

## **AXIS 30**

### **Product Description**

The AXIS 30 (AS30) is designed as an emergency radio to meet the requirements for survival craft portable VHF.

The AXIS 30 (AX30) is a self contained product with built in battery compartment to house a lithium primary battery (LTB2).

There are no electrically connected accessories for the product.

### **Product Specification**

All radio operating parameters subject to the minimum performance criteria of ETS300-225.

EMC performance criteria subject to the minimum performance as specified in IEC945 (as modified by draft ETS300 828).

### **Manufacturers Specified Parameters.**

R.F. output power	0.5 watts ERP
Rated Audio output power	0.4 watts (1khz tone) into 32 ohms
Battery and voltage	8 volts

## **CIRCUIT DESCRIPTION AXIS 30**

### **INTRODUCTION**

The AXIS 30 transceiver is self contained on a single PCB assembly E03196. Control of the radio is via a simple keypad arrangement and PTT Key which control the actions of a simple microprocessor to provide the relevant control functions and data loading to the synthesiser.

### **RECEIVER**

The signal from the antenna passes through a low pass filter provided by L1, L2, L3 and associated capacitors. Isolation from the transmit signal is provided by a pin diode clamp D1. The signal then passes a dual stage band pass filter provided by L5, L6 with associated capacitors and is then fed to an rf amplifier provided by TR1. Further filtering is provided by the dual band pass filter provided by L7, L8 and associated capacitors.

The signal is then fed to the first mixer which is provided by TR2, the output of which is filtered at 21.4 MHz by L9 and associated capacitors and then fed into a 4 pole crystal filter arrangement provided by Xtal 1 and Xtal 2. The local oscillator signal for the mixer is fed onto the second gate of TR2.

After filtering the 21.4 MHz signal is fed to the dedicated IF chip IC1 which houses the gain stages second local oscillator and de-modulator coil. The frequency of oscillation of the second local oscillator is determined by Xtal 3 - at 21.855 MHz. Further filtering is provided by FIL 1 at 455 KHz. De-modulator is provided by coil L19. The audio output is fed from the IF chip to the audio stage, a second output from the IF chip filters the noise in a 25 KHz band width and is used to detect the presence of a signal and provide squelch operation.

### **AUDIO.**

The audio signal from the IF chip is fed via a single transistor gain stage TR26 through to a dedicated audio amplifier IC2. The necessary de-emphasis is provided by R2 and C61. Control of the volume is achieved via digital control from the microprocessor of a simple D to A converter provided by IC8b. IC8a provides a buffer stage and the output of this is then fed to the audio amplifier to a pin which acts as voltage control gain.

### **TRANSMITTER**

The output of the VCO is fed via amplifier and filter TR11 through to a series of gain stages developed by TR16, TR8 and final output stage TR7 which is acting in class C. The output is then fed via pin diode D4 through to the low pass filter and then to the antenna.

## **VCO AND FREQUENCY SYNTHESIS.**

The VCO is provided by TR14 with associated tuning coil L25 and associated capacitors. This operates at a fundamental frequency for transmit and is offset from the receive frequency by 21.4 MHz on the low side. The change of frequency is achieved by switching in different components using pin diode D7. Tuning of the VCO is achieved by varactor D6 with tuning voltage fed from the output of the synthesiser via filtering provided by R62, R63, C98 and C89. The synthesiser is provided by IC3 which uses a reference frequency of 9.6 MHz provided by TR15 with associated crystal Xtal 5. VC2 provides fine adjustment to this frequency.

The synthesiser is loaded with data from the microprocessor.

## **MODULATOR**

The built in microphone is connected to amplifier and filter circuit provided by IC7 and associated components. This circuit also provides a limiting function using feedback provided by the network around TR16 and TR17. The output of the final amplifier stage IC7a is fed via resistive potdown R18, VR5 and R83 to a varactor diode D5 which provides fine tuning of the VCO frequency thus providing modulation.

## **POWER SUPPLY AND SWITCHING**

Most circuits operate from 5 volts with the exception of the final RF output stage on transmit and the audio amplifier on receive. The power supply from the battery to the regulators is isolated by P channel mosfet TR24 which switches on when the on/off switch S8 is pressed. This provides power to the 5 volt regulators which in turn powers up the microprocessor which sustains the signal to the gate of TR24 by turning on TR21 and TR22.

In addition isolation of the battery supply voltage is provided by TR23 to the transmitter output stage and by TR25 to the receive audio.

## **MICROPROCESSOR**

The microprocessor IC6 works at a relatively low frequency - 4 MHz provided by Xtal 4. A reset at power on is provided by IC5 and the function of the microprocessor is controlled by switches S1 to S7.

## Certificate of Type Examination - Schedule of ancillary equipment

The applicant declared that the following units comprise the transceiver system listed on sheet 1 to form an operational radio of the system name given. Satisfactory details of these units were included in the technical file.

MAIN UNIT	Designation
VHF Transceiver	Axis 30

### OTHER UNITS:-

Lithium Battery Pack	LTB2
-----End of List.	

### NOTES:-

1. This unit is a hand-held emergency survival radio for life boat/raft use under the GMDSS.
2. It has been UK Type Approved to IMO Resolution A809(19) by test and evaluation to ETS 300-225, and granted certificate No DERA-TAR/10/98-01.

**Conditions of Issue of this certificate are printed overleaf.**

DEFENCE EVALUATION and RESEARCH AGENCY  
Maritime Navigation Systems  
Fort Cumberland Road  
Portsmouth. PO4 9LJ

Certificates of Type Examination  
Conditions of Issue

1. Each Certificate must be used in its entirety and not reproduced in part.
2. Each certificate will apply only to equipment identical with that which successfully underwent examination.
3. No unit of apparatus shall be advertised or labelled as "approved" or "certified" on behalf of the Defence Evaluation and Research Agency, the UK Government, or the European Union in any sense other than that it is a type that has been assessed as satisfactory against the EMC protection requirements.

The applicant must advise the DERA (as Notified Body No. 0191) of any future changes to the design or production of the equipment which might affect the equipment performance.

For minor modifications to the equipment, factory test results provided to the DERA by the manufacturer can be considered on a case-by-case basis. These test results will be reviewed by the DERA, in consultation as necessary, with the test facility which conducted the original Type tests on the equipment.

The DERA will advise the manufacturer if there is a need for further testing.

If an equipment manufacturer wishes to have the type Examined equipment designated under alternative names (e.g. agent/distributor's name and model number), a separate application should be completed and sent to the DERA quoting this certificate's reference number.