

**OWNER'S  
OPERATION  
MANUAL**

**SWAN MODEL 1500Z  
LINEAR AMPLIFIER**



OWNER'S OPERATION MANUAL  
FOR THE  
1500Z LINEAR AMPLIFIER

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Welcome to the ranks of 1500Z 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.

## 1.0 INTRODUCTION

The Swan Model 1500Z 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 Swan 1500Z is capable of 1500 watts peak input power.

The 1500Z 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 1500Z or the necessity to disconnect it from the antenna system. Its 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.

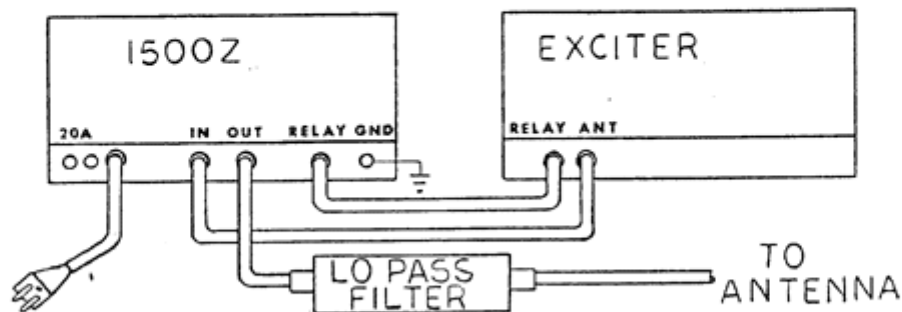


FIGURE 1, Typical Installation

### 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 1500Z 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 1500Z for proper connection for the voltage you wish to use. The unit is shipped wired for operation on 110VAC to 120 VAC, 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 1500Z 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 1500Z. The run should be less than 15 feet if possible.

The 1500Z does not have a built-in low pass 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 1500Z 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 1500Z to the BYPASS position and the POWER switch to ON. The meter lamp should light and the tube filaments should be on. The exciter is now connected directly to the antenna through the 1500Z. 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 1500Z 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 low 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 1500Z 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 1500Z 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 43 dB from full peak output on all bands.

##### D. Output Impedance

50 ohms nominal 2.0 to 1 SWR maximum.

##### E. Input Impedance

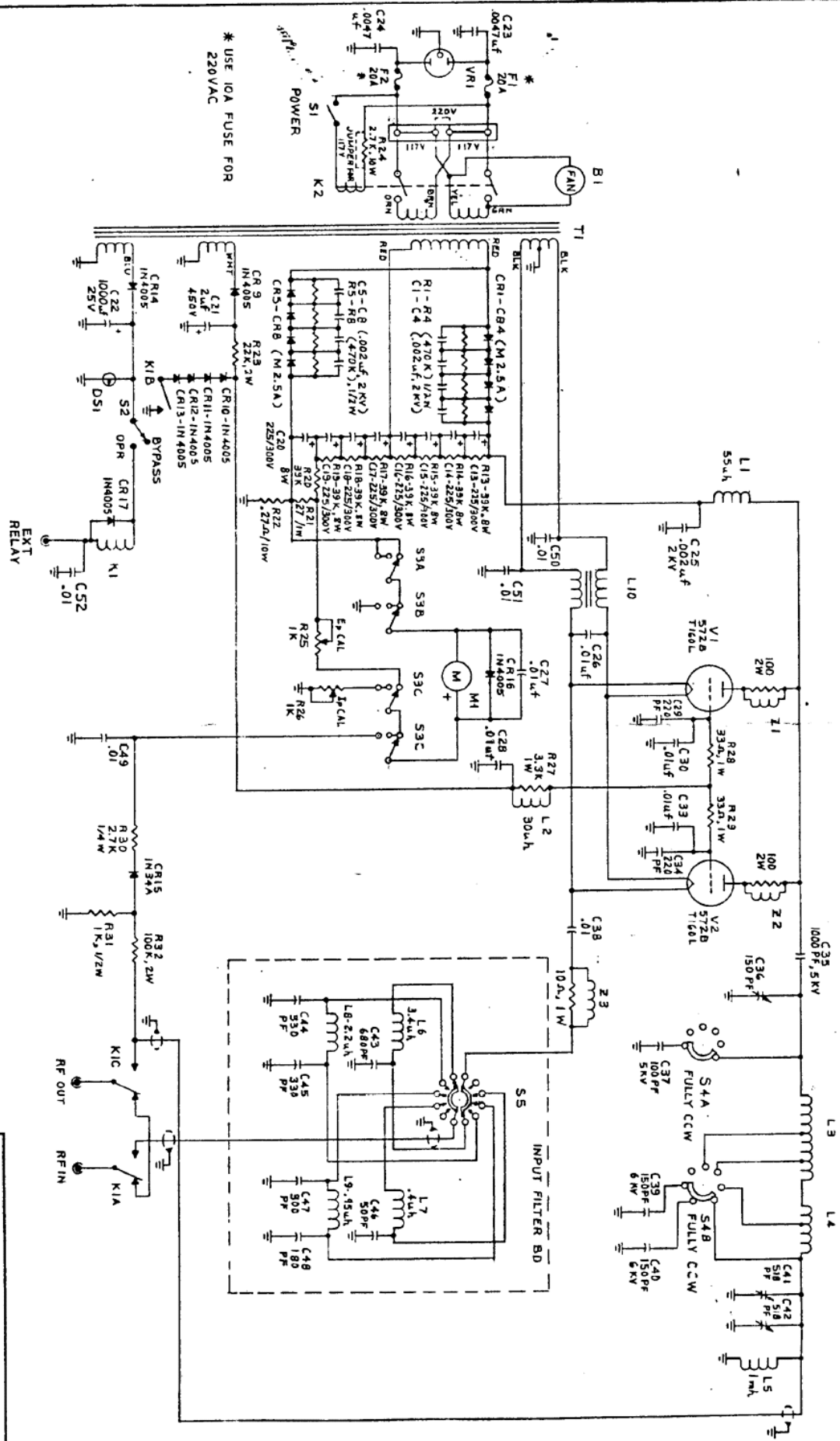
50 ohms nominal 1.5 to 1 SWR maximum.

7.0 MAINTENANCE

Little maintenance will be required for the 1500Z 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.





\* USE 10A FUSE FOR 220VAC

|                                |                                 |
|--------------------------------|---------------------------------|
| SWAN ELECTRONICS               |                                 |
| MODEL: NONE                    | APPROVED BY: <i>[Signature]</i> |
| DATE: 9-28-78                  | DESIGNED BY: <i>[Signature]</i> |
| SCHEMATIC - 1500Ω LINEAR AMPL. |                                 |
| REV: 1                         | DATE: 9-28-78                   |

#### OPERACION del AMPLIFICADOR LINEAL 1500 Z

- A) Los tres mandos del panel frontal son :
- 1º.- Conmutador margen en MHz. RANGO MHz. : Seleccione el margen de trabajo en una de las cuatro bandas de radioaficionado. Este conmutador selecciona la inductancia y capacidad apropiadas en cada banda para una relación óptima de L/C. También selecciona el acoplamiento de entrada.
  - 2º.- Placa. PLATE : Sintoniza la capacidad de entrada del circuito PI.
  - 3º.- Carga. LOAD : Sintoniza la capacidad de salida del circuito PI, acoplando la impedancia a la carga de la antena.
- B) Interruptor de potencia. POWER : Sirve para el encendido del equipo en la operación ON. Se iluminan las lamparitas del medidor del panel.
- C) Conmutador de función. En la posición OPERATE (Trabajo) se aplica al amplificador lineal la salida del excitador. En la posición BYPASS, la salida del excitador se aplica directamente a la antena.
- D) Medidor. METER : Este conmutador tiene tres posiciones. En la posición Ip, mide la corriente de placa de las válvulas. Se utiliza como indicador de sintonía del amplificador, marcando en su lectura un "DIP" (Caída de lectura brusca) cuando se obtiene la resonancia. También indica la carga de antena, cuando se actúa sobre el mando LOAD. Cuando el conmutador se sitúa en la posición REL-POWER (Potencia relativa), el medidor lee el voltaje de radiofrecuencia del conductor de la línea de antena, indicando la potencia relativa de salida. En la posición EP del conmutador, el parato indica el voltaje aplicado a las placas de las válvulas.

#### INSTRUCCIONES DE SINTONIA

- 1) Colocar el conmutador BYPASS/OPERATE en la posición BYPASS y el interruptor POWER en ON. Deben encenderse las lamparitas del medidor y los filamentos de las lámparas. El excitador queda conectado directamente a la antena. Sintonizar el excitador en la forma normal según las instrucciones del fabricante.
- 2) Asegúrese que el excitador no da salida de potencia y que su conmutador de función está situado en la posición SSB. También, que el mando de balance de portadora esté en cero y que la ganancia de micro esté al mínimo. Coloque el conmutador del lineal en la posición Ip.
- 3) Ponga en funcionamiento el excitador y observe la lectura del medidor del Lineal 1500 Z. La lectura debe de ser 90 mA  $\pm$  más menos 10 mA.
- 4) Reajuste PLATE y LOAD de acuerdo con la tabla L. Sitúe el conmutador de banda en el margen de salida del excitador. Todas las sintonías iniciales deben efectuarse con bajo nivel de potencia, para evitar daños en las válvulas del amplificador. Poner en marcha el excitador al nivel de potencia de salida, utilizando el balance de portadora, ó si el excitador es de estado sólido, colocando el mando en CW y ajustando el nivel de excitación para obtener una ligera indicación en el medidor del panel frontal. Ajustar el mando PLATE para obtener un "DIP" (caída de tensión) en la lectura del medidor.

TABLA 1

| Margen en MHz. | PLATE (Placa)          | LOAD (Carga)   |
|----------------|------------------------|----------------|
| 3,5            | 80                     | 10 a 11 horas  |
| 7              | 40                     | 10 a 11 "      |
| 14             | 20                     | 12 a 1 horas   |
| 21             | 15                     | 2 a 3 horas    |
| 28             | <i>POSICION SIN N°</i> | <i>3 a 4 "</i> |

- 5) Sitúe el conmutador del 1500 Z en REL-POWER. Ponga en funcionamiento el excitador y ajuste PLATE y LOAD para máxima indicación del medidor. Aumente la excitación gradualmente y vuelva a reajustar para acoplar el circuito y transferir el máximo de potencia a la antena.
- 6) Cuando sintonice con antena, es posible que la potencia no exceda de 1 KW. Para sintonizar la máxima potencia, utilice una antena o carga artificial como la HEATHKIT CATENNE. Cuando el amplificador esté correctamente cargado, la excitación será de 100 W., la corriente de placas alrededor de 800 mA, el voltaje de unos 1600 V. y la potencia de salida de unos 750 W.
- 7) Después de completar las instrucciones de sintonía, situar el excitador en SSB y avanzar la ganancia de micrófono para obtener picos de lecturas de 250 mA en el 1500 Z, cuando se habla ante el micrófono.

ADVERTENCIA

Maneje con cuidado la ganancia de micrófono. Es fácil obtener mas altos valores de potencia de salida, pero produciendo grandes distorsiones, interferencias y desparramamientos de la banda.

NOTA

No desmontar ni retirar las tapas del aparato sin desconectar el cable de de alimentación de red. En los circuitos interiores se hayan presentes MUY ALTOS VOLTAJES que pueden ser mortales. Después de desconectar el cable, esperar por lo menos un minuto para que se descarguen los condensadores, pasado este tiempo, ponerlos en cortocircuito con chasis, mediante un destornillador de mango aislado para asegurarse de su descarga total.