

I. GENERAL INFORMATION

I.1 Introduction

The type 7010 LINEAR AMPLIFIER is intended for use as a base HF SSB/AM transmitter, driven by a type 7021 HF SSB/AM EXCITER, housed in the same cabinet. Output powers of 1 KW PEP or 500W PEP versions are available (others to special order). The transmitters are either single channel or multi-channel (up to six), the single channel being manually tuned. The multi-channel transmitters are automatically servo-tuned on channel change. Both version are pre-wired for remote control.

When placed into service the run-up procedure is fully automatic eliminating operator errors in sequencing. The transmitter is completely protected against any antenna condition ranging from absolute short circuit to completely open circuit and attempted operation of the transmitter under such conditions cannot cause damage. In addition to full metering of essential parameters at the front panel, a continuous SWR indication is provided.

The cabinet rear door contains an air filter to ensure a dust free flow to the PA valve cooling system. The system is protected against air flow failure.

The linear amplifier is mounted on slides and may be extended from the cabinet for servicing. It is still operational in this position. Gate safety switching has been eliminated by careful construction. Adequate warning labels are affixed to panels under which lethal voltages are accessible.

The type 7010 may carry "CODAN" or "EILCO" brand names. It is type approved by the APO.

I.2 CAUTION - MODE Switch

The mode transmitted (A3H or A3J) is selected by a switch at the rear of the Exciter.

This switch must be returned to the correct position after tests or measurements have been performed.

1.3 Specification

The specification figures are for a 7010 Linear Amplifier driven by a 7021 Exciter. All figures refer to the 1KW version. Where 500W figures differ they are shown in brackets.

Frequency Range	2 - 12MHz (2 - 15MHz)
No. of Channels	6 maximum in multichannel version
Operating Modes	A3J normally upper sideband but lower sideband available A3H (compatible AM)
Frequency Stability	5 parts in 10^7 over the temperature range 0-60°C
Power Output	A3J 1000W PEP 2tone test (500W) A3H 250W nominal (125W)
RF output impedance	50 ohms nominal. The transmitter can be loaded into any impedance producing a VSWR of less than 2:1
Harmonic Emissions	At least 45 dB below PEP
Spurious Emissions	Spurious Emissions (not harmonics) separated from the carrier by more than 20 kHz : 50 dB below PEP
Carrier Suppression	At least 50 dB below PEP
Unwanted Sideband	At least 43 dB below PEP
Intermodulation Products	At least 40 dB below PEP
Hum and noise	At least 50 dB below PEP
Audio input level	The onset of compression may be adjusted for input signals between -20 dBm and +10 dBm into 600 ohms.
Audio input impedance	10 k ohm balanced.
ALC Range	An increase of 30 dB in input level above the compression level will produce less than 1dB increase in power output.
AF frequency response	$\pm$ 3dB 300 - 2800 Hz.

1.3 Cont'd

Controls	Power on/off HT on/off Function:- Normal/Off/Local/Tune Local control:- Standby/Transmit CHANNEL select Mode A3H/A3J at rear.
Metering Separate meters for	a) Cathode Current (Switched each tube & total) b) Tune (Switched PA grid & anode) c) Load d) Switched. Screen current (each tube) Major HT. voltage Minor HT. voltage Grid Bias voltage Load SWR Servo balance.
Protection	Overload trips are provided for. Low air pressure Low grid bias High plate current High SWR
Power requirements	220-260 v 50 Hz single phase. Other voltages and frequencies to order.
Power consumption	2000 V A (1300VA) 2 tone test. 500 V A standby
Environmental	Ambient Temperature C 0 to 30 30 to 60 Relative humidity 95% from 95% at 30°C to 50% at 60°C Atmospheric Pressure 700 milibars (7500' or 2500 metres) above sea level
Dimensions (cabinet)	20½"W x 23"D x 56"H 52cmW x 58.4cmD x 142.2cmH (19" standard panels).
Weight	
Finish Colours	Colours to BS381C:1964 Panels Sky No 210 in semigloss stoved enamel Cabinet Mid bronze green No 223 in armorhide vinyl Lettering Black.

LINEAR AMPLIFIER TYPE 7010

3. BRIEF DESCRIPTION

3.1 General

The LINEAR AMPLIFIER TYPE 7010 is in three main sections :-

- (a) AMPLIFIER (and integral power units) .(para 5.3 to 5.9)
- (b) HIGH VOLTAGE SUPPLY (paras 5.3 to 5.9)
- (c) POWER CONTROL UNIT. (para 5.1.2 and 5.2)

The AMPLIFIER occupies the top section of the cabinet and the other two units the bottom section.

An HF SSB EXCITER Type 7021 housed directly under the AMPLIFIER is an essential part of the complete transmitter.

3.2 Mechanical

The AMPLIFIER and EXCITER can be extended out from the cabinet on extending runners for servicing and adjustments. No gate switches are provided as access to lethal voltages can only be obtained by removing sub-panels which are clearly labelled. Provision is made for the fitting of a gate switch if locally required (see para 5.12).

The HIGH VOLTAGE SUPPLY is firmly bolted to the cabinet floor and should not be removed with the AMPLIFIER in the extended position.

The POWER CONTROL UNIT can be removed from the cabinet independent of the High Voltage Supply.

A centrifugal type air blower is fitted to the rear of the AMPLIFIER which provides cooling for the PA Valves. A pressure operated AIR FLOW SWITCH is fitted and if the air flow fails or reduces for any reason the unit is disabled.

3.3 Supplies

The HIGH VOLTAGE SUPPLY is designed to provide approximately +1800V DC for the PA Valve anodes, provision is made for monitoring the voltage and current supplied by the unit.

The POWER CONTROL UNIT provides a + 24V DC supply for relay operation and by a series of interlocks ensures correct operation of all the AMPLIFIER supplies. The unit houses the main circuit breaker and all fuses, the indicator neons for each supply and fault indicator lamps.

The AMPLIFIER houses the remainder of the supplies, namely the MINOR HT SUPPLY (regulated +350V DC and +300V DC), BIAS (-50 to -100 VDC) and FILAMENTS (6.1 and 6.3V AC).

3.4 Signal circuits

The DRIVER STAGE is a single valve Class A amplifier driven by the 100mW RF output from the exciter unit. The output is developed across the combined driver anode/PA grid tuned circuit. On multi-channel amplifiers the inductance tap and tuning capacitor is pre-selected to suit the channel frequency by relays switched by the diode matrix which is controlled by the exciter. The stage is manually tuned, assisted by a phase comparator circuit and tune indicator meter.

The PA STAGE uses four air-cooled valves in parallel operated in Class AB1. The cathode and screen currents of each valve are separately monitored and each screen voltage can be adjusted to "balance" the four cathode currents.

The PA TANK circuit on single channel amplifiers is manually tuned and loaded. On multi-channel amplifiers the tank inductor tap and additional loading capacitors are pre-selected to suit the channel frequencies by relays switched by the diode matrix. The tuning and loading capacitors are motor driven, servo operated from signals derived from a tuning phase comparator and a load comparator. Coarse control of the servo amplifiers is from relay selected SERVO PRESET potentiometers to ensure that the phase comparator does not accidentally tune to a harmonic of the channel frequency.

Feedback from the PA anode to DRIVER cathode maintains linearity and stability of the amplifier. A separate ALC voltage is fed back to the exciter unit to limit the PA dissipation during 'TUNE' and controls the PEP of the amplifier during normal operation.

An SWR detector is connected between the PA tank circuit and the output Socket. Signals from this circuit are fed to an SWR bridge circuit (on the LOAD, ALC & DET PCB) which drives the SWR meter and operates a SWR TRIP circuit should the load cause a high SWR reading. The SWR TRIP circuit will shut down the transmitter in the event of a fault.

The SERVO-AMPLIFIER system is described separately in para 4.