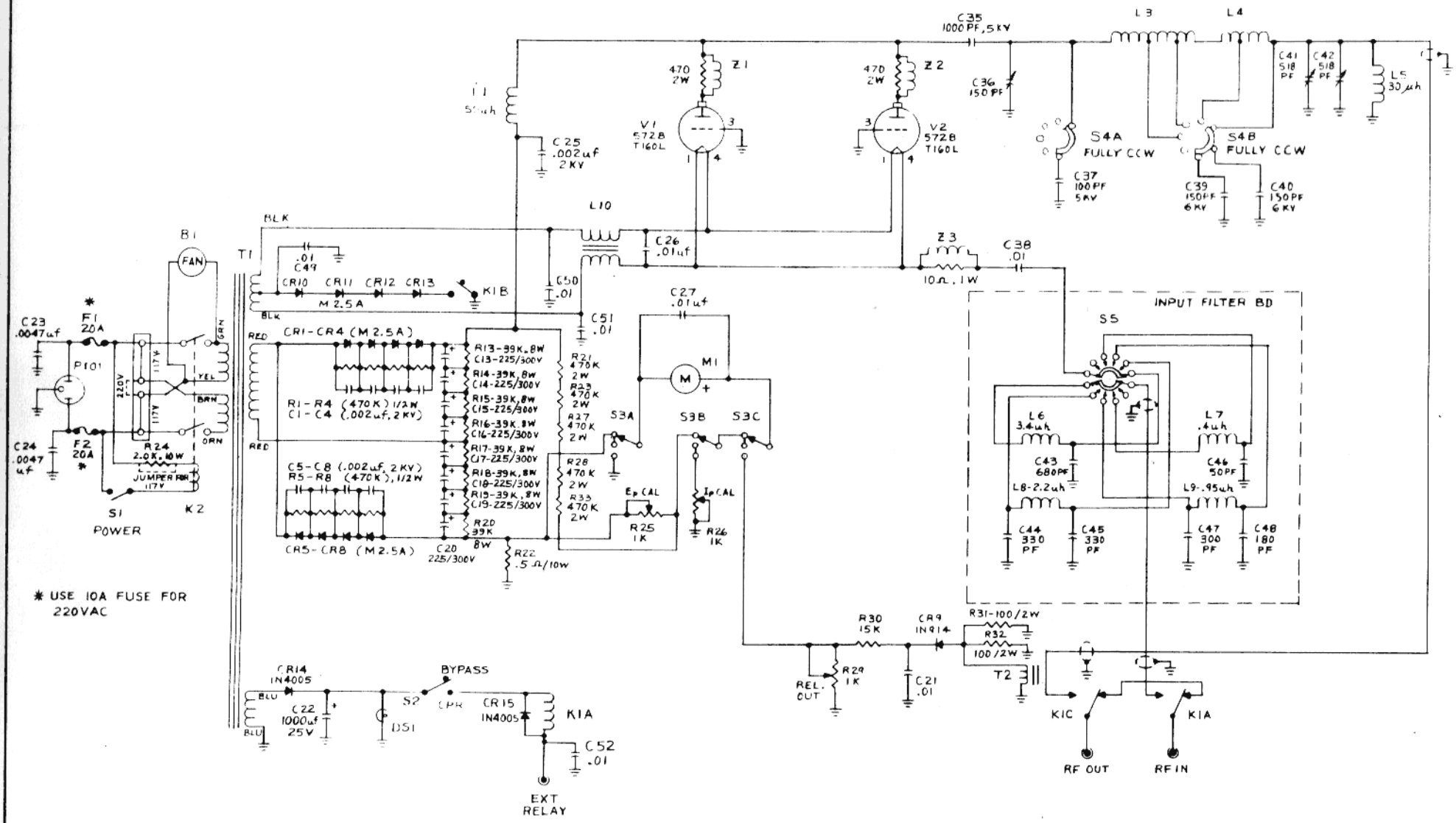
50 ohms nominal 1.5 to 1 SWR maximum.

7.0 MAINTENANCE

Little maintenance will be required for the 1500ZA Linear Amplifier. The 572B/T160L tubes, when operated according to the instructions in this manual, will provide thousands of hours of service. Deterioration of a tube will be indicated by a change in idling current or inability to draw normal plate current or both.

Other components are also operating conservatively, and well within nominal ratings. The electrolytic filter capacitors in the power supply are computer grade and have a much higher degree of purity and quality control than conventional types.

Ep = 1850 Vdc



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SCALE: NONE	APPROVED BY:		DRAWN BY AJG
DATE: 9-28-78			REVISED

SCHEMATIC – 1500 Z LINEAR AMPL

REV	DRAWING NUMBER
C	600-064