

CHAPTER 6

TECHNICAL DESCRIPTION

INTRODUCTION

1 This chapter provides an overview of the Mk VII Downmast Transceiver CTX-A9, and the associated Turning Mechanism, together with functional and technical descriptions for the electronic units.

DOWNMAST TRANSCEIVER

2 The downmast transceiver is designed for bulkhead mounting inside the vessel. It comprises a sheet metal rear plate which is formed to include the top of the unit. This is braced by two 'U' sections which protrude above and below the rear plate to provide the bulkhead fixing points. The main sub-units are bolted to the rear plate (refer to Figure 1).

3 The main sub-units are:

- (1) EMC Filter
- (2) Power Unit 45-677-124
- (3) Electronic Unit consisting of:
 - (a) 25 kW FET Modulator CTX-A369/CTX-A345
 - (b) Tx Microcontroller PCB CTX-A346
- (4) Logarithmic Receiver PCB CTX-A356
- (5) RF Head CTX-A384
- (6) Magnetron (CTX-A309) attached to the RF Head

4 Figure 2 shows the interconnections between the units.

5 The Electronic Unit has to be removed to gain access to the modulator and pulse transformer. The 25 kW FET Modulator (CTX-A369) consists of a 25 kW Modulator PCB (CTX-A345) mounted on a chassis, together with the high power FETs and a heatsink.

6 The EMC Filter is located at the right hand side of the unit and is fitted to the mounting that supports the Electronic Unit. The output terminal 1TB1 is also fitted to this mounting.

7 The RF Head is fixed to the top of the framework and is also supported on brackets.

8 Two fans are fitted to the Transceiver. One fan (CTX-A379) located at the base of the Electronic Unit provides general purpose cooling for the whole Transceiver. The second fan (45-683-158), fitted to the Electronic Unit heatsink, provides cooling for the modulator components.

9 A sheet metal wrap-around cover, secured in position by six captive screws, provides access to the front and sides of the unit. Cable entry is at the bottom of the unit. An earth bonding point is situated on the top.

POWER SUPPLY (45-677-124)

10 The Power Supply is located at the base of the Transceiver and is secured to two mounting brackets by four captive screws. It provides the +27V DC to drive the 300V modulator power supply in the 30 kW Modulator PCB. The +26V or +36V power supplies are not used (required for X band antenna motor only).

- (1) +27V
- (2) +15V
- (3) +10V (Heater Supply)
- (4) -15V

25 kW FET MODULATOR (CTX-A369/CTX-A345)

11 The 25 kW FET Modulator provides the following functions:

- (1) Drives the S-band 30 kW magnetron.
- (2) Automatically adjusts the parameters of the magnetron to compensate for the characteristics of different magnetrons, and to allow for change of characteristics due to ageing.

12 Full details of this unit are provided in the Unit Information at the end of this chapter.

TX MICROCONTROLLER PCB (CTX-A346)

13 The main function of the Tx Microcontroller PCB is to interface the Display Unit with the Transceiver. The PCB carries out the following functions:

- (1) Controls the transmitter via direct parallel connection or Controller Area Network (CAN) bus.
- (2) Provides control of the FET modulator.
- (3) Provides modulator trigger pulses of the relevant width and PRF.
- (4) Provides sync pulses for the receiver and display units.
- (5) Provides control of the turning motor and modulator cooling fan.
- (6) Provides the capability of using an external trigger from 300 Hz to 8 kHz, subject to pulse width. The trigger pulse must be positive from 0V.
- (7) Provides BITE information on the running parameters from the modulator.
- (8) Provides BITE information on the running parameters of the control board.
- (9) Controls the pulse width and PRF via a computer serial link.

14 Full details of this unit are provided in the Unit Information at the end of this chapter.

LOGARITHMIC RECEIVER PCB (CTX-A356)

15 The Receiver Assembly (CTX-A364) consists of a Logarithmic Receiver PCB (CTX-A356) mounted on a chassis with a screening cover. The Receiver Assembly is mounted on brackets attached to the main framework and the LNFE. The Logarithmic Receiver PCB provides the following:

- (1) RF input stages.
- (2) Logarithmic amplifier with switchable bandwidths.
- (3) Video detector and amplifier with three independent outputs.
- (4) Tune indicating and AFC functions.

16 Full details of this unit are provided in the Unit Information at the end of this chapter.

RF HEAD (CTX-A384)

17 The RF Head comprises:

- (1) Noise Source CAE-A213
- (2) Circulator 45-750-0008-001
- (3) Diode Limiter 45-646-608
- (4) Bandpass Filter 45-750-0009-001
- (5) Low Noise Front End CAE-A217, combining an RF amplifier, balanced mixer, electronically tunes local oscillator and IF head amplifier.

18 The Magnetron CTX-A309 does not form part of the RF Head, but functionally completes the RF path.

High Power (Tx) Signal Path

19 Typical pulse conditions for the 30 kW magnetron are:

- (1) Short pulse: 50 ns at 6 amps
- (2) Medium pulse: 180 ns at 8.0 amps
- (3) Long pulse: 800 ns at 8.0 amps
- (4) Very long pulse: 950 ns at 8.0 amps

20 The magnetron output is fed into port 2 of the circulator, and due to the rotational properties of the circulator, emerges at port 3 and out to the rotating joint.

21 A small amount of the magnetron energy leaks across the ferrite junction and into the diode limiter. The limiter in turn limits this energy to a safe level for the low noise front end to use as a tune signal.

Low Power (Rx) Signal Path

22 Signals, which are target returns, are received by the antenna and are fed to port 3 of the circulator, via the rotating joint. The signals emerge at port 1, and are fed to the diode limiter. Normally these signals are of low amplitude, and will not be limited by the diode limiter. The limited signals are passed through an S-band Bandpass Filter and are amplified by the LNFE and mixed at 60MHz, to produce IF for the receiver.