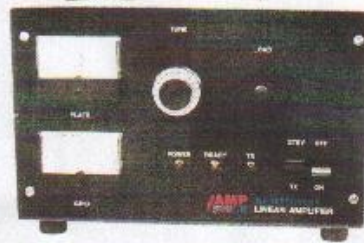


**LINEAR AMP UK**

## 2m & 6m DISCOVERY LINEAR AMPLIFIER



The Discovery is a self-contained power amplifier which is designed to give the full legal limit at the aerial, allowing for feeder losses.

The amplifier uses the Eimac 3CX800A7 high mu triode, which has a valve anode dissipation of 800 Watts. The unit has its own self-contained power supply which is fully protected. Specification:-

<b>Power</b> 800 Watts with 25 Watts of drive	<b>Max O/P</b> 1 kW PEP with 35 Watts of drive
<b>Input</b> 1500 Watts input DC at 25 Watts drive	<b>Supply</b> 220 - 240 V AC, 50 - 60 Hz @ 8 Amps

The new 2m and 6m Discovery are designed for the serious DXer who wants long distance QSO's on 144 and 50 MHz. The 3CX800A7 has been chosen for its very high stability and its capability of giving 400 Watts O/P with only 10 Watts of drive.

- The amplifier is fan cooled with an Airflow 33BTFL fan which is quiet and very efficient. The O/P of the amplifier is a tuned cavity to give maximum efficiency on 2m (on 6m the O/P is a Pi - L network)
- Full metering of Plate input and Grid current are provided on the front panel along with LED status lights to give present Tx/Rx mode.
- A 3 min timer is incorporated to give a delay on switch-on to ensure that the valve cathode is thoroughly warmed up.
- The power supply incorporates an ILP toroidal transformer which has been used in our HUNTER HF amplifier for the last 5 years with not one failing on us, into our voltage-doubler power supply board to give 2500 Volts.
- The amplifier is housed in a strong newly designed cabinet for easy operation whether at home or on a Field Day site etc.

Dimensions:- 13in (330mm) wide...8.75in (220mm)...16in (410) deep



**2m (with 1kW coaxial relay fitted as standard)**

**6m (optional relay as above may be fitted as extra)**



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**2m DISCOVERY  
LINEAR AMPLIFIER**

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Operating Manual

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1. Specifications
2. Introduction
3. Installation
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5. Operation

## CAUTION

**There are dangerously high voltages inside the amplifier when the power is switched on. DO NOT remove the covers unless the power has been disconnected and sufficient time has elapsed for the capacitors to discharge.**

## NOTE

The 2m Discovery is capable of a greater power output than the CW rating shown in the specifications. In order to achieve the stated PEP output, the amplifier must be capable of operating CW at the same level for short periods. Do not try to operate the amplifier at greater than the recommended level.

If the amplifier is operated for long periods at levels greater than the recommended ones, then damage may occur. This applies particularly to the 3CX800A7 valve, so great care should be taken not to exceed 600mA plate current or to drive with more than 25W continuous wave drive. Also care should be taken not to exceed 1.5 : 1 SWR.

## 1. SPECIFICATIONS

Function.....	The 2m Discovery is a desk top linear RF amplifier with a nominal output of 1000 Watts covering the range 144-146 MHz for Amateur Radio use.
Type of Emission.....	SSB/FM/CW/AM/RTTY
Dimensions.....	13in wide x 8.75in high x 16in deep 330mm x 220mm x 410mm
Weight.....	25kg
Output power.....	1000Watts PEP, 750W CW
Gain.....	15dB nominal
Power requirements.....	230VAC at 15Amps, 50/60 Hz
Duty cycle.....	Full O/P with normal amateur service
Cooling.....	Forced air cooling
Frequency coverage.....	144 to 146 MHz
Input impedance.....	50 Ohms with tuned I/P circuit
Valve.....	single 3CX800A7
Harmonics.....	3rd harmonic: better than -35dB
Plate Voltage.....	SSB: 2200 to 2600 VDC
Cabinet.....	All made from Zintec (incl. RF box)
Antenna relay.....	12VDC antenna relays automatically transfer the driver to the antenna when in STBY or OFF. Standard in-built are coaxial O/P relay and short throw I/P relay. The amplifier requires a relay contact in the driver to key the amplifier.
Metering.....	Plate current, Grid current
Protection.....	All circuits protected by fuses

## 2. INTRODUCTION

The 2m Discovery is a high quality linear RF power amplifier which is designed around an Eimac 3CX800A7 high mu triode in grounded grid configuration. The amplifier uses a 1/4 wave strip-line in the output circuit and a tuned input circuit. The amplifier is fan cooled to give you the ability to operate at full O/P power for as long as you wish. The recommended maximum drive is 25 Watts.

The 3CX800A7 must be allowed to warm up properly hence a 2 min. start up timer is fitted. When the amplifier is switched on, the WAIT light will come on. After the time has elapsed the WAIT light will go out allowing you to operate the PTT.

It is recommended that you use a Bird (or equivalent) power meter capable of measuring up to 1kW at the correct frequency.

Please read the instructions carefully before operating the equipment. RF amplifiers at this power level and frequency can be easily damaged by improper use. Please follow the precautions on page 1 of this manual.

The Discovery is fully self-contained and has three separate voltages:-

1. HIGH VOLTAGE which is 2400 V, the main voltage applied to the valve anode.
2. HEATER SUPPLY which is 13.8 V at 3 Amps.
3. CONTROL VOLTAGE which is 12 V used for pulling in the Tx/Rx relays and gives the LED the control condition of the amplifier.

### 3. INSTALLATION

#### SETTING UP

- a) Unpack the amplifier and check that it is undamaged. The carton should also contain a power cable, operating manual, phono plug (for relay switching lead) and spare fuses. Please retain the packing and box should it be necessary to ship it or move it to another location.
- b) Ensure you have a reasonable airflow around the site you have chosen to install your amplifier. Do not enclose the cabinet or restrict the airflow in any way. Try to avoid extremes of heat, humidity or dust in order to give many hours of trouble-free operation.
- c) Ensure ALL connectors to be used by yourself are of a sufficient electrical standard to carry the higher RF output generated by the amplifier. To properly tune the amplifier a high quality Wattmeter (eg. Bird throughline) should be used to measure the output and if possible a similar meter between the driver and the amplifier to correctly measure the input.
- d) NEVER attempt to operate the amplifier without first connecting an antenna or 50ohm dummy load. Check the SWR of the antenna with the amplifier in the OFF or STBY position and do not operate the amplifier if the SWR is greater than 2 : 1.
- d) Check that the front panel switches are in the STBY and OFF positions.

#### CONNECTIONS

- a) POWER CABLE. The amplifier is supplied with a 3-wire Mains cable terminated in an IEC connector to go into the socket on the rear panel. The other end is left free for you to connect whichever plug is suitable for your electricity supply. The supply must be 230 VAC, single phase, 50/60 Hz.
- b) OUTPUT COAX. Any good quality 50ohm coax capable of carrying up to 1000W at 144MHz is suitable. This needs an N-type connector to go on to the amplifier, and whatever connector is required for your Wattmeter.
- c) INPUT COAX. Good quality 50ohm coax with an N-type connector to the amplifier and a connector of your choice for the driver.
- d) RELAY SWITCHING LEAD. A phono plug is supplied for you make a lead to go into the PTT socket on the rear of the amplifier and connect to the antenna relay on your driver. This cable sends the keying signal from the driver to switch the amplifier to transmit. Do not apply any voltage to the amplifiers relay control as it has its own in-built power supply.

#### 4. OPERATING CONTROLS

##### FRONT PANEL CONTROLS

1. ON/OFF SWITCH..... Mains power on and off
2. STBY/TX..... Amplifier standby / operate
3. PLATE METER..... 0 - 1 Amp, monitors the plate current of the valve
4. GRID METER..... 0 - 100mA, monitors the grid current which should not rise above 60mA.
5. LOAD CONTROL..... Adjusts the loading of the strip line
6. TUNE CONTROL..... Adjusts the tuning of the strip line
7. POWER LED..... Shows that the amplifier is switched on
8. WAIT LED..... Lit until the valve has warmed up and then goes out when the amplifier is ready to use.
9. TX LED..... Shows when the amplifier is ON AIR

##### REAR PANEL

1. FUSE HOLDER..... 1.25" (30mm) 10Amp
2. MAINS..... IEC connector for Mains cable, 230VAC
3. TX..... N-type connector, coaxial INPUT to amplifier from driver.
4. ANT..... N-type connector, coaxial OUTPUT to antenna through a suitable power meter.
5. PTT..... Phono connector for relay switching lead

## 5. OPERATION

### SET-UP

Connect all the cables as previously described in the manual, then double check. When you are satisfied that everything is correct and the STBY/TX switch is on STBY, switch the amplifier on. The red LED should be lit and also the yellow LED. After approximately 2 min the yellow LED will go out, indicating that the valve has warmed up and is ready for operation. Now put the STBY switch to TX, which puts it into the operate mode. With no RF drive applied, key the amplifier and check that the Plate meter shows a standing current of about 80 - 100 mA. The green LED will be on when the amplifier is keyed.

### TUNE-UP

Now set your driver (2m transceiver) to about 10 Watts output, in either CW or FM mode, and using the two dials tune for maximum output on your power meter. This should indicate about 400 Watts output. The amplifier will give about 800 Watts RMS when 25 Watts of drive is now applied with very slight adjustments being necessary.

In the tune mode with 600 Watts O/P, the plate meter should rise to about half-scale.

**CAUTION.** Maximum Grid current should NEVER exceed 60mA.

On increasing drive, loading should be applied to keep the grid current at a minimum ie. about 20 - 30 mA.

The amplifier is now ready for operation.

### OPERATION

The mode of operation, SSB or CW, can now be selected and operate as normal. When the amplifier is in the STBY position the RF goes straight through from the transceiver to the antenna, and when it is in the TX position the amplifier comes into operation.

To key the amplifier, an earth on transmit is required from the transceiver (relay) to the PTT socket on the back of the amplifier. When the transceiver and amplifier are keyed, the green TX LED indicator on the front panel is lit.

During operation, keep a careful eye on the Grid meter making sure it does not exceed the 60 mA mark.

### **Grid Protection**

There is grid protection fitted to this model of Discovery. If the Load control is increased, the grid current increases. As the grid current reaches approximately 50mA the yellow LED on the front panel will flicker on and an audible 'clicking' will be heard, also it will not be possible to key the amplifier. To rectify this, reduce the Load until normal grid current is achieved.

If excessive grid current is reached, then the relay will lock and the yellow LED will remain on. To reset the amplifier, turn the Load control anticlockwise then put STBY/TX switch to STBY then back to TX. The LED should now have gone out and the amplifier is able to be keyed once more. Tune the amplifier correctly to achieve maximum output with minimum grid current.

### OPERATING PRECAUTIONS

To ensure safe and reliable operation please regard the following precautions:-

**HIGH VOLTAGES CAN BE LETHAL.** Never try to operate your amplifier with the covers removed. If it is necessary to work inside the cabinet, always disconnect the Mains supply and allow the capacitors to discharge fully.

Never operate the amplifier into a load or antenna with an SWR greater than 2 : 1

Always tune the amplifier for resonance using low drive at the operating frequency.

The components in the amplifier are designed to be used within the parameters of the specifications on page 2. Excessive drive giving output in excess of these specifications will shorten valve life and could affect the reliability of other components.

## **WARRANTY**

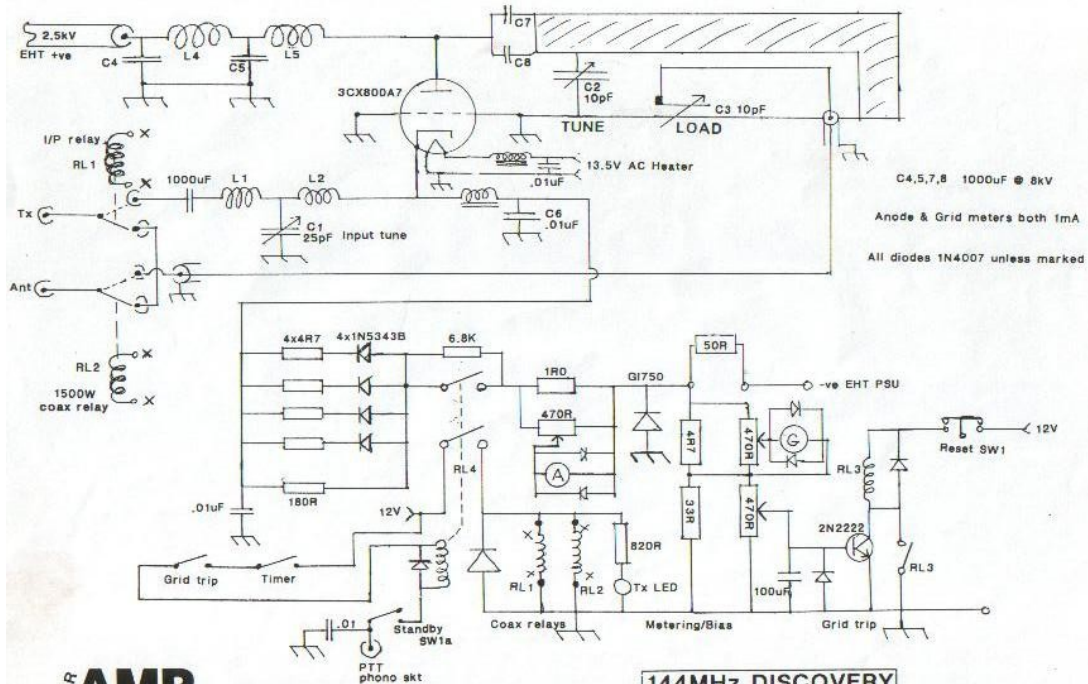
Linear Amp UK warrants to the original purchaser that this product shall be free from defects in material or workmanship for 12 months from the date of the original purchase. Valves are excluded from any warranty.

Notification should be given as soon as possible after discovering a possible defect. Carriage charges for any parts or units submitted for replacement or repair under this warranty must be paid by the purchaser.

Correct maintenance, repair and use are important to insure proper performance from this product. Carefully read the operating manual. This warranty does not apply to any defect Linear Amp UK determines is caused by (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 or improper installation; (3) accidental or intentional damage; (4) acts of God.

Linear Amp UK is not responsible for damage to other equipment or property or any other consequential or incidental damage of any kind.

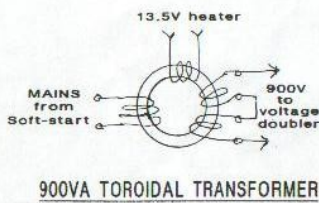
This warranty is not transferable from the original owner on sale of the unit to another.



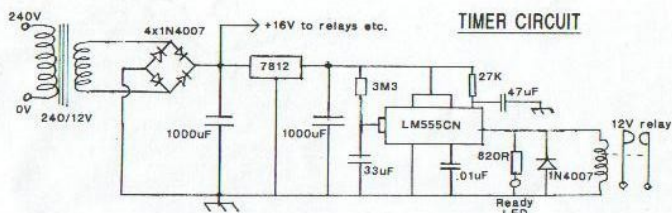
Field Head  
Leconfield Road, Leconfield,  
Beverley, E. Yorks. HU17 7LU

**144MHz DISCOVERY**

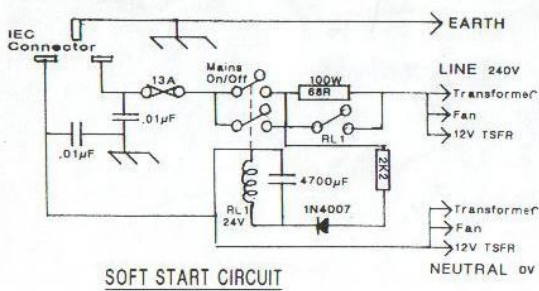
**3CX800A7 1kW Linear Amplifier**



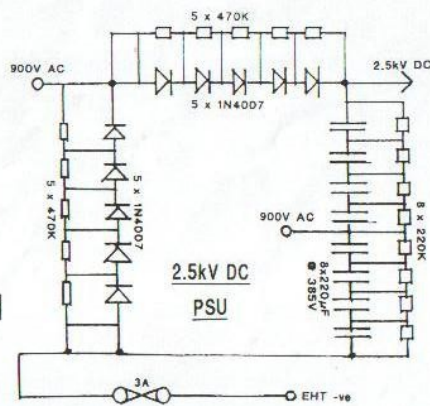
**900VA TOROIDAL TRANSFORMER**



**TIMER CIRCUIT**



**SOFT START CIRCUIT**



**2.5kV DC  
PSU**



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**DISCOVERY**