Issued June 1987

BR 8385A

VLF/LF MULTICHANNEL TRANSMISSION/RECEPTION SYSTEM

OUTFITS CFD

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By Command of The Defence Council

MINISTRY OF DEFENCE
SEA SYSTEMS CONTROLLERATE
D/SSC/DCSV/939/8385/87

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AMENDMENT RECORD

When an amendment to this handbook is incorporated the brief details required below are to be entered. The modification number will be shown on the Amendment Instruction page when the amendment is caused by an equipment modification.

AMENDMENT NO	AUTHORITY (P Series No)	DATE OF INSERTION	MODIFICATION NO	INITIALS
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Continued overleaf

AMENDMENT RECORD (continued)

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BR 8385A

VLF/LF MULTICHANNEL TRANSMISSION/RECEPTION SYSTEM

OUTFITS CFD

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(2) Category 8 - Modification Instructions (issued separately as a microfiche publication BRF 8385A(8)).

LIST OF ABBREVIATIONS

AGC	-	Automatic Gain Control
AF	-	audio frequency
AM	-	Amplitude Modulation
AWG	-	American Wire Gauge
BB	-	Baseband
BFO	-	Beat Frequency Oscillator
BW	-	bandwidth
CCITT	-	Comite' Consultatif International Te'le'graphique et Telephonique
Chan	-	channel
CLR	-	Clear
CSU	-	Channel Selector Unit
CW	-	Carrier Wave
D-CAL	-	Delay Calibrate
EC	-	Error Correction
ECF	-	Empty Channel Filler
EDAC	-	Error Detection and Correction
ERF	-	External Reference Fail
FDM	-	Frequency Division Multiplexing
FH	-	Frequency Hop
FSD	-	Full Scale Deflection
FRS	-	Frequency Reference Status
FSF	-	Fibonacci Synchronisation Fail
FSK	-	Frequency Shift keying
HATS	-	Harbour Acceptance Trials
IF	-	Intermediate Frequency
J	-	Jason
LCD	-	liquid crystal display
LED	-	light emitting diode
LF	-	Low Frequency
LH	-	left hand
MSK	-	Minimum Shift Keying
OOK	-	On/Off Keying
PCW	-	Precept Codeword
PEC	-	Panel, Electronic Circuit
PSU	-	Power Supply Unit
RC	-	Redundancy Coded
REF	-	reference
RH	-	right hand
RLF	-	Reference Loop Fail
SAMHADS		Submarine Automatic Message Handling and Distribution System
SATS	-	Sea Acceptance Trials
SD	-	Slow Data

LIST OF ABBREVIATIONS (continued)

TC - Terminal chamber
TCFS - Thermafit Cable Feedthrough System

V - Vallor
VLF - Very Low Frequency
VSWR - Voltage Standing Wave Ratio

SUB-CATEGORY 1A

CATALOGUE OF INFORMATION

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CHAPTER 1

SUMMARY OF DATA

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PURPOSE

1 Outfits CFD, installed in HM ships and submarines, provide selected tone outputs or V28 DC (6-0-6 V) data outputs to a broadcast reception system from three (maximum) integral receivers operating within a frequency range of 10 kHz to 200 kHz.

INCORPORATED EQUIPMENTS

2 Rack (with incorporated Terminal Chamber), NSN 5975-99-761-9470
Receiver, NSN 5820-99-723-3104
Channel Selector Unit, NSN 5895-99-750-9019 (vertically mounted)
Channel Selector Unit, NSN 5829-99-253-4762 (horizontally mounted)

OUTFIT CONFIGURATIONS

Outfit CFD(2)

3 Outfit CFD(2) comprises two racks with Terminal Chambers, two VLF/LF Receivers and a vertically mounted Channel Selector Unit, NSN 5895-99-750-9019.

Outfit CFD(4)

4 Outfit CFD(4) comprises three racks without Terminal Chambers, three VLF/LF Receivers and a horizontally mounted Channel Selector Unit NSN 5829-99-253-4762.

BRIEF DESCRIPTION

5 Each rack contained within an Outfit CFD incorporates a VLF/LF Receiver for reception of MSK, FSK, FSK+SD, FH, AM, CW and FDM modes of transmission. The Receiver is a self contained unit of modular construction and is controlled from two keyboards mounted on the detachable front panel.

6 In Outfit CFD(2) the four MSK 1 kHz tone on/off outputs or the single FSK 1 kHz tone on/off output or the V28 (6-0-6 V) DC data output from each receiver are interfaced at the associated Terminal Chamber and fed to the Channel Selector Unit (CSU). Switches on the CSU enable any tone or DC data output from any receiver to be selected on each of the four output lines to the broadcast reception system. In Outfit CFD(4), the outputs from each receiver are routed via Outfit YBX to the Channel Selector Unit.

7 The FDM audio based output from each receiver is also interfaced at the associated Terminal Chamber (or via Outfit YBX) and fed to the CSU. Hardwired links within the CSU enable the audio baseband output from one of the receivers to be selected for demodulation in the broadcast reception system.

EQUIPMENT CHARACTERISTICS

Receiver

8

Frequency range: VLF - 10 kHz to 30 kHz. LF - 30 kHz to 200 kHz.

Modes of operation:

(1) One channel of 50 Baud Minimum Shift Keying (MSK).

(2) Two channels of 50 or 75 Baud MSK simultaneously from a single carrier.

(3) Four channels of 50 or 75 Baud MSK simultaneously from a single carrier.

(4) One channel of 50 Baud Frequency Shift Keying (FSK): Frequency shift ±25 Hz.

(5) One channel of 75 Baud FSK: Frequency shift ±42.5 Hz.

(6) One channel of 50 Baud FSK with one channel of 1 Baud Slow Data (SD) superimposed (FSK + SD) using a 1 Hz total shift on each tone or 1 Baud SD on either tone without the 50 Baud data.

(7) One channel of 1 Baud Frequency Hopping (FH) with 1 hop or 3 hops per second.

(8) Up to 8 channels of Frequency Division Multiplexing (FDM) modulated onto a single suppressed carrier, each channel modulated onto a sub-carrier spaced at 170 Hz increments. One selectable channel is internally demodulated, but all channels are output as baseband signals for external demodulation.

(9) Amplitude Modulation (AM) for voice.

(10) On/off Continuous Wave (CW). Maximum speed 56 Baud (75 wpm).

Frequency tuning: Selected by numeral function and use keypads in 5 Hz frequency increments.

Intermediate freq: 247.5 kHz.

Reception channels: 63 channels for storing and recalling of selected parameters. Up to 10 channels allocated specifically for transmissions in constant use.
1 channel dedicated to last reception parameters in use.

Aerial inputs: 100 ohm balanced input with up to 3:1 VSWR at the tuned frequency.
High impedance for whip aerial.

AF Outputs: Four 1 kHz keyed tone data at 10 mW max. each.
Five 6-0-6 V dc data (ie CCITT-V28 operating levels). Three audio, 600 ohm at 5 mW. each
One audio 250 mW, paralleled into 32 ohm speaker and 600 ohm headphone.

IF Output: 100 mV rms (+1 dB/50L at 247.5 kHz) from a dedicated socket on rear of receiver.

Frequency Accuracy: Better than 1 in 10^8 on internal oscillator.

Bandwidths (Hz): As defined below at 3 dB (Normal or Wide bandwidth) and 60 dB (Normal maximum bandwidth only).

Mode	Baud	3 dB (Normal)	3 dB (Wide)	60 dB (Normal)
MSK1	50	110	400	660
MSK2	50/75	110	400	660
MSK4	50	160	400	680
MSK4	75	210	400	1000
FSK ±25 Hz	50	110	400	660
FSK ±42.5 Hz	75	160	400	680
8 Chan FDM	-	3000	-	3000
CW	-	160	210	680
AM	-	3000	-	5400

Sensitivity: The signal emf inputs required to obtain a 10 dB signal/noise ratio in the CW and AM modes are:

Mode	Bandwidth	Freq Range	Input (100L)
CW	Normal	10 - 200 kHz	1.4 µV
AM	Normal	160 - 200 kHz	38 µV

AGC: Threshold set to give signal/noise ratio of 15 to 20 dB at 3 dB/normal bandwidth.

Time constants, as defined below:

Mode	Attack Time	Delay Time
CW	40 ms +50%	2 5 +50%
AM, FDM, FH FSK. MSK	40 ms +50%	200 ms +50%

BFO (CW Mode only): Range 0 to +3 kHz in 100 Hz increments.

Monitoring: Front panel switch and meter.

Power Supplies: 100 to 125 V (selected in 5 V steps); 47 to 63 Hz, single phase.
200 to 250 V (selected in 10 V steps); 47 to 63 Hz, single phase.

Channel Selector Units

9

AF inputs: 12 channels (maximum) of 1 kHz on/off tones at 10 mW max. each.
Three FDM audio baseband.

AF outputs: Four channels of MSK/FSK 1 kHz on/off tones at 10 mW max. each
Two channels of identical FDM audio baseband.

RELATED SPECIFICATIONS

10 The equipment meets the relevant clauses of the following specifications:
NWS 3 - Electromagnetic Compatibility of Naval Electrical Equipments.
NWS 1000 - Equipment Design.
BR 1326 - Air Purification in Nuclear Submarines.
DEF STAN 0010 - General Requirements for Service Telecommunication Equipment.
DEF STAN 07-55 - Environmental Testing of Service Material.
CCITT Recommendations V11 and V28
DEF STAN 59-36 - Relation to B59000 and Selection of Components.
SW/NNSP/1/38 - Hardening Against Nuclear EMP and TREE.
NIL Handbook 217D - Reliability Predictions.

ENVIRONMENT

11

Operating temperature and relative humidity:	-10°C to +40°C, RH 90 to 95% at +40°C.
Storage temperature:	-40°C to +70°C.

INSTALLATION SPECIFICATION

12

BRF 8385A(4A)

SINGLE RECEIVER INSTALLATION - OVERALL DIMENSIONS

13

Height:	362 mm
Width:	610 mm
Depth:	780 mm

WEIGHTS

14

Rack,	NSN 5975-99-761-9470:	18 kg (approx)
Channel Selector Unit,	NSN 5895-99-750-9019:	5 kg (approx)
Channel Selector Unit,	NSN 5820-99-523-4762:	5 kg (approx)
Receiver,	NSN 5820-99-723-3104:	26 kg (approx)

COOLING

15 Cooling is by means of two fans fitted in the rear of the rack. The direction of air flow is into the rack.

FIRE PRECAUTIONS

16 The receiver is fitted with a front panel CO_2 injection socket.

CHAPTER 2

ASSOCIATED HANDBOOKS

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Para
1 System Publication Plan

Figure
2.1 System Publication Plan

SYSTEM PUBLICATION PLAN (Fig 2.1)

1 The associated handbooks for equipments incorporated in the VLF/LF Multichannel Transmission/Reception System are as detailed in the System Publication Plan.

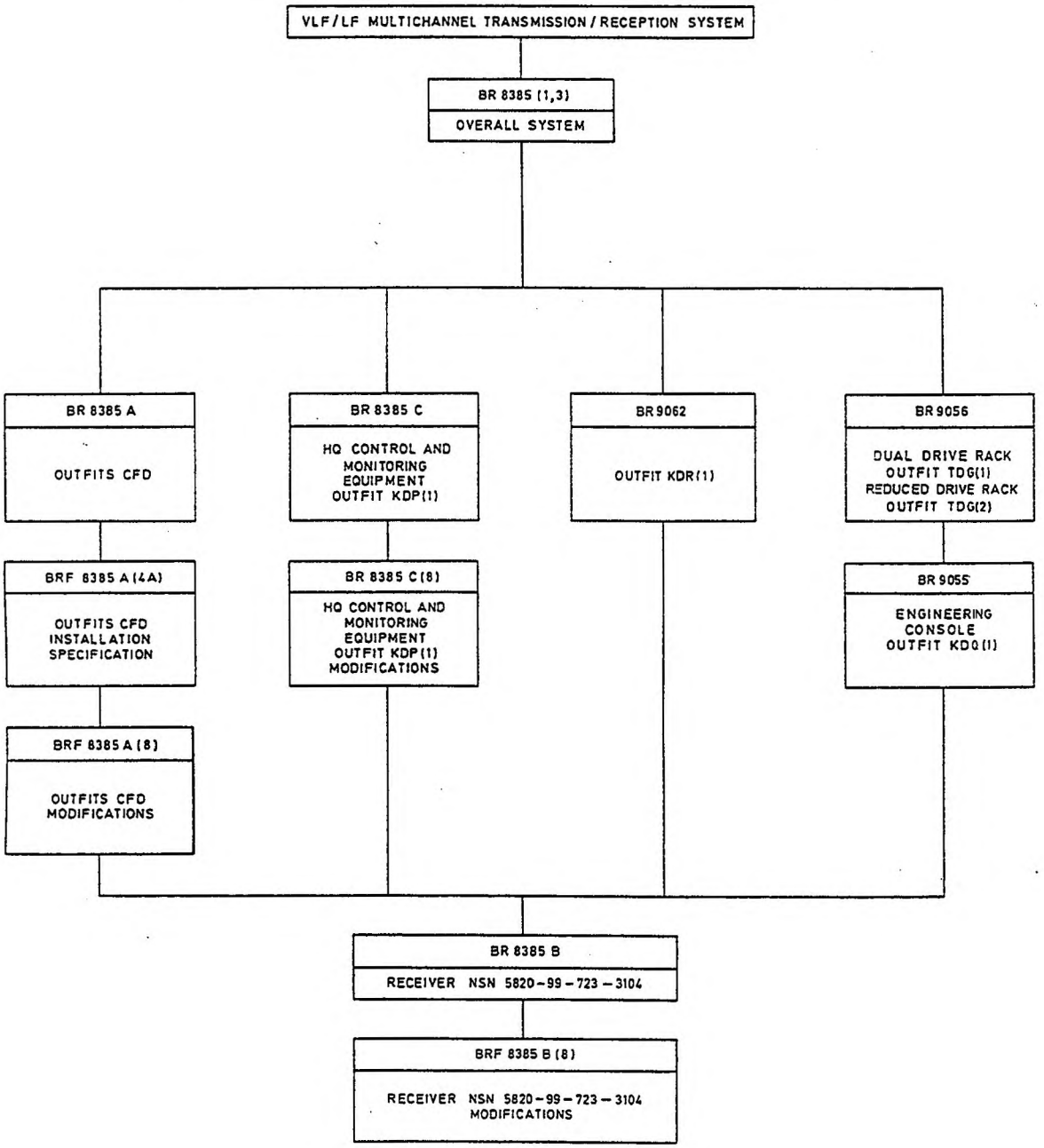


Fig 2.1 System Publication Plan

CHAPTER 3

ASSOCIATED EQUIPMENT

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2 Fan supply changeover unit (FSCU) 5820-99-542-2208

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12 Maintenance and repair

SECTION 1

SUBMARINE AUTOMATIC MESSAGE HANDLING AND DISTRIBUTION SYSTEM (SAMHADS)

OVERVIEW

References

1 The following documents refer to SAMHADS:

(1) BR 8487

(2) E Lists:

S2178 and S2179

Purpose

2 The purpose of the equipment is to provide the following:

2.1 Automatic handling and distribution of signals. The system will handle a variety of baud speeds from 50 to 9600 and can pass both plain and encrypted data.

2.2 The SAMHADS processor can connect to any of the communications systems onboard, ie:

VLF
HF TACTICAL
ASSATS
V/UHF
SSIXS

2.3 Alternatively the system can be operated with any of these systems in Real Time.

BRIEF DESCRIPTION

System Equipments

3 The SAMHADS system comprises a Message Filter Processing Unit (MFPU), Dual Disc Store, Cartridge Magnetic Tape Unit (CMTU), Terminal Display Unit (TDU) with a TGQ printer and an RWL/Real Time Patch Panel, and an Extended Filter Processing Unit (EFPU) (fitted to HMS Vanguard only).

Filter Processing Units

4 S and T Class platforms are fitted with a single MFPU which can handle 4 radio lines simultaneously. Vanguard Class platforms are fitted with 1 MFPU and 3 EFPUs each handling 4 radio lines.

Terminal Display Units

5 Control and display of the system is carried out at one of three TDUs (4 TDUs on Vanguard Class). Each TDU has a designated TGQ printer., one being designated the Journal printer by the operator at the TDU. Data transfer between the various equipments within the system is via two data highways (Port/Starboard).

RWL/Real Time Patch Panel

6 The SAMHADS system connects to the ships communication system via the RWL Patch Panel. The system can be operated independently of the processor in Real Time Working by patching any of the TDUs to the various communications nets via the Real Time Patch Panel. The MFPU comprises two identical processors, one being designated MASTER the other operating as SLAVE.

7 The Slave processor will run parallel to the Master processor so that it can automatically take over control in the event of the Master failing. The Disc Drive also contains two discs, one operating as MASTER and the other SLAVE.

8 All data read from or written to the Master disc is also read from or written to the Slave disc, allowing the Slave to automatically take over if the Master fails. Long term storage of data, either system files or signals is achieved using the Cartridge Magnetic Tape Unit (CMTU).

OPERATION

9 After initial Switch On at the MFPU, DISC DRIVE and TDU, all operator control and commands are effected at the TDUs.

10 The system access is controlled using a system of user level passwords. The highest level of access is allowed to the system administrator who will be responsible for the system operating Set Up. The administrator will set various parameters at the TDU to allocate radio lines to communications nets via the MFPU, set various tables and formats which will aid the writing of signals and control the automatic distribution and access of incoming and outgoing signals.

11 The MFPU, where instructed, will hold and store data in the Disc Drives as archive data or to call forward at a later time for transmission.

POWER SUPPLIES

12 System power supplies are:

115 V 60 Hz.

MAINTENANCE AND REPAIR

13 Maintenance is limited to general cleaning routines. Repair will be by replacement of LRUs.

SECTION 2

FAN SUPPLY CHANGEOVER UNIT (FSCU) 5820-99-542-2208

INTRODUCTION

1 CFD(2) was originally supplied in two rack assemblies each containing one VLF/LF Receiver and one Channel Selector Unit fitted to the side of the rack on installation. Racks could be installed side by side or one above the other. At this stage there was no requirement for a Fan Supply Changeover Unit (FSCU).

2 A modification was later installed for S and T Class Submarines to vacate one of the two racks, the removed receiver being fitted into the second rack thus providing two receivers in one rack.

3 At this stage, it was decided to install a Fan Supply Cangeover Unit. Hence on completion of modification No. 7 to the rack assembly, the FSCU becomes associated with, but not part of, Outfit CFD(2).

References

4 The following documents refer to FSCU:

(1) BRF 8385A (8)

(2) 'E' List: S2165

Purpose

5 To provide a separate electrical power supply for each of the two receivers and fan plates within the rack assembly for Outfit CFD(2).

BRIEF DESCRIPTION

6 The FSCU is a bulkhead mounted metal box with the following dimensions:

Width: 252 mm

Height: 147 mm

Depth: 54 mm

7 The left hand side of the FSCU contains five in number, cable glands, labelled:

(1) Mains 1 (115V)

(2) Rx.1

(3) Fans

(4) Rx.2

(5) Mains 2 (115V)

8 An earth stud is fitted below the 'Mains 2 (115V)' gland position.

9 Mounted on the right hand side of the FSCU are two toggle switches, labelled:

(1) SW.1 ON

(2) SW.2 ON

OPERATION

10 To select mains power for Receiver No. 1 and its associated fans, operate switch SW.1 into the down position. Similarly, to select mains power for Receiver No. 2 and its associated fans, operate switch SW.2 into the down position.

POWER SUPPLIES

11 Power supplies for FSCU are:

115 V 60 Hz

MAINTENANCE AND REPAIR

12 Maintenance is limited to isolating the FSCU from all electrical supplies, removing the six securing screws and the front cover to gain access to the unit interior. Visual inspection and cleaning routines may then be carried out, paying particular attention to the terminal strip connections. Any poor connections are to be made good. Earth bonding checks may also be carried out.

CATEGORY 2

OPERATING INSTRUCTIONS

CONTENTS

CHAPTER 1 Operating Instructions

CHAPTER 1

OPERATING INSTRUCTIONS

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41 Minor changes of operating frequency
42 Loudspeaker and headset volume control
43 Internal monitoring
44 BITE tests
45 Extended front panel

Figure
1.1 Receiver front panel layouts
1.2 CSU NSN 5895-99-750-9019 front panel controls
1.3 CSU NSN 5820-99-253-4762 front panel controls
1.4 Terminal chamber front panel

INTRODUCTION

1 Outfit CFD is installed in HM submarines and comprises the following variants:

(1) Outfit CFD(2) - Two VLF/LF Receivers, NSN 5820-99-723-3104, each installed in a mounting rack. One of the racks also incorporates a Channel Selector Unit (CSU).

Notes ...

(1) Modification No. 9 to Receiver Outfit CFD(2) changes the internal wiring of the Terminal Chamber so that V28 DC (6-0-6V) outputs are provided in place of Tone on/off outputs.

(2) In some submarine fits Outfit CFD(2) incorporates a second receiver, fitted in the space normally occupied by a transit plate. A single Channel Selector Unit selects outputs from both receivers.

(2) Outfit CFD(4) - Three VLF/LF Receivers, NSN 5820-99-723-3104, each installed in a mounting rack. One of the racks also incorporates a Channel Selector Unit (CSU).

2 The Receiver, NSN 5820-99-723-3104, covering the VLF/LF frequency range of 10 kHz to 200 kHz in 5 Hz increments, is capable of receiving and demodulating AM, FDM, CW, FH, FSK and MSK transmissions with Vallor and/or Jason encryption. In addition, the receiver detects the presence of Empty Channel Filler (ECF) and has an Error Detection and Correction (EDAC) facility to enhance the error rate performance, if required. Comprehensive monitoring and self-testing facilities enable the receiver to operate with minimum down-time, assuming a module repair by replacement policy is in force.

3 The CSU accepts the tone outputs from all receivers contained in the outfit and allows selection of the tone required to drive each external terminal equipment (four maximum).

GENERAL (Figs 1.1, 1.2)

Receiver Controls

4 The receiver controls are located on the three front panels which comprise:

(1) Front Panel, Left, incorporating the Mains switch and headphone socket.

(2) Front Panel, Centre, incorporating the main user controls.

(3) Front Panel, Right, incorporating monitoring controls.

5 Tuning of the receiver is controlled by microprocessor via keypad controls, and the selected parameters are displayed on two liquid crystal displays (LCDs) which can be illuminated when necessary. Push on/off keypads are provided for EDAC, AGC and loudspeaker/headset audio, BFO and attenuation (ATTN) settings are controlled by the function keypad in conjunction with the numeral keypads.

CSU Controls

6 Four line output selector switches (Line 1 to Line 4) are located on the CSU front panel. Each switch enables the operator to select any tone output from any receiver in the outfit to drive an associated external user terminal.

Displays

7 The left-hand (LH) display indicates Channel Number, Frequency kHz and one of the command words (ie INT, MEM, USE or TEST). The TEST indication flashes during warm-up, tuning processes, mode change or when a failure is detected (as indicated by adjacent LED). The right-hand (RH) display shows Mode, EDAC On/Off, Baud speed 50/75, BFO or Attenuator setting, Crypto selection for each MSK channel, AGC On/Off, Bandwidth Normal/Wide and AF (speaker) On/Off. A triangular marker appears when certain function keys are pressed to indicate which part of the display is being addressed.

Channelisation

8 Up to 63 channels can be preset with reception parameters (ie channel, frequency, mode, Baud speed, MSK crypto, EDAC, BFO, bandwidth and AGC). A facility is incorporated by which the preset parameters of Channels 1 to 10 can be protected from accidental overwriting, these channels should be used for the most common reception parameters. The facility is controlled by internal switch selection and a maintainer is required to be present when setting up such channels. Temporary alterations can be made to any channel in use without affecting the stored parameters although the latter can be easily altered if required, except for protected channels. On switching off or loss of power, the current operating parameters are automatically stored in Channel 0 and are reinstated on switching on.

BITE Testing

9 Ten BITE tests, detailed in Para 26, are available to check various receiver functions.

FRONT PANEL CONTROLS

Mains Switches

Note ...

Mod. 7 in S and T Class Submarines having two receivers fitted in one rack provides for an independent mains supply to each receiver, controlled from mains switches SW1 and SW2 on Fan Supply Change Over Unit (FSCU)(5820-99-524-2208 - not part of the CFD Outfit) mounted on an adjacent bulkhead. In addition, the unit automatically ensures that the cooling fans fitted in the CFD rack receive a separate mains supply provided either (or both) of the unit mains switches are set to ON. Refer to Cat 1A, Chap 3, Section 2.

10 Two mains switches are provided, one on the front of the switch panel to the left of the receiver, and the other on the left front panel of the receiver.

10.1 The functions of the switch on the switch panel are as follows:

Switch Position	Function
Down (On)	Power connected to the receiver and fans.
Up (Off)	Power disconnected from the receiver and fans.

Mains LEDs on the receiver will be illuminated as indicated in the table below when this switch is in the Down position.

10.2 The functions and indications provided by the mains switch on the front panel of the receiver are as follows:

Switch Position	LED Indications	Function
Off	Red LED only illuminated (when power is available).	
Standby	Red and amber LEDs illuminated.	Full power applied to the internal frequency reference, but reduced power to remainder.
On	Red and green LEDs illuminated.	Full power applied.

LH Keyboard

11 The functions of the keypads on the LH keyboard are as follows:

Keypads	Position	Functions
CHAN	Pressed	Prepares for entry of channel number.
FREQ	Pressed	Prepares for entry of a frequency.
INT (interr ogate)	Pressed	Causes the preset parameters of selected channel to be displayed.
MEM	Pressed	Causes the display number and parameters to be memorised.
USE	Pressed	Sets the receiver to the operational state on the displayed parameters.
UP/DOWN *(See Note)	Pressed	With USE displayed and FREQ pressed: increases (UP) or decreases (DOWN) frequency in use in 5 Hz steps.
TEST	Pressed (in conjunction with required numeral keypad).	Initiates BITE test as follows: Test 1 - illuminates all front panel LCDs and LEDs Test 2 - illuminates in turn each display on LCDs and then LEDs Test 3 - Keyboard check Test 4 - Memory check Test 5 - MSK reception test Test 6 - Checks synthesiser outputs and phase lock condition of Freq. Reference Module Test 7 - FSK reception test Test 8 - FH reception test Test 9 - SD reception test Test 10 - Delay Calibrate to determine the delay time of an MSK signal through receiver.
LAMP	Pressed	Illuminates LCD back lighting for approx 2 mins.
CLR	Pressed	Clears displays (which revert to operational channel) or stops current test sequence.
0 to 9	Pressed	Used in conjunction with other keys to enter channel, frequency, attenuator/BFO settings or test modes.

Note ...

For BFO keypad operation, the BFO frequency is either above (UP) or below (DOWN) the IF signal frequency and provides a corresponding positive or negative audio output frequency display in the RHS LCD panel BFO display.

RH Keyboard

12 The functions of the keypads on the RH keyboard are as follows:

Keypads	Position	Functions
MSK1/2/4, FSK, F, FDM, CW, AM	Pressed	Selects required reception mode (F = FH). For parameter selections available in FSK and FH modes, see BR 8385B, Category 2, Chap 1.
BW	Pressed	Selects NORMAL and WIDE bandwidth.
AGC	Pressed	Selects AGC ON or OFF.
CY	Pressed after CY	Selects manual setting or automatic recognition of channel encryption.
V	Pressed after CY	Sets Vallor encryption for next MSK channel.
J	Pressed after CY	Sets Jason encryption for next MSK channel.
EDAC	Pressed	Sets EDAC ON or OFF for MSK signals.
Baud	Pressed	Sets 50 or 75 Baud operation.
AF	Pressed	Sets loudspeaker/headset AF ON or OFF.
UP/DOWN	Pressed	Provides stepped control of AF output volume.
BFO	Pressed	Selects BFO display (BFO may then be changed by pressing reqd. number). Range 0 to ±3000 Hz
ATTEN	Pressed	Used in conjunction with numerals 0 to 6 to set rf attenuation in 10 dB increments.

CENTRE FRONT PANEL LED INDICATIONS

13 The indications provided by the red LED indicators on the Front Panel, Centre, are as follows:

LED	Condition	Function
RLF	Illuminated	Indicates frequency Reference Loop Failure if internal/external reference 'out of lock'.
ERF	Illuminated	Indicates External Reference Failure or external reference not connected.
EC	Illuminated	Indicates Error Correction occurring on MSK signal when EDAC is selected to ON.
FSF	Illuminated	Indicates Fibonacci Synchronisation Failure (MSK only) or synchronisation not yet achieved.
REMOTE	Illuminated	Indicates receiver is controlled from remote terminal (if fitted).
ECF 1-4	Illuminated	Indicates the presence of Empty Channel Filler on Channels 1 to 4 respectively.

OPERATING INSTRUCTIONS

Switching On

14 To switch on the receiver, carry out the following and ensure the relevant LED indications are as detailed for each procedure:

Procedure	Action	Remarks
1	Check that the red 'Mains' LED is illuminated. If not, check that the switch on the switch panel to left of the receiver is DOWN.	Remains illuminated for all positions of Mains switch.
2	Set Mains switch on receiver to 'Standby'.	Amber 'Standby' LED illuminates.
3	When required for operation, set Mains switch to 'On'.	Green 'On' LED illuminates switch to and 'Standby' LED extinguishes. Last operating parameters are displayed and used.

Line Output Selection

15 Set 'Line 1' to 'Line 4' output switches on CSU, as required, to provide selected tone outputs from Outfit CFD to the user terminals.

Setting up Channels

16 To set up channel parameters, carry out the following, ensuring the relevant displays indicate as detailed for each procedure:

Note...

This operation does not affect operational use.

Procedure	Action	Remarks
1	Press CHAN and the required channel number.	Display clears, channel number displayed.
2	Press FREQ and enter required six figured frequency. If a five figured frequency is required, the five figures are to be preceded by a zero (eg 016.000).	Frequency displayed.
3	Press the desired mode and amend parameters as required.	(Standard parameters are displayed).
4	When correct parameters are displayed, press MEM.	Parameters are stored in memory. Display shows parameters with MEM for 30 secs then reverts to operational display.

Checking Memory

17 To check the contents of a particular channel carry out the following, ensuring the relevant displays indicate as detailed for each procedure:

Note...

This check does not affect operational use.

Procedure	Action	Remarks
1	Press CHAN and the required channel number.	Display clears. Channel number displayed.
2	Press INT.	Stored channel parameters are displayed for 30 seconds. (Press CLR to immediately revert to operational display).

Selecting Preset Channel for Operational Use

18 To select a preset channel for operational use, carry out the following, ensuring the relevant displays indicate as detailed for each procedure:

Procedure	Action	Remarks
1	Press CHAN and the required channel number.	Display clears, channel number displayed.
2	Press USE.	Parameters of selected channel and USE displayed. When TEST extinguishes, receiver is tuned to displayed channel parameters. If the Delay Calibrate test is invoked (selected channel contains MSK mode), the test must not be inhibited or curtailed by the use of CLR.

Setting Up New Frequency for Operational Use

19 To set up a new frequency for operational use, carry out the following, ensuring the relevant displays indicate as detailed for each procedure:

Procedure	Action	Remarks
1	Press FREQ and enter required six figured frequency.	LH display clears and frequency displayed.
2	Press mode and amend parameters as required.	(Standard parameters are displayed).
3*	When correct parameters displayed, press USE.	Parameters and USE displayed. When TEST extinguishes, receiver is tuned to displayed parameters.

* If an MSK mode is already being used or is selected for use at the new operating frequency, the Delay Calibrate test must not be inhibited or curtailed by the use of CLR.

Changing Mode/Parameters on Operational Frequency

20 To change the mode/parameters on the operational frequency, carry out the following, ensuring all relevant information is indicated as detailed:

Procedure	Action	Remarks
1	Press new mode, amend parameters as required.	Standard parameters are displayed, channel number (if displayed) extinguishes.
2**	Press USE.	When TEST extinguishes, receiver is tuned to new parameters.

** If the new mode is MSK or if other parameter amendments are made when using MSK mode which invoke the Delay Calibrate test, the test must not be inhibited or curtailed by the use of CLR.

OPERATING NOTES

Controls Not Affecting Operation

21 The following controls may be used without affecting the operational channel/frequency in use:

(1) CHAN and FREQ with numerals, unless followed by USE

(2) INT

(3) MEM

(4) CLR

Note...

The CLR key must not be used to avoid or curtail the Delay Calibrate when invoked by selection of MSK modes and associated parameters (eg Baud rate, frequency etc).

(5) AF Up/Down

(6) ATTEN and BFO (unless followed by numeral)

MSK Operation

22 In MSK modes using Vallor encryption, EDAC data bits are applied at the transmitter and the receiver processes this EDAC data. If, at the transmitter, there is no traffic in one or more of the MSK channels, a plain language Empty Channel Filler (ECF) is inserted in those channels; this is indicated at the receiver by illumination of the appropriate ECF LED. For full details of operating in the MSK mode and in all other available modes of operation. Refer to the Operating Notes in BR 8385B, Category 2, Chapter 1, Paras 20 to 38.

23 Channel data is output from the receiver only when Fibonacci synchronisation has been acquired. On having received a valid MSK signal for approximately 60 seconds, the Fibonacci sequence contained in Channel 1 data is recognised. This allows the receiver to determine channel identity and encryption processes for all channels in addition to establishing correct data polarity.

Note...

Phase-coherent demodulators may output data in either the erect or inverted sense.

24 The channel data is then output to the designated channel outputs and the FSF LED is extinguished. Individual channel encryptions (V or 3) are displayed if the automatic encryption mode is selected. The foregoing process is defined as "Fibonacci Synchronisation and Channel Demultiplexing".

25 When MSK modes are selected, the receiver automatically selects the WIDE bandwidth option. This option incorporates noise processing circuits which are extremely effective in reducing interference due to atmospheric and other impulsive type noise.

Note...

The WIDE bandwidth option is the preferred operating condition for reception of MSK signals unless adjacent frequency interference is causing reception failure.

FSK Operation

26 In the FSK mode, the channel data is output immediately, irrespective of the transmitted encryption type.

27 Since the demodulation process is non-coherent, there is no data polarity ambiguity. In addition, because there is only a single channel of data (which does not contain the EDAC facility), synchronisation to the Fibonacci sequence of a Vallor encrypted transmission is not necessary. Furthermore, selection of the V or 3 encryption parameter either manually or automatically is also unnecessary.

28 When an FSK mode is selected, the receiver automatically selects the WIDE bandwidth option in order to use the same noise processing circuits employed for MSK reception.

Note...

The WIDE bandwidth option is the preferred operating condition for receiving FSK signals unless adjacent frequency interference is causing reception failure.

FSK Polarity

29 FSK output data polarity may be inverted by successive operations of the FSK keypad.

30 When an FSK mode is initially selected, the 1 kHz ON/OFF tone output polarity is consistent with the signalling conditions of Arrangement 1, shown as follows:

Transmitted signal:

Binary 1 = MARK = $F_c - F_s$

Binary 0 = SPACE = $F_c + F_s$

Where F_c is the nominal carrier frequency in Hz and Fs is the modulation frequency shift in Hz.

Receiver data outputs:

V28 (6-0-6 V DC)	MARK =	+6 V (typically +9.5 V)
	SPACE =	-6 V (typically -9.5 V)
1 kHz ON/OFF tone	MARK =	Tone OFF
	SPACE =	Tone ON

31 Assuming the same transmitted signal polarity, inversion of the FSK data outputs (to Arrangement 2) is accomplished by pressing the FSK and USE keypads. The inverted data FSK mode is indicated by the negative sign normally preceding the BFO frequency display.

FSK + Slow Data

32 The receiver is capable of receiving and demodulating a separate 1 Baud Signal which can be superimposed by the transmitter onto the 50 Baud FSK signal. Reception of the Slow Data signal is automatic whenever the FSK (50 Baud) mode is selected (refer to the Third and Fourth IF Amplifier Module technical description in Category 3B, Chapter 5).

33 The following three conditions of the FSK (50 Baud) signal may be used:

(1) 50 Baud message data.

(2) Continuous MARK.

(3) Continuous SPACE.

34 For simultaneous reception of 50 Baud and 1 Baud data, the receiver is set to the FSK (50 Baud) mode with the bandwidth set to WIDE, as previously described.

35 For reception of 1 Baud data when the 50 Baud data is set at a continuous MARK (ie the designated carrier frequency F_c - 25 Hz), the receiver must be set to FSK1 mode by pressing keypads FSK-1-USE. The most significant digit of the BFO display will indicate "1".

36 For reception of 1 Baud data when the 50 Baud data is set at a continuous SPACE (ie the designated carrier frequency F_c + 25 Hz), the receiver must be set to FSK0 mode by pressing keypads FSK-0-USE. The most significant digit of the BFO display will indicate "0".

37 Although the FSK data polarity inversion facility remains available in the FSK(1) and FSK(0) Slow Data modes, the facility only applies to the 50 Baud element of the transmission. Therefore the transmitted constant MARK or SPACE can be output as constant MARK or SPACE respectively and, alternatively, as constant SPACE or MARK respectively.

38 The polarity of the 1 Baud data is fixed and is not affected by selection of FSK, FSK(1) and FSK(0) options or other parameter settings for the FSK modes. Bandwidth changes are available as for normal SD Baud FSK mode operation.

Note...

The Slow Data mode is not applicable to the 75 Baud FSK mode of operation.

Frequency Hopping Modes of Operation

39 Reception of Frequency Hopping modes of 1 Baud data is available with either 1 or 3 hops per data bit. Selection of the mode and the 1 or 3 hops per bit is accomplished by successively operating keypads F-USE or F-3-USE respectively. A change from 3 hops per bit to 1 hop per bit can be actioned by selecting F-1-USE.

Note...

Only the NORMAL single bandwidth is available for FH modes.

Reception of CW (with Adjacent Channel Interference present)

40 Interference from an adjacent channel signal when operating in the CW mode can be minimised by either of the following two actions, both of which use the bandpass filter in the audio amplifier to attenuate the interference:

40.1 Adjust the BFO for a zero (or very low frequency) audio beat with the interfering signal.

40.2 Adjust the BFO to the other side of the wanted signal (using the BFO keypad in conjunction with the DOWN and numeric keypads of the LH keyboard) for a high audio frequency beat with the interfering signal.

Minor Changes of Operating Frequency

41 Minor changes of operating frequency (eg to improve CW reception) can be made by pressing FREQ and then the LH UP/DOWN keypads. This action changes frequency in 5 Hz increments.

Loudspeaker and Headset Volume Control

42 When AF is selected, the RH UP/DOWN keys provide stepped increase/decrease of loudspeaker/headset volume. Although no change in volume will occur if the UP key is pressed when the Volume is already at the maximum, the key strokes are stored and must be countered by pressing the DOWN key the same number of times to restore normal operation.

INTERNAL MONITORING

43 The monitor switch on the Front Panel, Right, selects 11 internal monitoring points, defined on the panel, for indication on the monitor meter.

BITE TESTS

44 Ten BITE tests are available to check various receiver functions. The tests are initiated by pressing TEST, entering the required test number and pressing USE and continue until stopped by pressing CLR. The tests may be used as Command User Checks or to test for suspected faults. The maintainer should be informed if the correct indication is not given. The function of each test and action required is as follows:

Test	Function	Action
1	Simultaneous LCD and LED display.	Check that all segments on both LCDs are displayed and 9 red LEDs are illuminated.
2	Individual LCD and LEDs display.	Check that all are correct.
3	Keyboard Check. (Press CLR twice to stop this test).	Press each key in turn and check that, on the LH display, numeral codes appear as follows: CHAN to CLR - 11 to 25 0 to 9 - 31 to 45 MSK1 to AGC - 51 to 65 CY to ATTN - 71 to 85
4	Memory Check.	Check LH display shows 111.
5	MSK Reception Test.	Check the LH display shows 1 after approx 15 seconds.
6	Synthesiser output and phase lock condition.	Check LH display shows 1.
7	FSK Reception Test.	Check that LH display shows 1 within 15 seconds and that audio tone is present on completion.
8	FH Reception Test.	Check LH display shows 1.
9	SD Reception Test.	Check LH display shows 1.
10 (see Note)	Delay Calibrate to check delay time through receiver using MSK test modulation pattern (or selected parameters if already in MSK mode).	Check that a delay calculation is indicated on the frequency display. A typical figure for MSK4 at 16 kHz, WIDE bandwidth, 50 Baud is 2.35 ms.

Note...

Test 10 is automatically initiated when:

(1) An MSK mode is selected or changed.

(2) The receiver tuned frequency is changed when in an MSK mode.

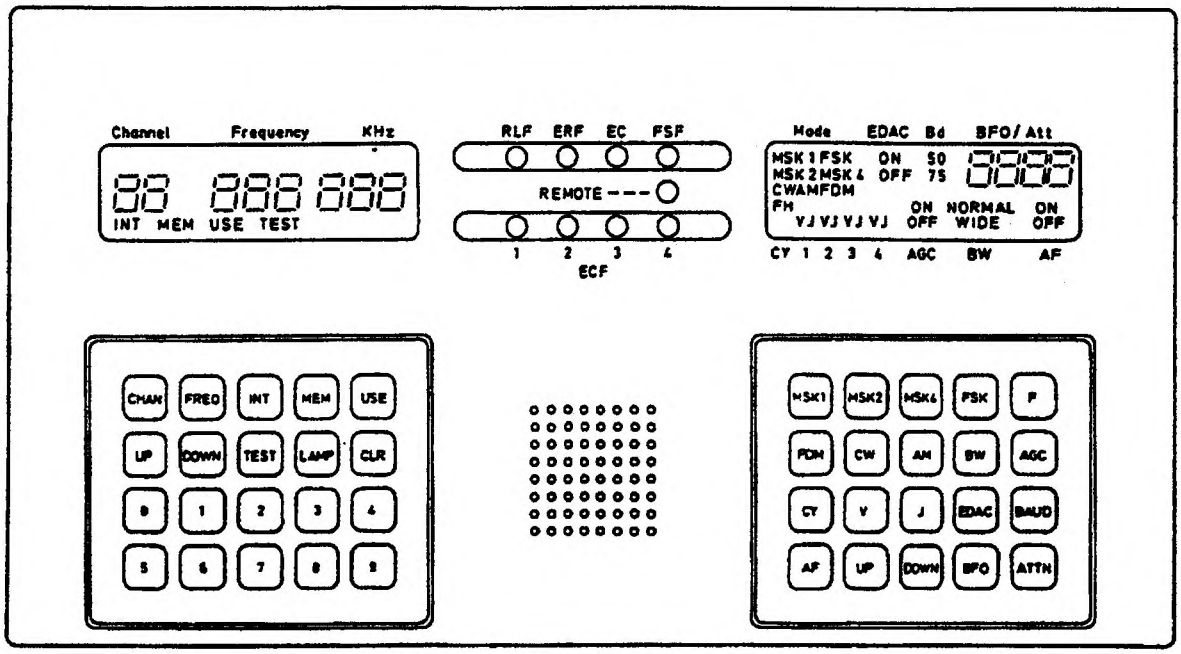
(3) The bandwidth is changed when in an MSK mode.

(4) The Baud rate is changed when in an MSK mode.

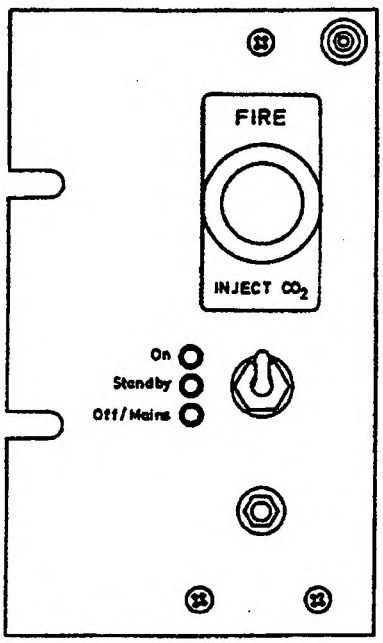
This test may take several seconds and, in order to provide a repetitive calibration result to external equipment, the test should not be inhibited or curtailed by the use of CLR.

EXTENDED FRONT PANEL

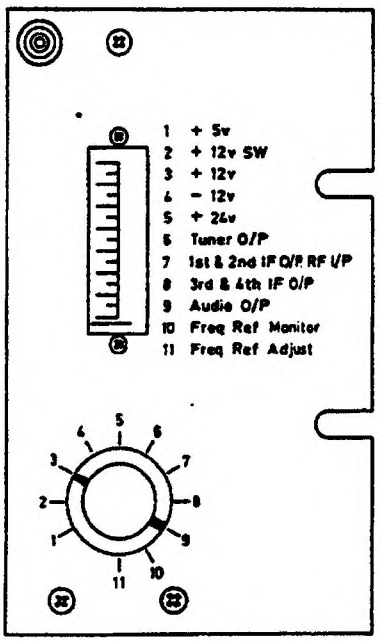
45 The Front Panel, Centre, can be removed from the receiver and an extension lead fitted to enable the panel to be located remote of the receiver (within five metres). Control and display functions remain unaltered.



FRONT PANEL, CENTRE



FRONT PANEL, LEFT



FRONT PANEL, RIGHT

Fig 1.1 Receiver front panel layouts

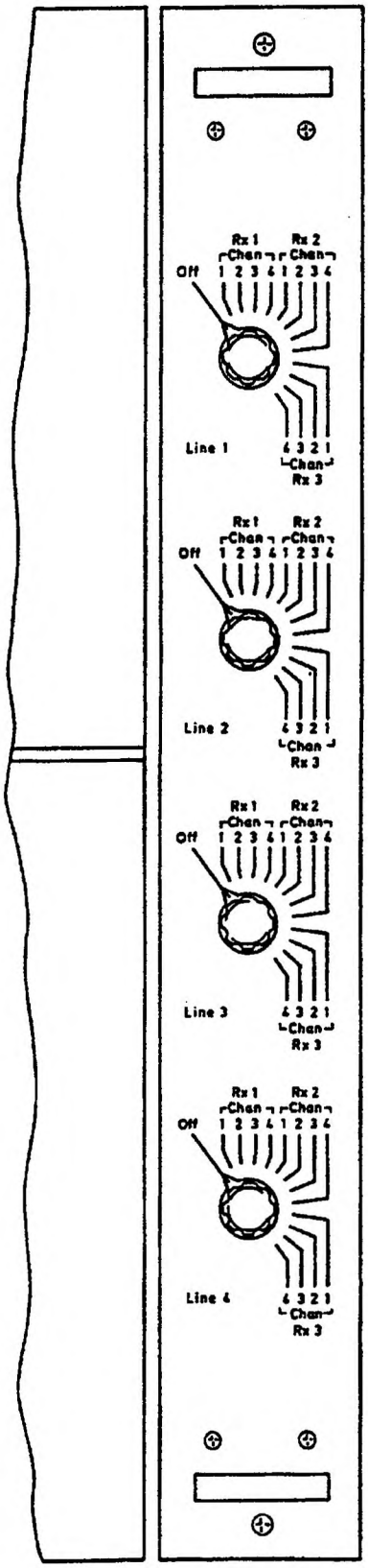


Fig 1.2 CSU NSN 5895-99-750-9019 front panel controls

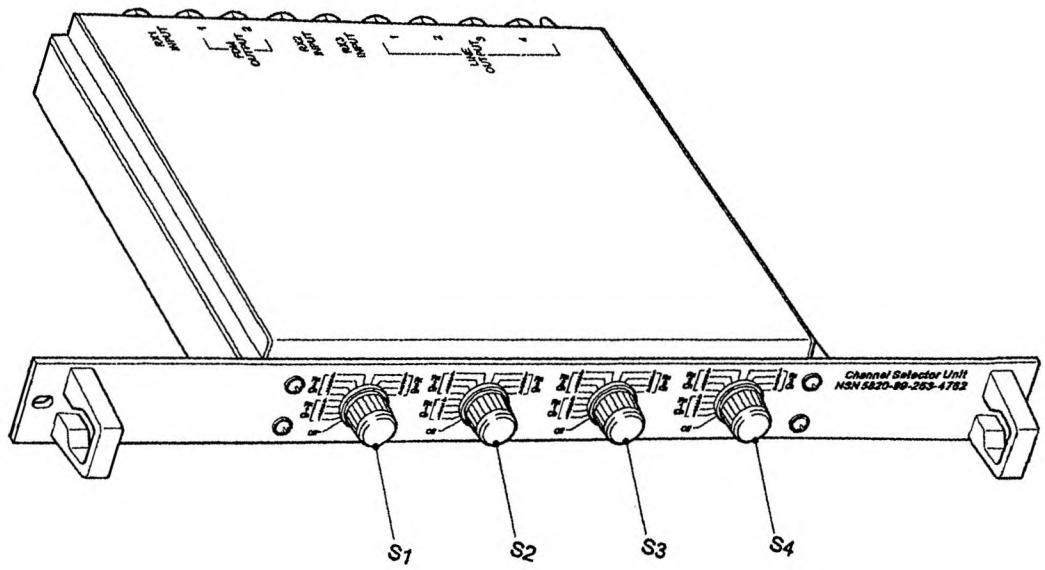


Fig 1.3 CSU NSN 5820-99-253-4762 front panel controls

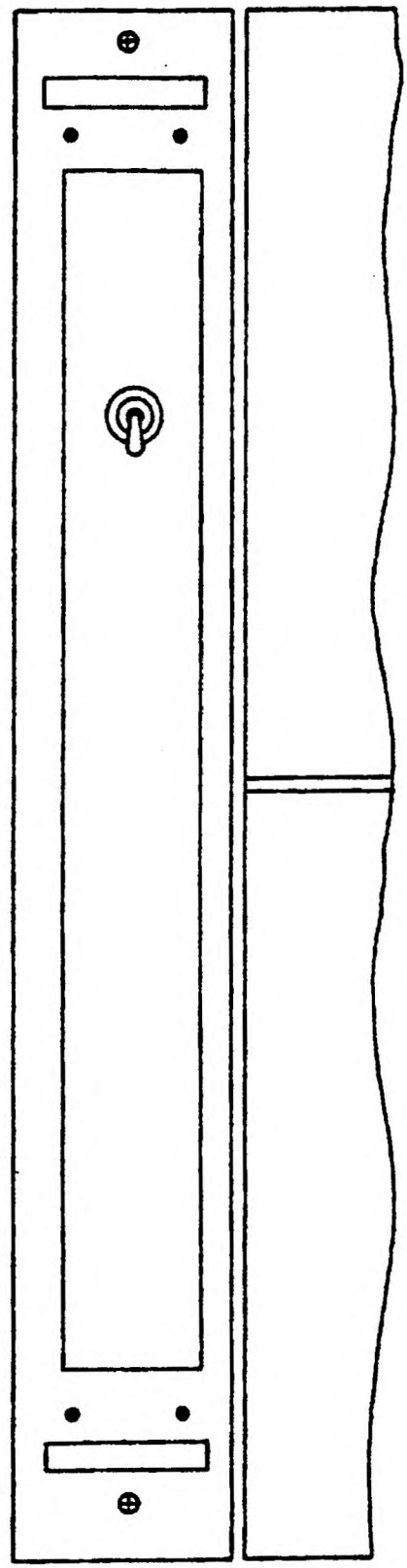


Fig 1.4 Terminal Chamber front panel

CHAPTER 1

CFD CONFIGURATIONS

CONTENTS

Para
1 Introduction
Types of Outfit CFD Fits
4 Outfit CFD(2)
7 Outfit CFD(4)

Figure
1.1 Basic Outfit CFD
1.2 Typical Outfit CFD installations

INTRODUCTION (Fig 1.1)

1 The major components of a basic Outfit CFD comprise the following:

(1) Rack, NSN 5975-99-761-9470, incorporating a connector panel at the rear and, in CFD(2), a Terminal Chamber (TC). In Outfit CFD(4) the function of the Terminal Chamber is provided via Outfit YBX.

(2) VLF/LF Receiver, NSN 5820-99-723-3104, mounted on runners within the rack.

(3) Channel Selector Unit (CSU), NSN 5895-99-750-9019, mounted on the outer RH side of the rack.

Note...

In S and T class submarines where two CFD receivers are mounted in one rack (post Mod 3, which affects the Rack Assembly NSN 5975-99-761-9470) a horizontally mounted Terminal Chamber is fitted in lieu of the vertically mounted Terminal Chamber from the vacated upper rack, see Fig. 1.2.

2 In addition, the rack incorporates a position to fit an RC Unit for processing redundancy coded MSK signals when output from the receiver. An externally fitted BID 1150 provides the required codeword data to the receiver when configured for operation in the FH and SD modes of reception.

3 In CFD(2) and CFD(4) installations (maximum of three receivers) only one CSU is incorporated to select the required channel tone outputs and FDM baseband audio outputs from the outfit to the terminal equipments.

TYPES OF OUTFIT CFD FITS (FIG 1.2)

Outfit CFD(2)

4 Outfit CFD(2) is fitted in a two receiver installation. The outfit comprises two racks each fitted with a VLF/LF receiver, Receiver NSN 5820-99-723-3104.

5 In some CFD(2) installations, the transit plate is removed from the rack and another VLF/LF Receiver, NSN 5820-99-723-3104 is fitted in the vacated position. The receiver operates independently, but the MSK, FSK and FDM outputs are fed for selection to the same CSU used in the original installation (but see note following Para 1(3) which refers to a horizontally mounted Terminal Chamber). This second Terminal Chamber is fitted in the rack to interface the second receiver.

6 Depending on the configuration of the broadcast receiver system, the two racks may be fitted as shown in Fig 1.2. Only one rack incorporates a CSU to provide manual selection of the required channel V28 DC (6-0-6 V) outputs from either or both receivers and which is hardwired to provide FDM baseband audio from one of the receivers, normally Rx1. The unused position is covered by a blanking plate.

Note ...

Modification No.9 to Receiver Outfit CFD(2) changes the internal wiring of the Terminal Chamber so that V28 DC (6-0-6 V) outputs are provided in place of Tone on/off outputs.

Outfit CFD(4)

7 Outfit CFD(4) is fitted in a three receiver installation. The outfit comprises three racks, each fitted with a VLF/LF receiver NSN 5820-99-723-3104.

8 Possible positioning configurations of the three racks in the broadcast receiving system are shown in Fig 1.2, but only one rack incorporates a CSU to provide manual selection of the required channel tone outputs from any of the receivers and which is hardwired to provide FDM baseband audio from one receiver only (normally Rx1).

9 Outfit CFD(4) does not have a Terminal Chamber fitted. The function of the Terminal Chamber is provided via Outfit YBX.

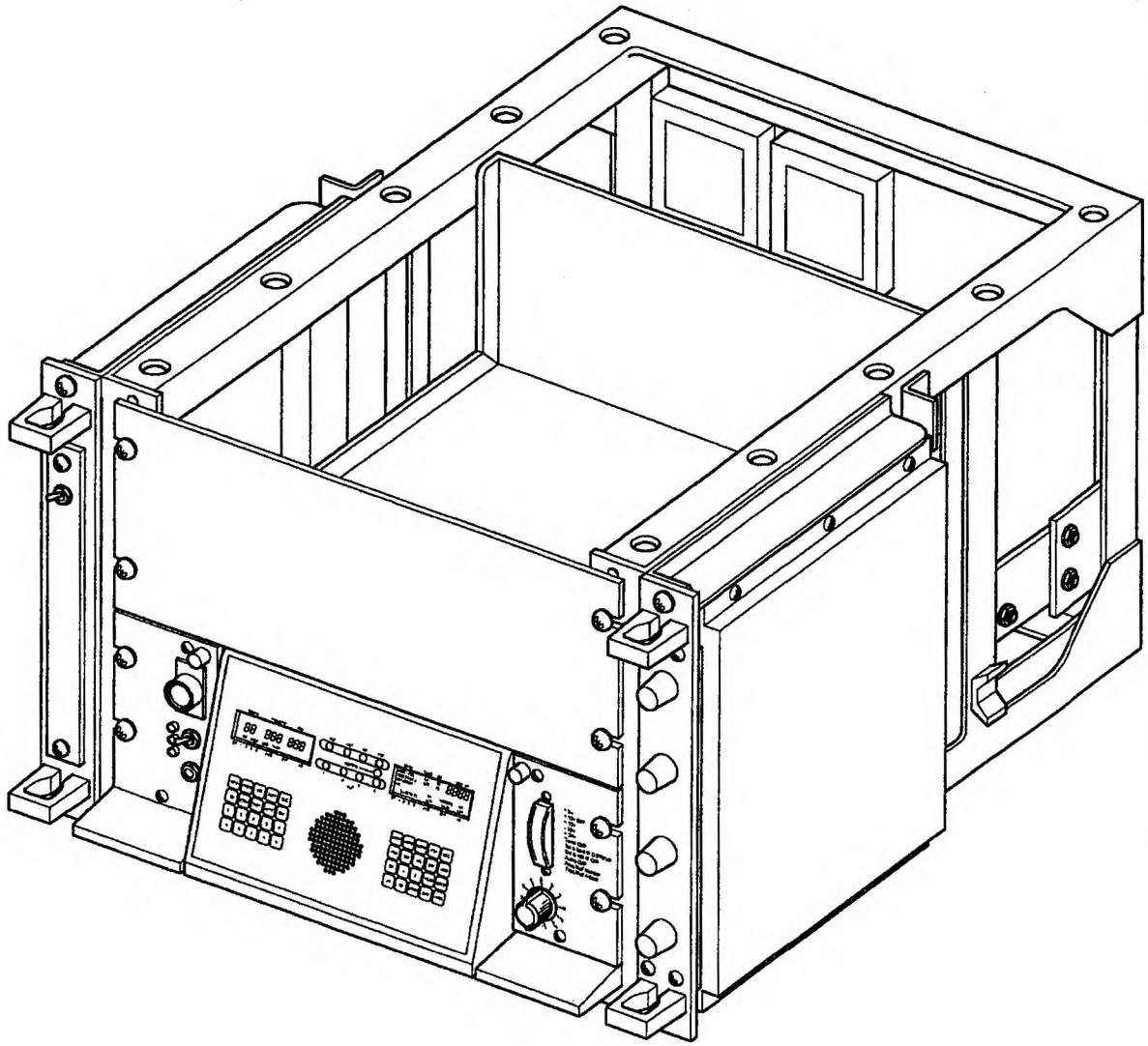
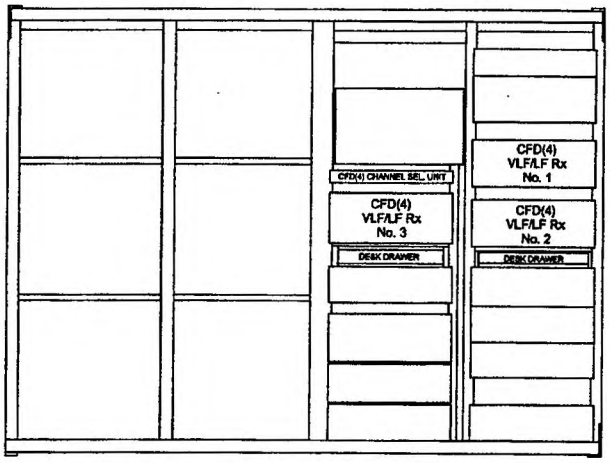
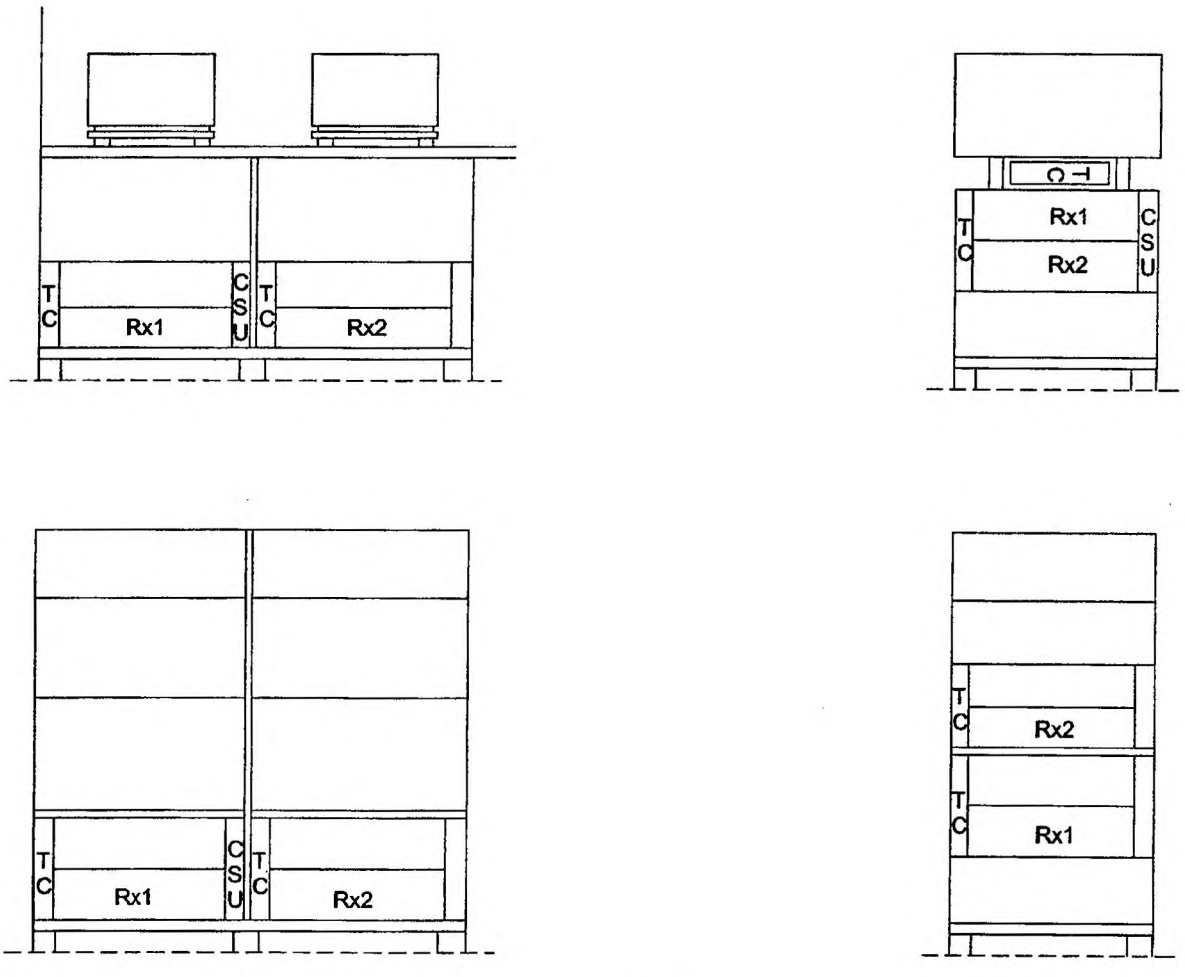


Fig 1.1 Basic Outfit CFD



CFD (4)



CFD (2)

Fig 1.2 Typical Outfit CFD installations

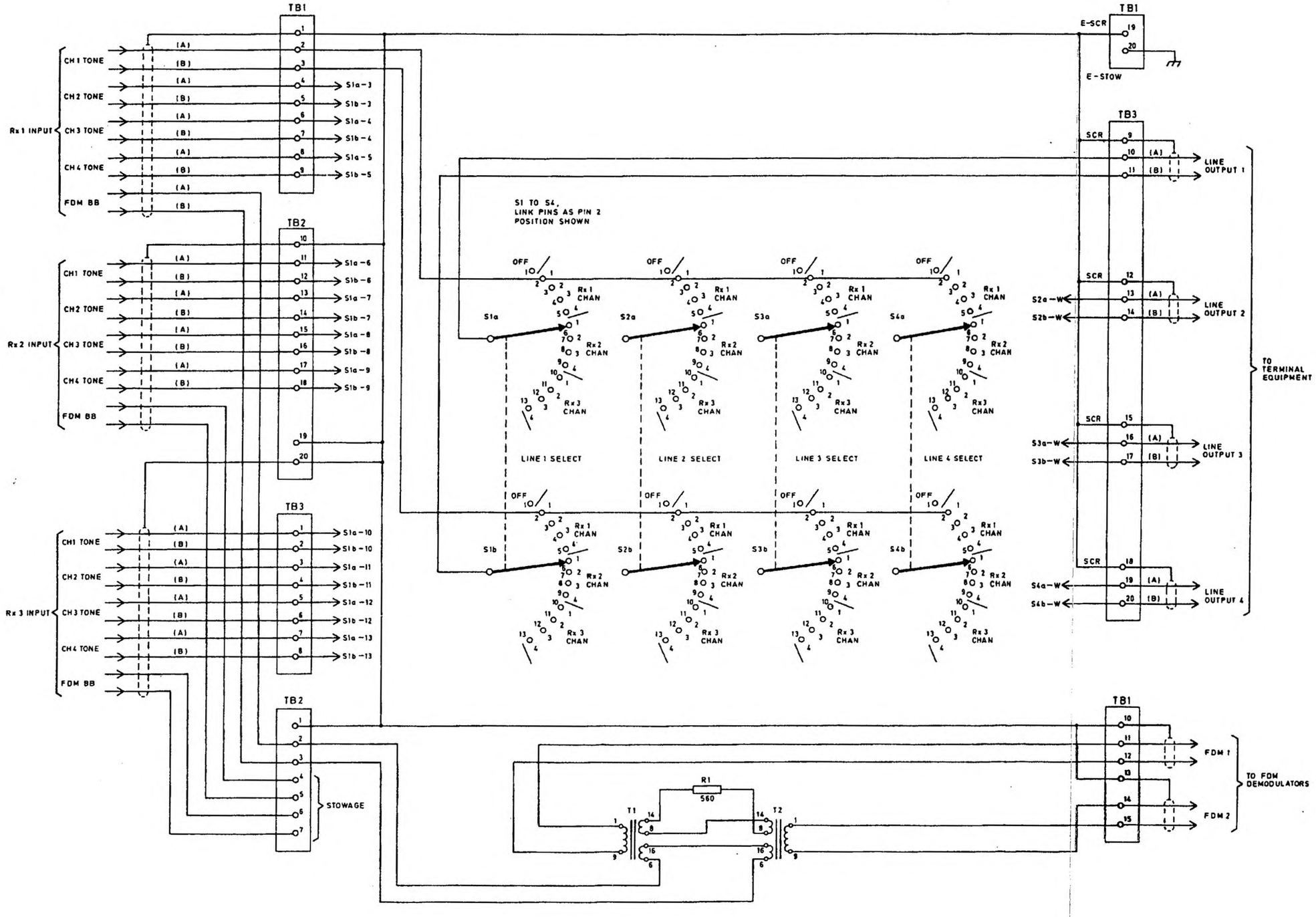


Fig 2.2 Circuit diagram - CSU

CHAPTER 2

OVERALL FUNCTIONAL DESCRIPTION

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Para
1 Purpose
General
2 Outfit CFD(2)
3 Outfit CFD(4)
5 General functional description
12 Outfit CFD(2)/CFD(4) functional description

Figure
2.1 General functional block diagram
2.2 Outfit CFD(2) - overall block diagram
2.3 Outfit CFD(4) - overall block diagram

PURPOSE

1 Outfit CFD is installed in a VLF/LF broadcast reception system of HM ships and submarines to receive MSK, FSK, FSK+SD, FH, AM, CW and FDM modes of transmission and to interface the receiver outputs for selection to the broadcast receiving system.

GENERAL

Outfit CFD(2)

2 Outfit CFD(2) comprises two racked VLF/LF Receiver Outfits NSN 5820-99-723-3104, a Channel Selector Unit (CSU) and Two Terminal Chambers. Space is provided within the rack to mount two Remote Control Units (RCU) but these units do not form part of the Outfit CFD(2). In any CFD outfit, only one CSU is fitted. The unused CSU mounting position has a blanking plate fitted.

Outfit CFD(4)

3 Outfit CFD(4) comprises three racked VLF/LF Receiver Outfits NSN 5820-99-723-3104 and a Channel Selector Unit (CSU). Space is provided within the rack to mount three Remote Control Units (RCU) but these units do not form part of the Outfit CFD(4). In any CFD outfit, only one CSU is fitted. The unused CSU mounting position has a blanking plate fitted.

4 The Channel Selector Units (CSU) (5820-99-253-4762) associated with CFD(4) in Vanguard Class Submarines is modified (mod strike 1 on CSU) in the following manner:

(1) At the rear panel of the CSU, the two cables labelled LINE OUTPUT 1 and LINE OUTPUT 2 which carry SSC composite output to Outfit KMW(1) have had their original plastic glands removed and replaced with TCFS (Thermofit Cable Feedthrough System) fittings.

GENERAL FUNCTIONAL DESCRIPTION

5 Received signals from the external aerial input are fed via a connector on the rear of the rack to the 100 ohm balanced broadband input of the VLF/LF receiver. The receiver operates over a frequency range of 10 kHz to 200 kHz and is capable of receiving and demodulating AM, CW, FDM, FH FSK, FSK+SD and MSK transmissions (either 1-channel, 2-channel or 4-channel) with BID 920 encryption (Vallor) and/or KW46T encryption (Jason).

6 The modular constructed receiver, fully described in BR 8385B(3), is configured as a superheterodyne and is microprocessor controlled with commands initiated by the operator from two keyboards on the front panel. An internal oscillator generates the required reference frequencies within the receiver, but the facility to derive the frequencies from an external 1 MHz Frequency Standard is provided via a connector at the rear of the rack.

7 The receiver has four balanced outputs, designated CHANNEL 1 to CHANNEL 4, which provide demodulated MSK or FSK transmissions as 1 kHz tone on/off signals. The number of channels in use at any one time depends on the receiver mode of operation, 4-channel MSK (ie MSK4) requiring the maximum of four channels.

8 When the receiver is operating in the FDM mode, a further balanced output designated FDM BB, provides FDM baseband audio for external demodulation within the broadcast reception system.

9 Demodulation of FH and SD modes of transmission by the receiver is possible when input codewords from an external BID 1150 are available. The receiver is also capable of providing a redundancy coded MSK output for processing by an RC Unit which may be housed in the rack but does not form an integral part of an Outfit CFD.

10 Further additional outputs provided by the receiver include four channels of demodulated MSK/FSK signals at CCITT-V28 operating levels, receiver status, AGC indication, soft decision information and audio. These outputs, with the tone and FDM baseband audio outputs, are interfaced at the Terminal Chamber (TC), part of the rack, to provide a convenient means for interconnection of receiver outputs to any required external equipments.

11 The four channels of 1 kHz on/off tones and the FDM audio baseband outputs are fed from the TC to the CSU. The CSU has four rotary switches, each switch enables the operator to select any channel on/off tone for output on LINE 1 to LINE 4, to the broadcast reception system. The FDM BB input is fed via a hybrid-splitter in the CSU to provide two outputs, FDM1 and FDM2, for processing within the broadcast reception system by FDM Demodulator Units.

OUTFITS CFD(2)/CFD(4) FUNCTIONAL DESCRIPTION (Figs 2.2 and 2.3)

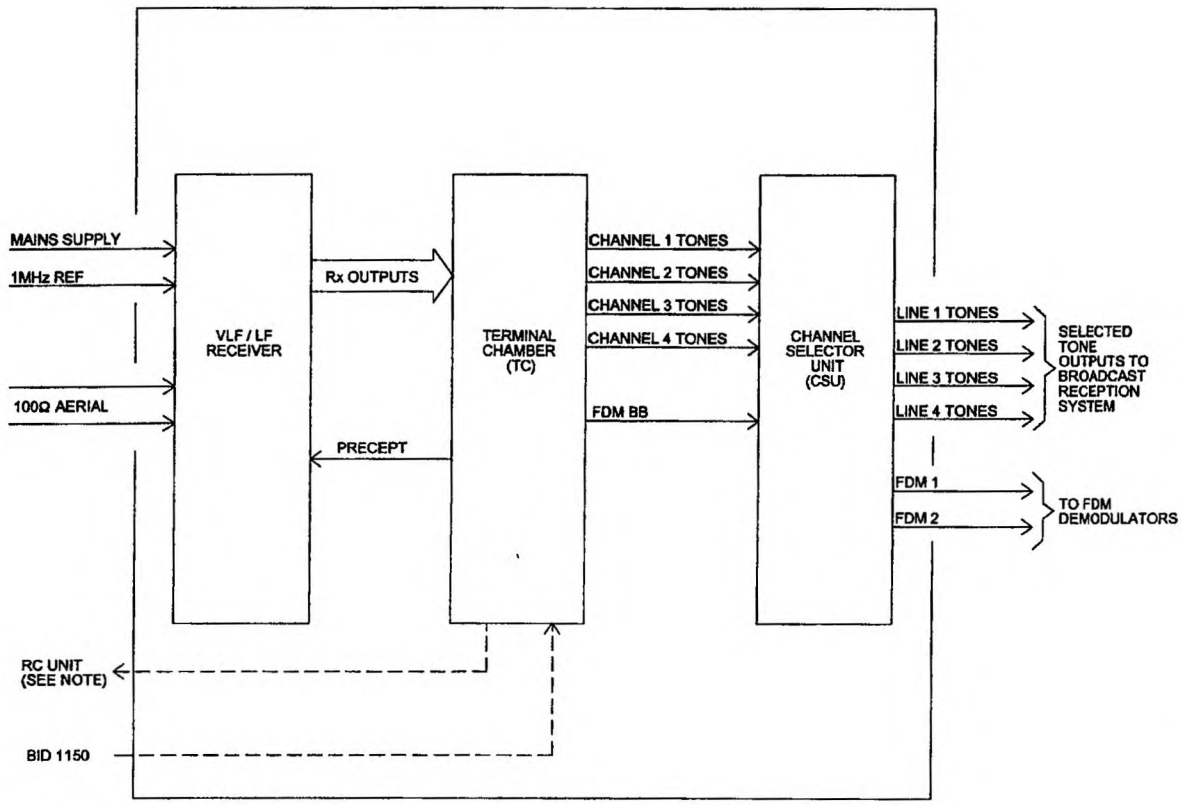
12 In the two receiver and three receiver configurations, Outfits CFD(2) and CFD(4) respectively, only one CSU is fitted. The four channels of tone outputs from each receiver are fed to the CSU and the four rotary switches on the CSU enable the operator to select any tone input from any receiver as an output on each of the four lines to the broadcast reception system.

13 FDM baseband audio is similarly input to the single CSU from each receiver in the outfit. Hardwired links within the CSU select one receiver (normally Rx1) to provide FDM outputs, FDM1 and FDM2, to Demodulator Units in the broadcast reception system.

Note ...

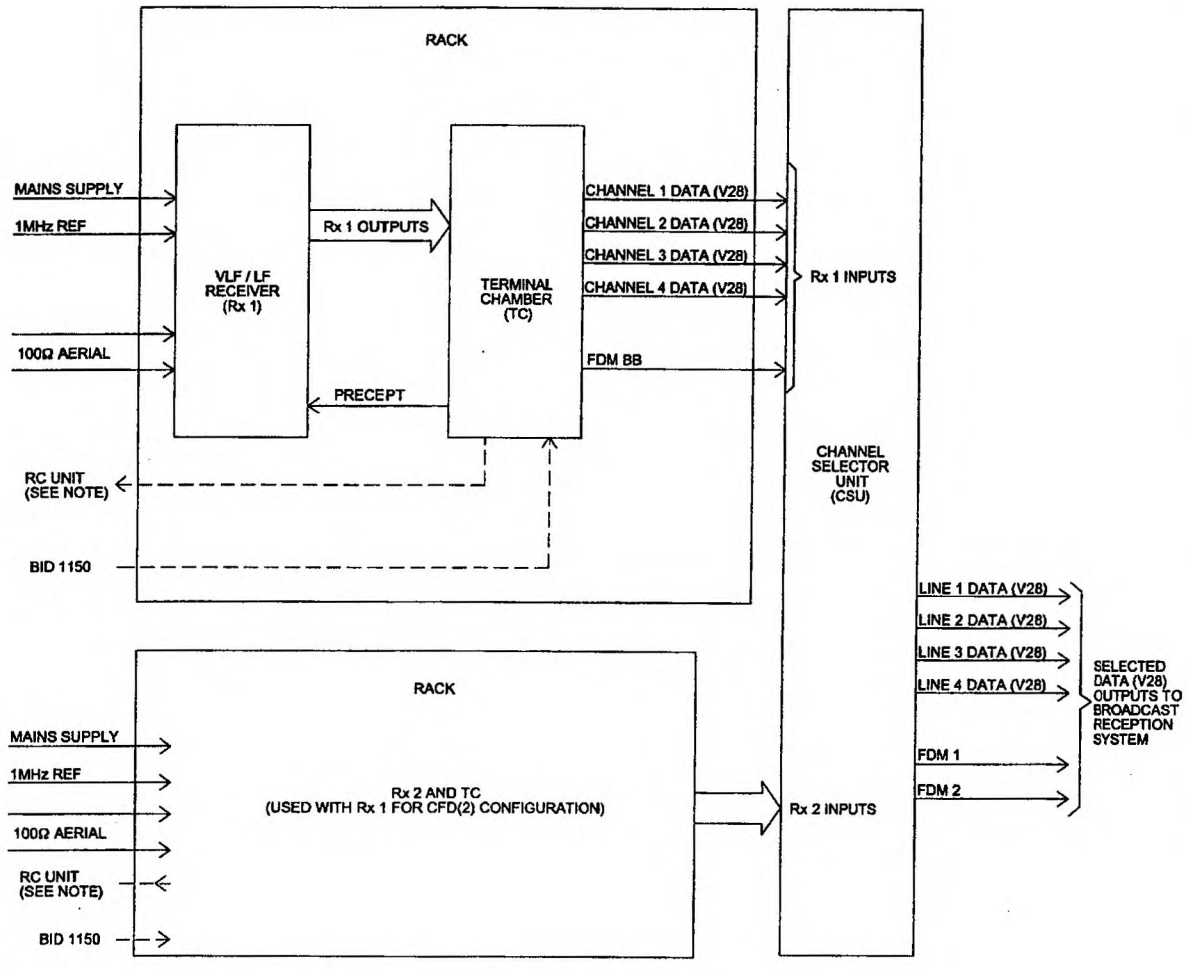
Modification No. 9 to Receiver Outfit CFD(2) changes the internal wiring of the Terminal Chamber so that V28 DC (6-0-6 V) outputs are provided in place of Tone on/off outputs. (Refer to Fig 2.2).

14 Outfit CFD(4) does not have a Terminal Chamber fitted. The function of the Terminal Chamber is provided via Outfit YBX.



NOTE: THE RC UNIT MAY BE FITTED IN RACK BUT DOES NOT FORM PART OF OUTFIT CFD

Fig 2.1 General functional block diagram



NOTE: THE RC UNIT MAY BE FITTED IN RACK BUT DOES NOT FORM PART OF OUTFIT CFD

Fig 2.2 Outfit CFD(2) - overall block diagram

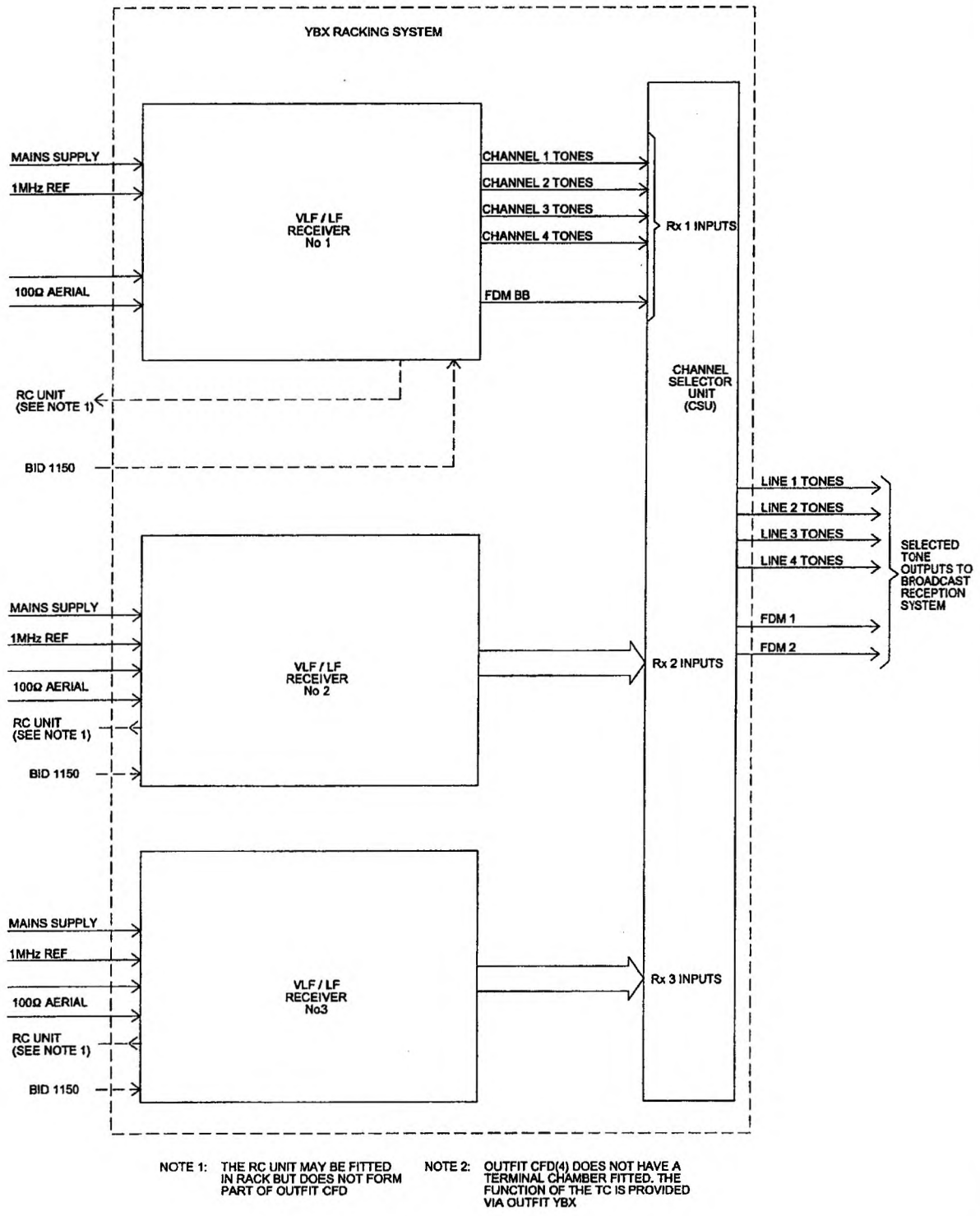


Fig 2.3 Outfit CFD(4) - overall block diagram
(as fitted in the YBX racking system)

CHAPTER 3

PHYSICAL DESCRIPTION

CONTENTS

Para
1 Rack assembly, NSN 5975-99-761-9470
10 Terminal Chamber
14 Channel Selector Units (CSUs), NSN 5895-99-750-9019 and NSN 5820-99-253-4762
18 Receiver, NSN 5820-99-723-3104
19 Overall dimensions and weights

Figure
3.1 Outfit CFD assembly (vertical CSU fitted)
3.2 CSU (NSN 5820-99-253-4762)

RACK ASSEMBLY, NSN 5975-99-761-9470 (Fig 3.1)

1 The rack assembly is a standard framework of angular construction and is designed for fitting within a multi-rack system of broadcast reception terminal equipments.

2 The lower 180 mm of the rack provides the housing for a Receiver, NSN 5820-99-723-3104 which may be inserted or withdrawn from the rack on telescopic runner assemblies, the guide rails for which are secured to a mounting plate on each side of the frame by five countersunk screws and nuts. Four screws on the receiver front panel enable the receiver to be secured to the frame when in the housed position.

3 A metal shelf, mounted on support brackets, is fitted approximately 17 mm above the receiver to prevent obstruction of airflow. The upper portion of the rack interior only contains fans for cooling, but may be used to house other terminal equipment not associated with Outfit CFD, when required.

4 An upper and lower guide rail, each secured to the outer LH side of the rack by three panhead screws, provide the housing for a Terminal Chamber, an integral part of the rack. A locating bracket, mounted vertically on the outside of the frame between the rear ends of the guide rails and secured to the frame by two countersunk screws, contains two locating holes to accommodate fixed dowels on the rear of the chamber when fitted in the housed position.

5 A similar arrangement is incorporated on the RH side of the rack to accommodate a Channel Selector Unit (CSU). In some installations the CSU is mounted horizontally above the receiver. In receiver positions not requiring the installation of a CSU the vacant housing is fitted with a front blanking panel.

6 A connector plate at the rear of the rack is secured to the lower rear frame by three screws and provides the interface for mains, aerial and 1 MHz external reference inputs to the receiver at TB3, SK1 and SK2 respectively.

7 Five cable assemblies, an integral part of the rack, interconnect the rear receiver terminations to the connector plate and the Terminal Chamber. The assemblies are secured to the rack frame by cable ties and are routed to the rear of the receiver via a swinging arm cable support. The support carries a hinged angle bracket containing two slotted holes through which securing screws are fitted to attach the arm to the rear of the receiver chassis. The hinged rear support of the arm is secured by two screws to an angle bracket mounted on the rear of the rack frame. Withdrawal or insertion of the receiver within the rack operates the arm to ensure cables remain free of any obstructions.

8 Cable assemblies into the Terminal Chamber and CSU are secured to the framework by cable ties and incorporate a bight of sufficient length to enable the units to be fully withdrawn from the front of the rack housings with the cables attached.

9 A further cable assembly from the Terminal Chamber to the associated CSU or the CSU fitted to another rack in the same Outfit CFD configuration, is secured to the outside of the frame by cable ties. Any excess length of cable is coiled and tied to the rack at a convenient position.

Terminal Chamber (CFD(2) only)

10 The Terminal Chamber on the LH outer side of the rack is mounted vertically between the two guides and secured to the rack by two front panel screws. The horizontally mounted handles on the front panel are provided to insert or withdraw the chamber from the rack housing. Where a Terminal Chamber is fitted horizontally on the top of the rack, the chamber is secured by six nuts and washers to a terminal chamber mounting plate secured to the rack frame. A mounting bracket, fixed to the rear of the mounting plate by two nuts and washers, incorporates location holes for the two spigots on the rear of the Terminal Chamber.

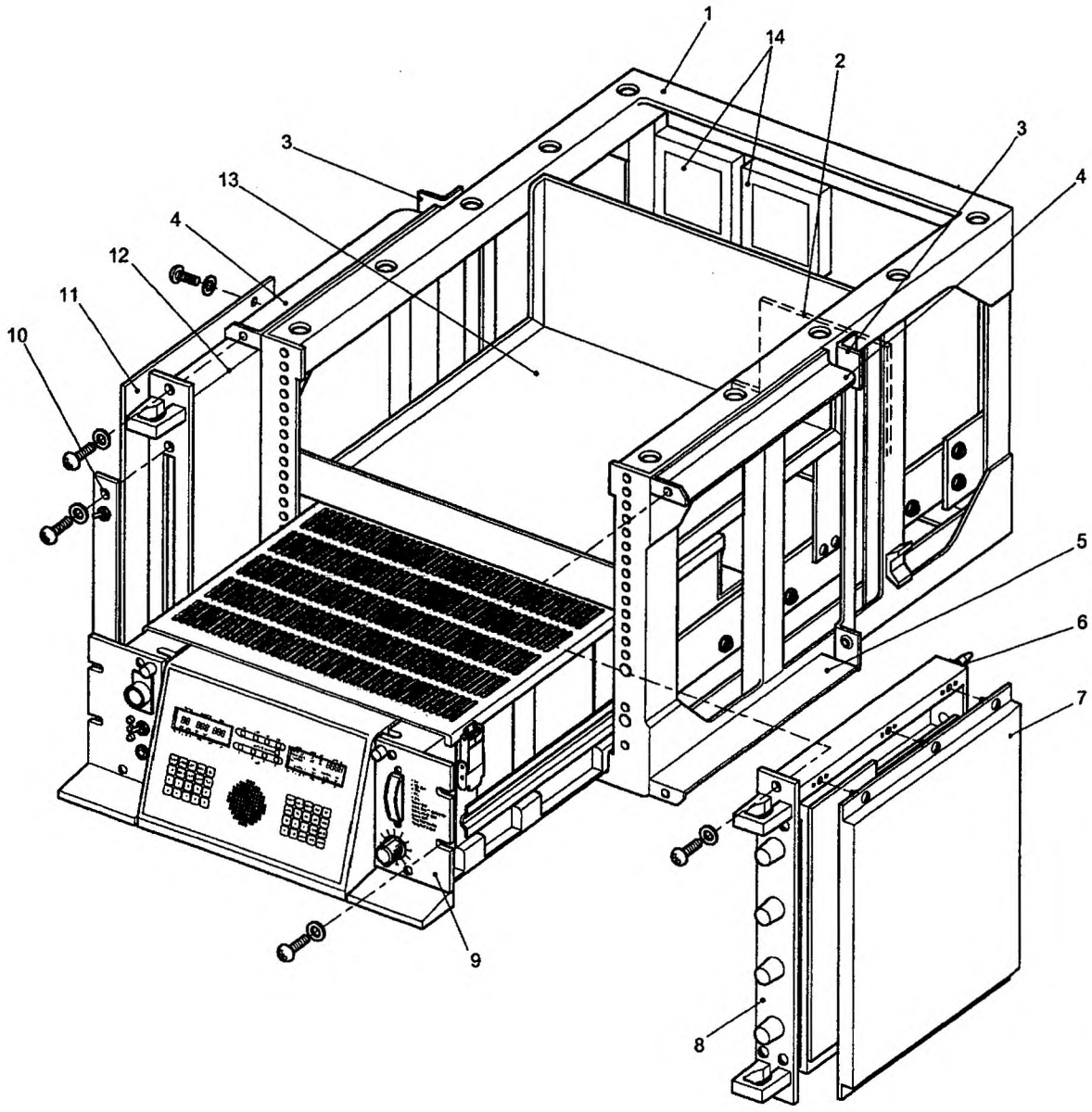
11 Access to within the chamber when fitted in the housed position is provided by a removable access panel which is secured to the front of the chamber by two screws. Ten peripheral countersunk screws secure the side cover of the chamber for access when removed from the rack.

12 The Terminal Chamber contains 10 cable glands on the rear panel to interconnect inputs and outputs. The outlet glands 2, 3, 4 and 6 (counting from top to bottom on side mounted chambers or from right to left on upper mounted chambers) each comprise a Thermofit Cable Feedthrough System (TCFS) fitting; the remaining glands are of plastic.

Note ...

Modification No. 9 to Receiver Outfit CFD(2) changes the internal wiring of the Terminal Chamber so that V28 DC (6-0-6 V) outputs are provided in place of Tone on/off outputs.

13 In S and T class submarines, where two CFD receivers are mounted in one rack (post Mod 3) which affects the rack assembly, NSN 5975-99-761-9470) a horizontally mounted Terminal Chamber is fitted in lieu of the vertically mounted Terminal Chamber from the vacated upper rack.



Key to annotations

1	Rack, NSN 5975-99-761-9470	8	CSU, NSN 5895-99-750-9019
2	Connector plate	9	Receiver, NSN 5820-99-723-3104
3	Locating bracket	10	Access panel
4	Upper guide rail	11	Side cover
5	Lower guide rail	12	Terminal Chamber
6	Dowel	13	Shelf
7	Side cover	14	Fans

Fig 3.1 Outfit CFD assembly (vertical CSU fitted)

CHANNEL SELECTOR UNITS (CSUs) (NSN 5895-99-750-9019 and NSN 5820-99-253-4762)
(Figs 3.1 and 3.2)

14 The CSU (NSN 5895-99-750-9019) (refer to Fig 3.1) is mounted vertically on the RH outer side of the rack between the two guides and secured to the rack by two front panel screws. Two horizontally mounted handles on the front panel are provided to insert or withdraw the unit from the rack housing.

15 Access to within the unit when extracted from the rack is provided by a removable side cover, secured to the unit by six locking fasteners.

16 The CSU contains nine cable glands on the rear panel to interconnect inputs and outputs. The outlet glands marked LINE OUTPUT 1 and LINE OUTPUT 2 each comprise a Thermofit Cable Feedthrough System (TCFS) fitting: the remaining glands are of plastic.

17 The CSU (NSN 5895-99-253-4762) (refer to Fig 3.2) is mounted horizontally in the rack directly above the receiver. The unit may be removed from the rack and access to within the unit is provided by a removable top cover, secured by locking fasteners. The unit has nine cable glands marked similarly to those of the vertically mounted CSU - (NSN 5895-99-750-9019).

RECEIVER, NSN 5820-99-723-3104

18 For an overall physical description of the receiver, refer to BR 8385B, Sub-category 3A, Chapter 2.

OVERALL DIMENSIONS AND WEIGHTS

19 The overall dimensions and weight of the rack (all equipments fitted) is:

Height: 362 mm
Width: 610 mm
Depth: 780 mm
Weight: 49 kg (approx)

20 Individual dimensions and weights of each unit are:

Receiver, NSN 5820-99-723-3104

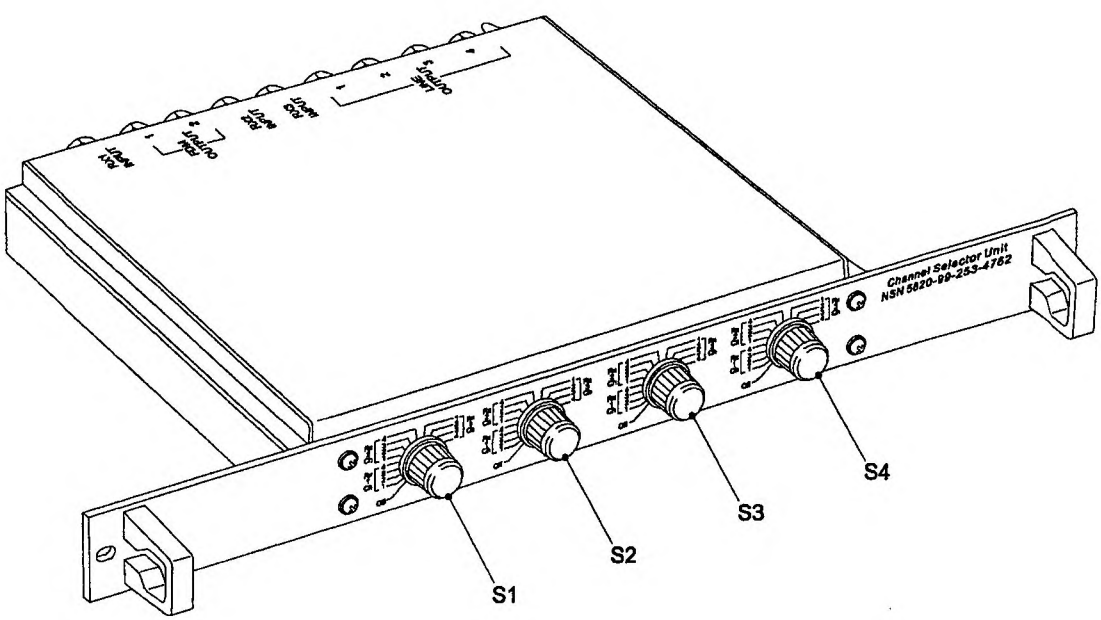
Height: 171 mm
Width: 482 mm
Depth: 596 mm
Weight: 26 kg (approx)

CSU, NSN 5895-99-750-9019

Height: 348 mm
Width: 41 mm
Depth: 388 mm
Weight: 5 kg (approx)

CSU, NSN 5820-99-253-4762

Height: 41 mm
Width: 482 mm
Depth: 388 mm
Weight: 5 kg (approx)



Note ...
The CSU illustrated is used only with Outfit CSU(4), the layout of which is shown in Category 3A, Chapter 1, Fig 1.2.

Fig 3.2 CSU (NSN 5820-99-253-4762)

SUB-CATEGORY 3B

DETAILED TECHNICAL DESCRIPTION

CONTENTS

CHAPTER 1 Rack, NSN 5975-99-761-9470
CHAPTER 2 Channel Selector Units, NSN 5895-99-750-9010 and NSN 5820-99-253-4762
CHAPTER 3 Receiver, NSN 5820-99-723-3104

CHAPTER 1

RACK, NSN 5975-99-761-9470

CONTENTS

Para
1 General
2 Connector plate
3 Terminal Chamber

Figure
1.1 Rack, NSN 5975-99-761-9470
1.2 Rack interconnections CFD(2) - showing 1 Rx only (post Mod 9)
1.3 Outfit CFD(2) terminal chamber connections for second receiver
1.4 Rack interconnections CFD(4) - showing 1 Rx only

GENERAL (Fig 1.1)

1 The rack, illustrated in Fig 1.1, incorporates a Terminal Chamber and connector plate, and provides for the installation of a VLF/LF Receiver, NSN 5820-99-723-3104 and a CSU within the broadcast reception system.

CONNECTOR PLATE (Fig 1.2)

2 Mains supply, 100 ohm aerial and 1 MHz reference inputs are fed via connectors TB3, SK1 and SK2, mounted on a connector plate at the rear of the rack, to 5PL1, 5SK5 and 5SK9 respectively on the receiver rear panel.

TERMINAL CHAMBER - (CFD(2) Only) (Fig 1.2)

3 The Terminal Chamber provides an interface for all connections to 5PL2 and 5PL3 on the associated receiver, the chamber containing two triple row, 60-pole, 60-way taper pin blocks TB1 and TB2.

4 TB1 is utilised to interconnect the four channels of balanced 1 kHz tone on/off outputs (CHANNEL 1 tone(A) and (B) to CHANNEL 4 TONE(A) and (B)) and the FDM audio baseband (FDM BB) from the receiver to a CSU. The remaining receiver signal inputs/ outputs at TB1 are available for use as required and comprise:

(1) Channel 1 to 4 outputs at CCITT-V28 operating levels.

(2) BID 1150 codeword data inputs.

(3) CW mode output signal.

(4) Delay Calibration output information.

(5) Redundancy coded MSK output.

(6) Channel 1 to 4 soft decision outputs.

(7) Receiver overheat alarm for remote indication.

(8) Receiver status output.

(9) AGC output level (0 to 10 V dc).

Note ...

Modification No. 9 to Receiver Outfit CFD(2) changes the internal wiring of the Terminal Chamber so that V28 DC (6-0-6 V) outputs are provided in place of Tone on/off outputs. (Refer to Fig 1.2).

5 TB2 is used to interface receiver inputs/outputs to external equipments when required to operate in the FSK+SD and FH modes of operation.

6 Outfit CFD(4) does not have a Terminal Chamber fitted. The function of the Terminal Chamber is provided via Outfit YBX. Refer to BR 8895.

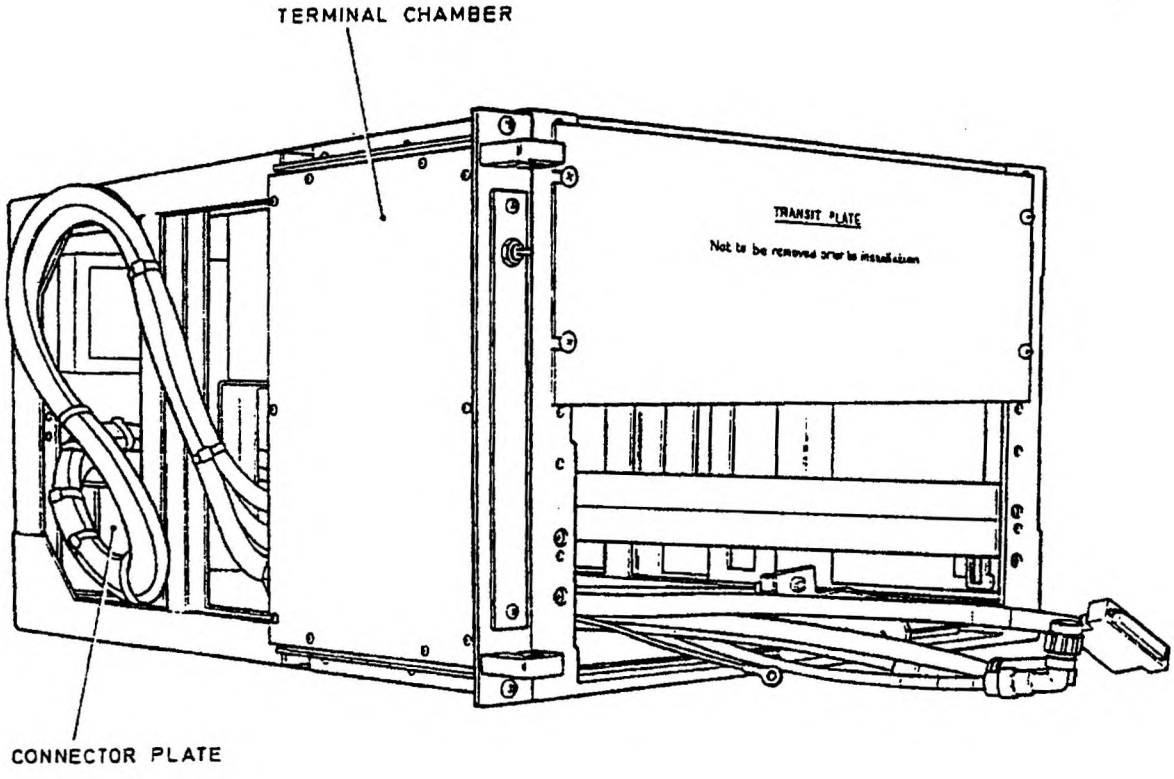


Fig 1.1 Rack, NSN 5975-99-761-9470

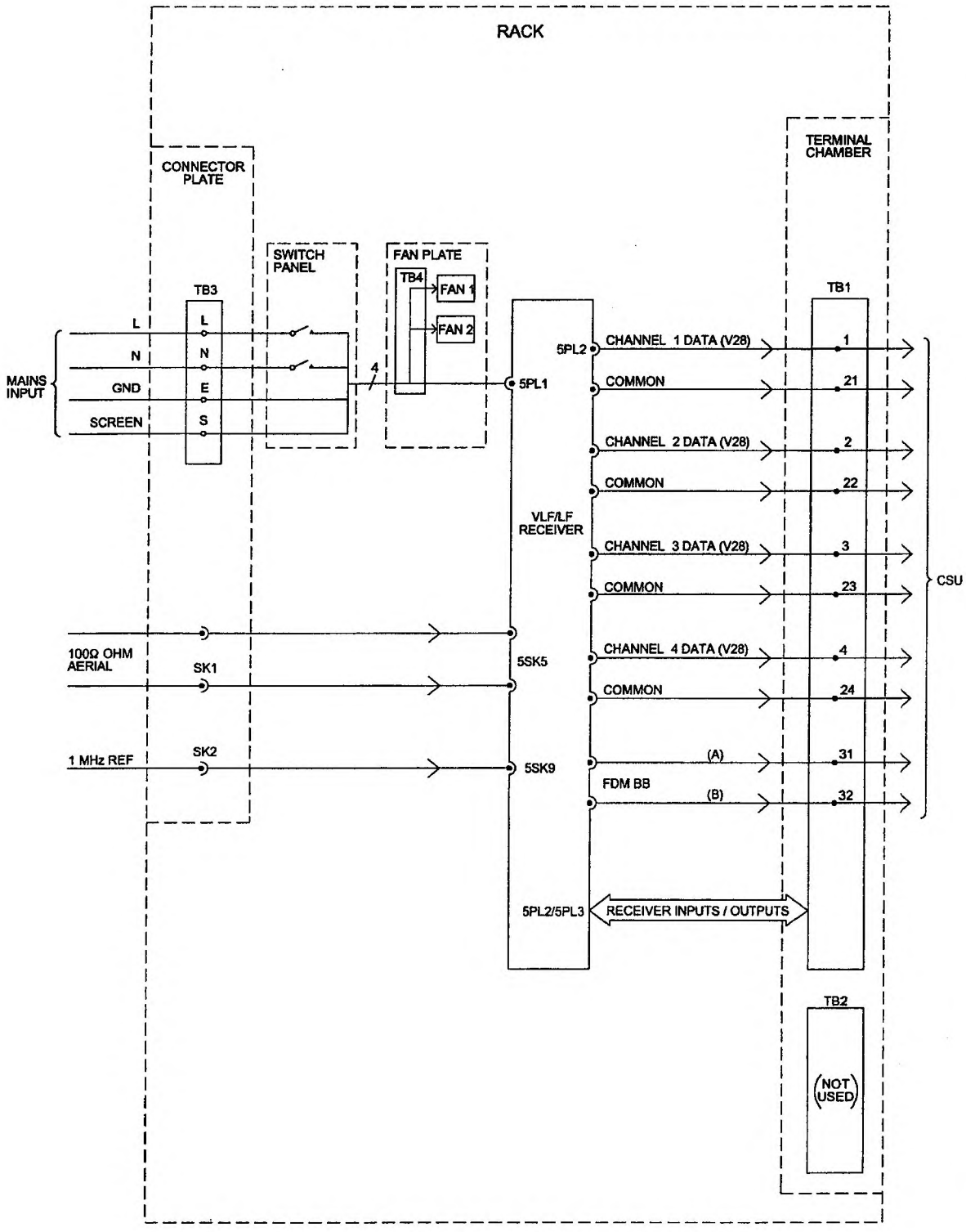


Fig 1.2 Rack interconnections CFD(2) - showing 1 Rx only (post Mod 9)

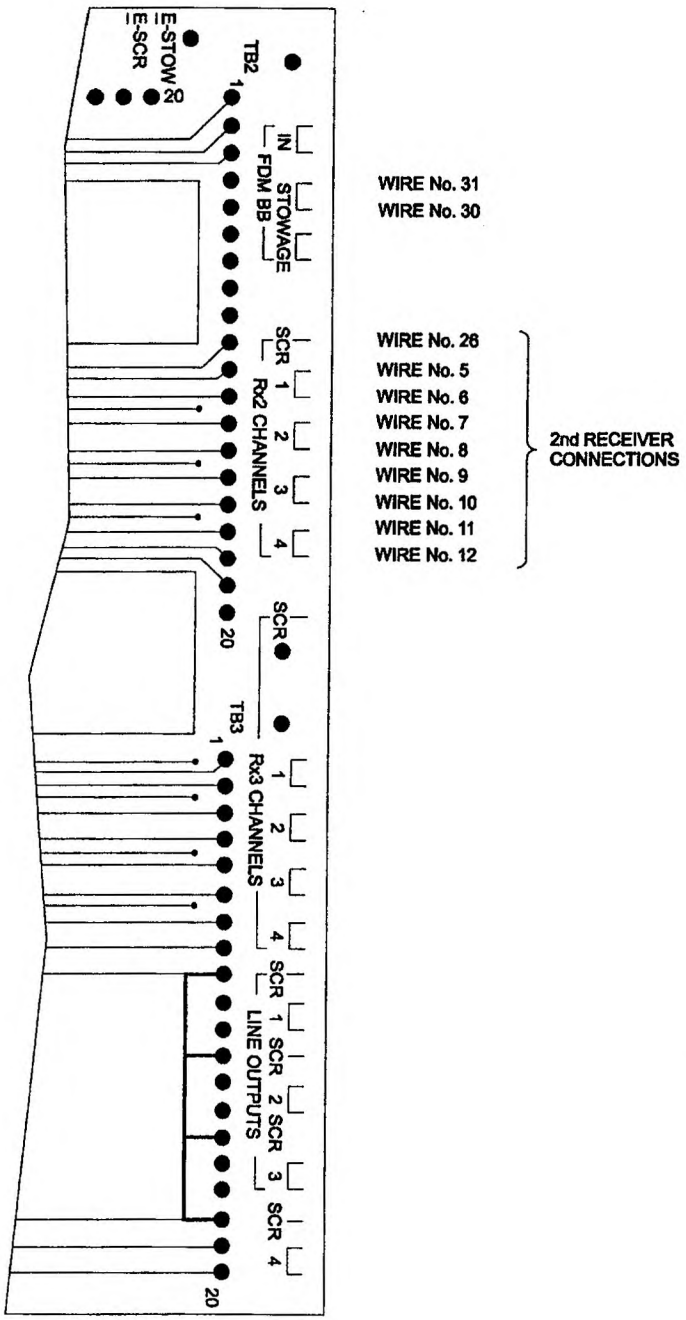


Fig 1.3 Outfit CFD(2) terminal chamber connections for second receiver

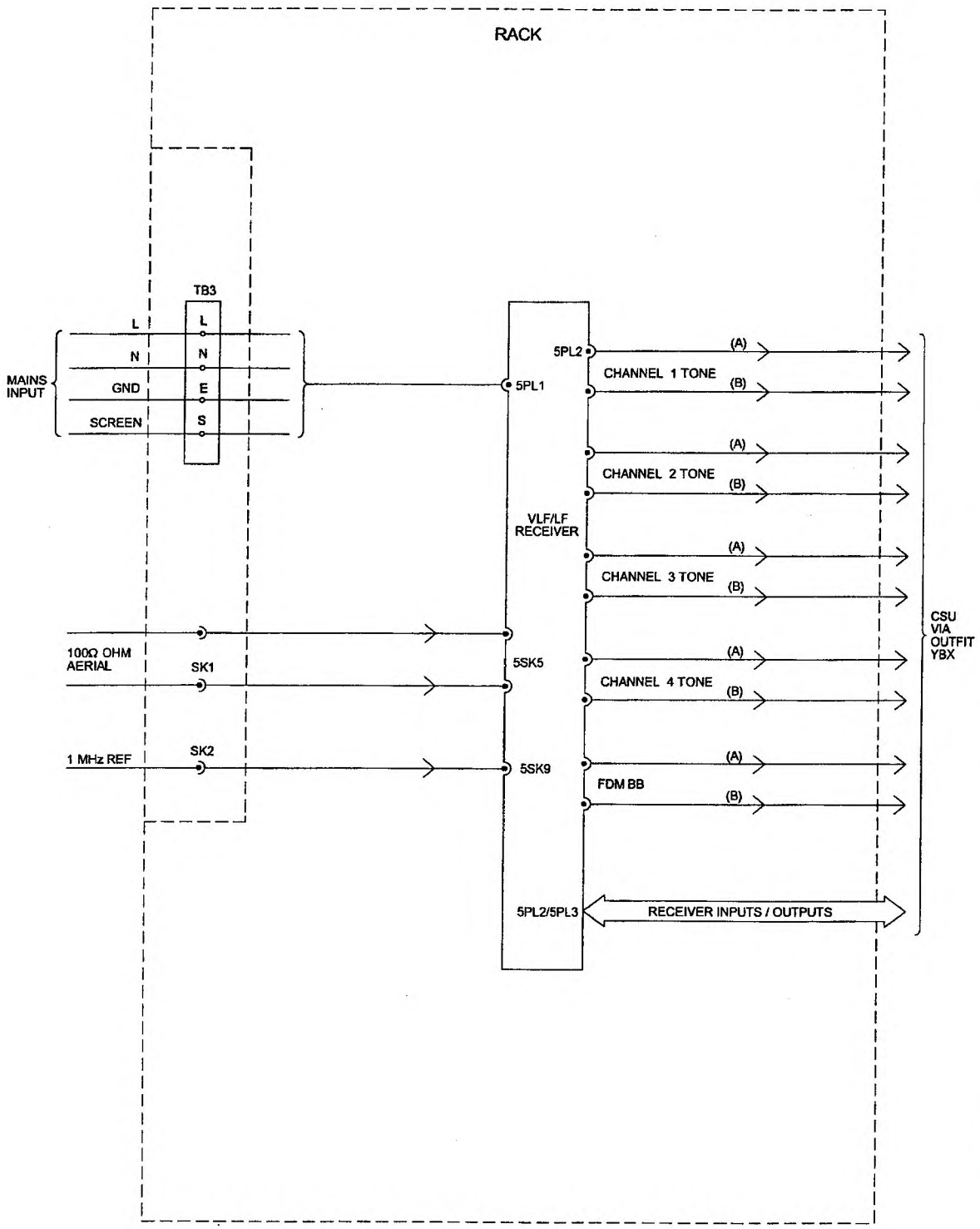


Fig 1.4 Rack interconnections CFD(4) - showing 1 Rx only

CHAPTER 2

CHANNEL SELECTOR UNITS,

NSN 5895-99-750-9019 AND NSN 5820-99-253-4762

CONTENTS

Para
1 Function
Circuit description
2 Tone selection
4 FDM operation

Figure
2.1 Channel Selector Unit, NSN 5895-99-750-9019
2.2 Circuit diagram - CSU
2.3 Channel Selector Unit, NSN 5820-99-253-4762

FUNCTION (Fig 2.1 and Fig 2.3)

1 The Channel Selector Unit (CSU), illustrated in Figs 2.1 and 2.3, accepts four traffic channel inputs of 1 kHz on/off tones from each of three receivers (maximum) operating in the MSK or FSK modes. The unit selects any of the traffic channels for output on each of four lines to the broadcast reception system. In addition, the unit receives FDM audio baseband output from each receiver operating in the FDM mode and selects the required output for use in the broadcast reception system.

CIRCUIT DESCRIPTION (Fig 2.2)

Tone Selection

2 The four channels of 1 kHz on/off tones, designated CHANNEL 1 TONE(A) and (B) to CHANNEL 4 TONE(A) and (B), fed from each of the three receivers (maximum) via the associated Terminal Chambers, provide a total of 12 inputs (maximum) to the unit. The inputs are wired via a PEC to four 13-way rotary switches S1 to S4. Each switch has two wafers; wafer 'a' to which all traffic (A) inputs are connected at positions 2 to 13 and wafer 'b' to which all traffic (B) inputs are connected at positions 2 to 13. Position 1 of each switch is the OFF condition.

Note ...

Modification No. 9 to Receiver Outfit CFD(2) changes the internal wiring of the Terminal Chamber so that V28 DC (6-0-6 V) outputs are provided in place of Tone on/off outputs. (Refer to Cat 3B, Chap 1).

3 The wipers of the four switches provide selected line traffic outputs, designated LINE 1(A) and (B) to LINE 4(A) and (B), to the external broadcast reception system equipments. According to the positions set on the switches, each line output may be derived from any of the receivers connected, or alternatively may be derived from the same receiver.

FDM Operation (Fig 2.2)

4 The CSU provides for the input of audio FDM baseband from the Terminal Chamber associated with each receiver in Outfit CFD. Internal hardwired links within the unit enable the audio from any one of the receivers to be connected to a hybrid-splitter comprising transformers T1 and T2 and resistor R1. The two identical outputs, designated FDM1 and FDM2, from the hybrid-splitter allows two external FDM demodulators to be fed from one receivers audio baseband output.

Note ...

Normally, the CSU is hardwired to provide FDM audio baseband outputs from Rx1 in a multi-receiver configuration.

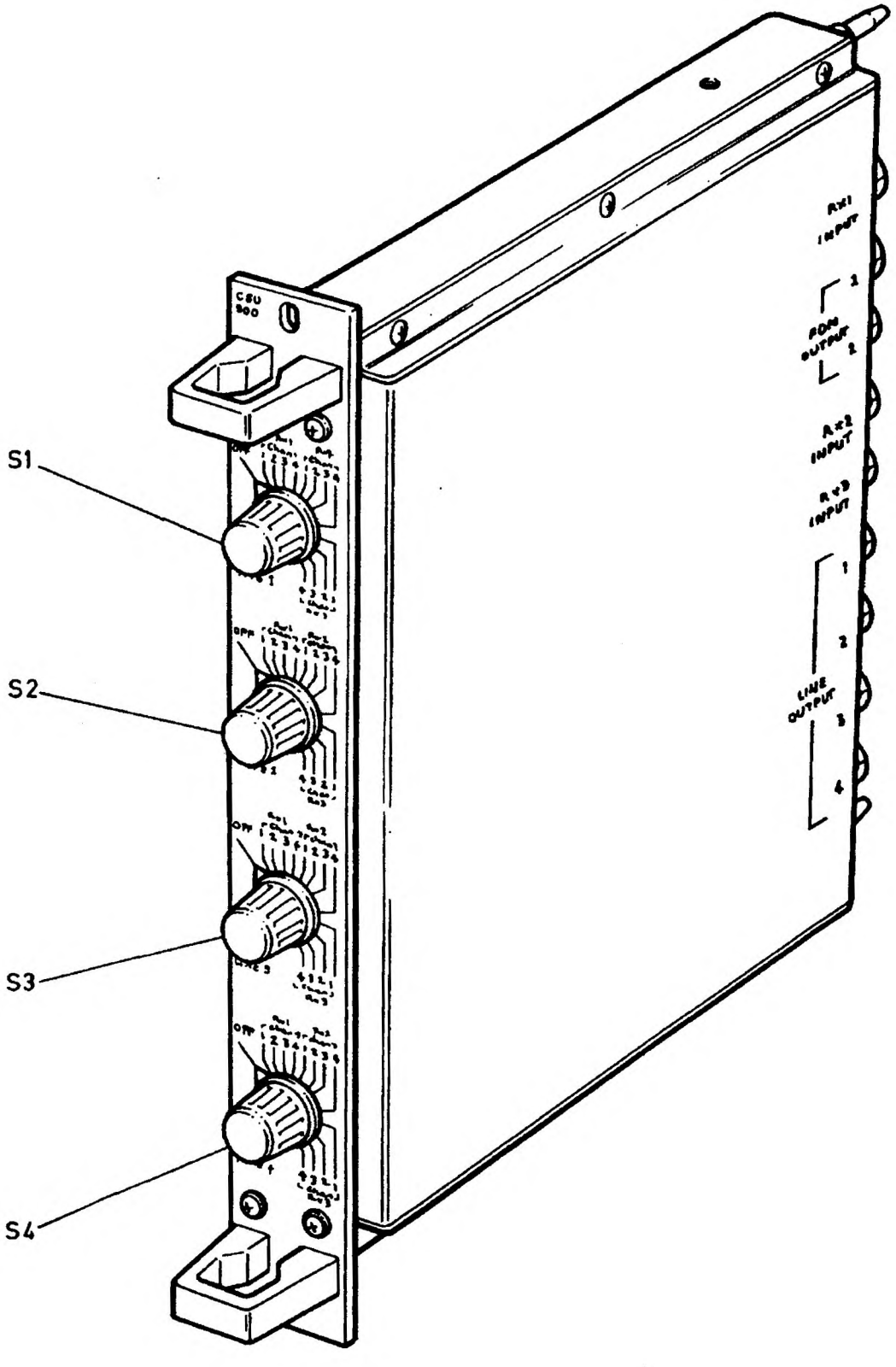


Fig 2.1 Channel Selector Unit, NSN 5895-99-750-9019

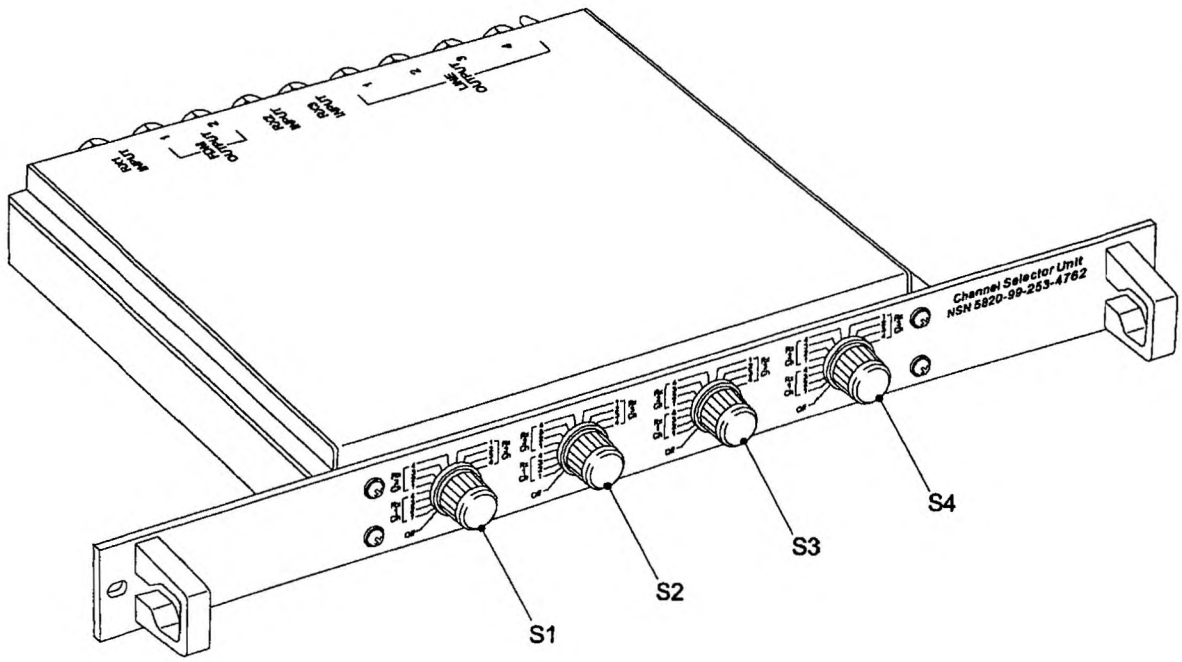


Fig 2.3 Channel Selector Unit, NSN 5820-99-253-4762

CHAPTER 3

RECEIVER, NSN 5820-99-723-3104

CONTENTS

Para
1 General
3 Functional description
13 Inputs and outputs

Figure
3.1 Receiver, NSN 5820-99-723-3104 (showing slotted top cover)

GENERAL (FIG 3.1)

1 The Receiver, NSN 5820-99-723-3104, illustrated in Fig 3.1 and fully described in BR 8385B, is mounted on runners and housed in the rack.

2 The receiver, operating over the VLF/LF frequency range of 10 kHz to 200 kHz, is capable of receiving and demodulating AM, FDM, CW, FH, FSK, FSK+SD and MSK transmissions with BID 920 encryption (Jason) and/or KW46T encryption (Vallor) with Error Detection and Correction (EDAC) and Empty Channel Filler (ECF).

FUNCTIONAL DESCRIPTION

3 The receiver is microprocessor controlled, the commands initiated from two keyboards, located on the front panel, which operate in conjunction with two associated Liquid Crystal Displays (LCDs) providing display of all receiver selections. Alternatively, the receiver may be controlled from a remote position, located up to five metres away.

4 The left hand keyboard controls CHANNEL and FREQUENCY selection and allows reception parameters to be stored or recalled from memory, or commands the receiver to USE them. The UP and DOWN keypads increment or decrement the tuned frequency in 5 Hz steps. A TEST keypad enables self-test programs to be selected to check all front panel controls and displays and to ascertain correct receiver operation in all reception modes. For these reception tests a built-in signal generator provides the necessary test signals. The CLR keypad cancels incorrect keyboard entries from either keyboard and removes any test instructions set.

5 The right hand keyboard and display select and indicate reception mode, together with EDAC, the method of decryption and baud rate (ie 50 or 75 baud). The operator has the facility to manually select either KW46R or BID 940 decryption, as appropriate, to each channel of the transmitted encryptions of a multichannel transmission (eg MSK2 or MSK4).

6 Except for frequency increment and volume control of internal monitor loudspeaker and headphones, there are no other variable operator controls. A single change of bandwidth and an AGC ON/OFF selection is available to modify the dedicated values of a selected mode.

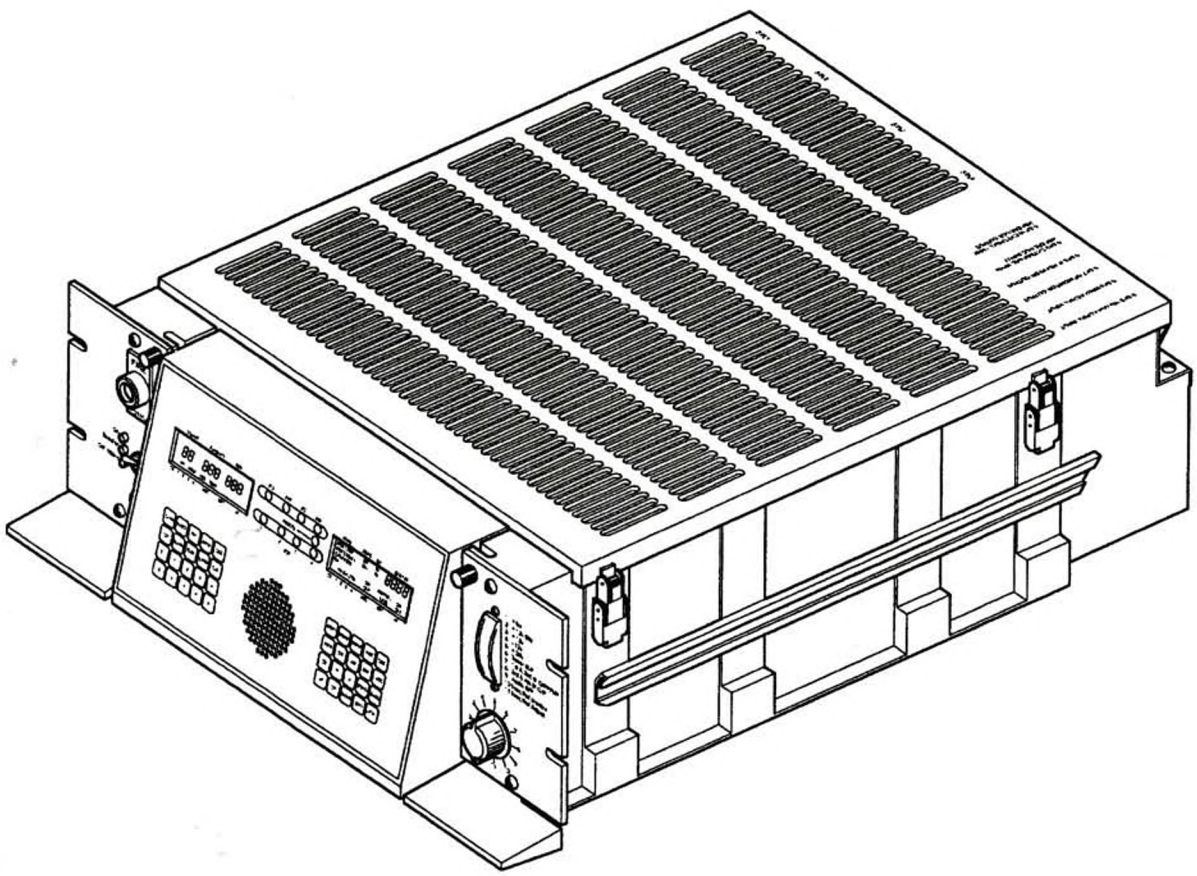


Fig 3.1 Receiver, NSN 5820-99-723-3104
(showing slotted top cover)

7 Up to 63 channels of selectable reception parameters may be stored and recalled. Each channel may be interrogated and modified without interruption to normal reception. Common transmission parameters are normally stored in channels 01 to 10 which may be protected by DIL switch selections in the control processor. The parameters of the channel in use are always stored in channel 00. If the receiver is switched off, or if the supply fails, the reception parameters last in use are memorised. On restoration of the supply, channel 00 is automatically recalled and reception resumes.

8 The receiver contains an internal frequency standard, accurate to within 1 part in 108, for which crystal ageing indication and correction is available. In addition, an external frequency standard may be used to supply a 1 MHz reference frequency to the receiver. When the external source is utilised, the internal generator is phase locked to the external reference and remains continuously available for automatic selection should the external standard fail.

9 The receiver may be switched to a standby condition whereby the internal frequency reference is fully powered, to preserve frequency stability, whilst other modules operate at low voltage to reduce power consumption. The status of receiver supplies can be monitored using the meter on the Front Panel, Left. Red LEDs are used to indicate Reference Loop Failure (RLF), External Reference Failure (ERF), the presence of ECF, loss of Fibonacci Synchronisation (FSF) and the existence of bit errors on any data channel (EC).

10 The receiver circuit is configured as a superheterodyne with front-end tuning and an IF of 247.5 kHz. Amplification prior to the main selectivity is provided by cascaded narrow bandwidth crystal filters.

11 Demodulation of FSK, MSK, FH and FSK+SD modes is provided by software controlled, digital signal processors. AM and CW modes are demodulated by an analogue product detector which also provides undemodulated FSK, MSK and FH for audio monitoring purposes. Similarly, 8-channel FDM is produced as an undemodulated output, at baseband, for use with external demodulators. Any one of these channels may be demodulated internally by the receiver.

12 The receiver continuously self-monitors synthesisers for 'out of phaselock' or inadequate level and, when a failure is detected, causes a flashing TEST message to be displayed on the front panel. Fault location is assisted by test programs, initiated by operator commands from the front panel, which are used in conjunction with LED indications and the front panel meter.

Inputs and Outputs

13 A connector plate, mounted on the rear of the rack, interconnects the following inputs to connectors on the rear chassis of the receiver:

(1) 100 ohm broadband balanced aerial input.

(2) 1 MHz frequency reference from an external standard.

(3) Mains supply.

14 Codeword data inputs, designated CODEWORD 0(A) and (B) and CODEWORD 1(A) and (B), are required by the receiver for demodulation of FH and FSK+SD modes. The data is to be input at CCITT-V11 operating levels from an external BID 1150 and fed via the Terminal Chamber to connectors mounted on the rear panel of the receiver.

15 Outputs from the receiver which are interfaced at the Terminal Chamber and fed to the Channel Selector Unit comprise:

15.1 Four channels (maximum) of 1 kHz on/off tones when operating in the MSK/FSK modes, the channels designated CHANNEL 1 TONE(A) and (B) to CHANNEL 4 TONE(A) and (B).

15.2 FDM baseband audio when operating in the FDM mode, the output designated FDM BB TONE(A) and (B).

16 Further outputs provided by the receiver are terminated at the Terminal Chamber and remain available for use when additional equipments are fitted in the broadcast reception system. These outputs comprise:

16.1 Four channels (maximum) at CCITT-V28 operating levels when the receiver is selected for MSK and FSK modes of operation, the channels designated CHANNEL 1 DATA to CHANNEL 4 DATA. A further output, designated MSK HARDWIRED, consists of any one of the four V28 channels, as selected by internal hardwired links within the receiver.

16.2 Four soft decision information channels operating at CCITT-V28 levels, each associated with a respective MSK channel output, and designated CHANNEL 1 SOFT DEC. to CHANNEL 4 SOFT DECISION DEC.

16.3 Delay calibration information operating at CCITT-V28 operating levels and designated DELAY CALIBRATE.

16.4 Redundancy coding information provided by a tone output, designated DATA D TONE, when the receiver is set to an MSK mode.

16.5 A channel data output, designated DATA A TONE and operating at CCITT-V11 levels, provided by the receiver when selected for FH and FSK+SD modes of operations.

16.6 AGC level output, designated AGC O/P (0 to 10 V dc), for remote indication of received signal strength.

16.7 Line outputs, designated OVERHEAT ALARM N/C, N/O and COMMON, to provide remote indication of an overheat condition within the receiver.

16.8 Receiver status, designated Rx STATUS, at CCITT-V28 operating levels for remote indication of the receiver operating status condition.

SUB-CATEGORY 4B

PREPARATION FOR ACCEPTANCE

CONTENTS

CHAPTER 1 Setting to Work Procedure

CHAPTER 1

SETTING TO WORK PROCEDURE

CONTENTS

Para

Prerequisites
1 Mechanical and electrical inspection
2 Receiver setting to work
3 Test equipment
4 Personnel
5 Signal path continuity checks
7 Outfit CFD(2)
8 Outfit CFD(4)
9 Fan checks

Figure
1.1 CSU output terminals

PREREQUISITES

Mechanical and Electrical Inspection

1 The Inspectorate (Maritime Commissioning Trials and Assessment - previously Captain Weapons Trials Team) to have inspected the work carried out by the Installation Authority and to have verified the electrical testing of Outfit CFD including earth bonding and continuity checks.

Receiver Setting to Work

2 Each receiver contained in Outfit CFD to be set to work in accordance with BR 8385B, Sub-category 4B, Chap 1.

Test Equipment

3 The following Test Equipment is required:

(1) Headphone set terminated with crocodile clips.

(2) Oscilloscope.

Personnel

4 Two skilled.

SIGNAL PATH CONTINUITY CHECKS (Fig 1.1)

5 Before carrying out the following continuity checks, switch off aerial exchange or remove the aerial inputs to ensure the receiver(s) do not achieve synchronism when selected for MSK4 operation (ie the receiver provides a 1 kHz continuous tone on each of the four channel tone outputs).

6 Modification No. 9 to Receiver Outfit CFD(2) changes the internal wiring of the Terminal Chamber so that V28 DC outputs (6-0-6 V) are provided in

place of Tone on/off outputs. In this case, the signal path may be checked using an oscilloscope instead of headphones.

Outfit CFD(2)

7 To check continuity of Channel 1 to 4 V28 DC (6-0-6 V) lines from Rx1 and Rx2 to the CSU line outputs, when selected on the appropriate CSU front panel switches, proceed as follows:

(1) Ensure Rx1 mains switch is to 'On' and Rx2 mains switch is to 'Standby'.

(2) Select an MSK4 configured channel on Rx1 and press USE keypad.

(3) Remove and retain the two screws securing the CSU to the rack and withdraw the CSU sufficient to access the side panel.

(4) Release the six fasteners securing the side panel to the unit and remove the side panel.

(5) On the CSU, set switch S1 (Line 1) to 'Rx1/Chan1' and set switches S2 to S4 (Line 2 to 4 respectively) to 'Off'.

(6) Connect the oscilloscope (suitably terminated with crocodile clips) across TB1-2 and TB1-3 and ensure a 6-0-6 V data signal is present.

(7) Use the oscilloscope to ensure no 6-0-6 V data signal outputs are present at TB1-4 and 5 (Line 2 output), TB1-6 and 7 (Line 3 output) and TB1-8 and 9 (Line 4 output).

(8) Set S1 to 'Rx1/Chan2', 'Chan3' and 'Chan4' in turn and repeat the procedures detailed in (5) and (6) for each switch position.

(9) Set S1 to 'Off' and set S2 (Line 2 switch) to 'Rx1/Chan1'.

(10) Connect oscilloscope across TB1-4 and 5 (Line 2 output) and ensure a 6-0-6 V data signal is present. Ensure no 6-0-6 V data signal is present at Line 1, 3, and 4 outputs.

(11) Set S2 to 'Rx1/Chan2', 'Chan3' and 'Chan4' in turn and repeat (10) for each switch position.

(12) Set S2 to 'Off' and S3 (Line 3 switch) to 'Rx1/Chan1'.

(13) Connect headphones across TB1-6 and 7 (Line 3 output) and ensure a 6-0-6 V data signal is present. Ensure no 6-0-6 V data signal output is present at Line 1, 2 and 4 outputs.

(14) Set S3 to 'Rx1/Chan2', 'Chan3' and 'Chan4' in turn and repeat (13) for each switch position.

(15) Set S3 to 'Off' and S4 (Line 4 switch) to 'Rx1/Chan1'.

(16) Connect oscilloscope across TB1-8 and 9 (Line 4 output) and ensure a 6-0-6 V data signal is present. Ensure no 6-0-6 V data signal output is present at Line 1, 2 and 3 outputs.

(17) Set S4 to 'Rx1/Chan2', 'Chan3' and 'Chan4' in turn and repeat (16) for each switch position.

(18) Set Rx1 mains switch to 'Standby' and Rx2 mains switch to 'On'.

(19) Select an MSK4 configured channel on Rx2 and press USE keypad.

(20) To check continuity of Rx2 outputs, carry out the procedures detailed in Sub-paragraphs 7(3) to 7(17) substituting Rx2 switch positions on S1 to S4 for the Rx1 positions.

(21) Remove oscilloscope connections and secure side panel of the unit using the six quick release fasteners.

(22) Secure the unit in position using the two screws retained in Step (3).

Outfit CFD(4)

8 To check continuity of Channel 1 to 4 tone output lines from Rx1 to the CSU line outputs, when selected on the appropriate CSU front panel switches, proceed as follows:

(1) Ensure Rx1 mains switch is to 'On' and Rx2 and Rx3 mains switches are to 'Standby'.

(2) At the receiver, select an MSK4 configured channel and press USE keypad.

(3) Remove and retain the two screws securing the CSU to the rack and withdraw the CSU sufficient to access side panel.

(4) Release the six fasteners securing the top panel to the unit and remove the top panel.

(5) On the CSU, set switch S1 (Line 1) to 'Rx1/Chan1' and set switches S2 to S4 (Line 2 to 4 respectively) to 'Off'.

(6) Connect an oscilloscope across TB3-10 and TB3-11 and ensure a V28 DC (6-0-6 V) signal is present.

(7) Use the oscilloscope to ensure no outputs are present at TB3-13 and 14 (Line 2 output), TB3-16 and 17 (Line 3 output) and TB3-19 and 20 (Line 4 output).

(8) Set S1 to 'Rx1/Chan2', 'Chan3' and 'Chan4' in turn and repeat the procedures detailed in (6) and (7) for each switch position.

(9) Set S1 to 'Off' and set S2 (Line 2 switch) to 'Rx1/Chan1'.

(10) Connect the oscilloscope across TB3-13 and 14 (Line 2 output) and ensure a V28 DC (6-0-6 V) signal is present. Ensure no signal output is present at Line 1, 3, and 4 outputs.

(11) Set S2 to 'Rx1/Chan2', 'Chan3' and 'Chan4' in turn and repeat (10) for each switch position.

(12) Set S2 to 'Off' and S3 (Line 3 switch) to 'Rx1/Chan1'.

(13) Connect the oscilloscope across TB3-16 and 17 (Line 3 output) and ensure a V28 DC (6-0-6 V) signal is present. Ensure no signal output is present at Line 1, 2 and 4 outputs.

(14) Set S3 to 'Rx1/Chan2', 'Chan3' and 'Chan4' in turn and repeat (13) for each switch position.

(15) Set S3 to 'Off' and S4 (Line 4 switch) to 'Rx1/Chan1'.

(16) Connect the oscilloscope across TB3-19 and 20 (Line 4 output) and ensure a V28 DC (6-0-6 V) signal is present. Ensure no signal output is present at Line 1, 2 and 3 outputs.

(17) Set S4 to 'Rx1/Chan2', 'Chan3' and 'Chan4' in turn and repeat (16) for each switch position.

(18) Remove the oscilloscope connections, replace the top panel and secure using the six quick release fasteners.

(19) Secure the unit in position in the rack using the two screws retained in Step (2).

FAN CHECK

9 CFD(4) fans are fitted at the bottom of the Outfit YBX Rack. Refer to BR 8895 - Flexible Racking System handbook which gives details of the correct procedure for checking the operation of the cooling fans.

Note ...

On S and T Class submarines, where two receivers are fitted in a single rack with an accompanying external Fan Supply Change Over Unit (5820-99-524-2208 (not part of Outfit CFD)), an independent mains power supply is fed to each receiver via switches SW1 and SW2 on the unit. Set either or both of these switches to ON and ensure both cooling fans mounted at the rear of the CFD rack are operating correctly. (Refer to Cat 1A, Chap 3, Section 2 of this manual for details).

SUB-CATEGORY 4C

ACCEPTANCE TRIALS SCHEDULES

CONTENTS

CHAPTER 1 Harbour Acceptance Trials (HATs)
CHAPTER 2 Sea Acceptance Trials (SATs)

CHAPTER 1

(COMPLETELY REVISED)

HARBOUR ACCEPTANCE TRIALS (HATs)

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Para
1 Object
2 Prerequisites
3 Receiver prerequisites
Conduct
4 Initial conditions
5 Preliminary checks of receiver and Test Set
6 Testing receiver outputs
7 Reception tests
8 Testing AM/CW modes of reception
9 Testing MSK and FSK modes of reception
10 Testing Empty Channel Filler (ECF)
11 Testing FH1 and FH3 modes of reception
12 Reconnection of the receiver
13 Re-validation of the reception system

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1.1 MSK and FSK Bit Error Rate at 16 kHz

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1.1 Receiver RHS LCD panel
1.2 Test Set central and LHS panels
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1.4 Test Set LHS/RHS LCD panels
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1.6 Receiver RHS LCD panel
1.7 Test Set - voltage selector details
1.8 Receiver and Test Set interconnections
1.9 Acceptance Performance Record Sheet

OBJECT

1 The object of HATs is to confirm satisfactory performance of the Outfit CFD with the vessel alongside in harbour and to verify that the equipment is ready in all respects for Sea Acceptance Trials (SATs) or external communication trials.

PREREQUISITES

2 The following requirements are to be observed:

2.1 Mechanical and Electrical Installation. The outfit is to have been in stalled in accordance with BRF 8385A(4A) - Installation Specification.

2.2 Setting to Work. The outfit is to have been set to work in accordance with Sub-category 4B - Preparation for Acceptance.

2.3 Associated Equipment. The following items of equipment, applicable to fit, are required to be tested, tuned and available for use.

(1) VLF/LF Aerial Outfit (ie ALZ Fin Loops).

(2) VLF/LF Aerial Exchange Outfit EUD(1).

(3) Crypto equipments.

(4) Teleprinter terminals.

2.4 Test Equipment

(1) Digital Multimeter (0657/539-4008).

(2) Receiver Test Set (NSN 5820-99-805-7199 - Modified to MOD STRIKE 1).

2.5 Associated Handbooks:

BR 8385B Receiver, NSN 5820-99-723-3104

2.6 Stabilised Electrical Supply

100 to 125 V, single phase, 47 to 63 Hz (or)
200 to 250 V, single phase, 47 to 63 Hz.

2.7 Crypto Material

Availability of current crypto material.

RECEIVER PREREQUISITES

3 Prior to conducting trial ensure the following:

3.1 EUD(1) aerial exchange unit is switched on and Fin Loop aerial selected to provide signal input to receiver(s).

CONDUCT

Initial Conditions

4 Prior to conducting trials of Receiver, NSN 5820-99-723-3104, ensure the following:

(1) All electrical power supplies to the receiver are disconnected.

(2) Disconnect receiver rear connectors, but retain the earth connection to the Earth Stud.

(3) Release the four securing clips which retain the top cover. Remove the top cover and retain.

(4) Remove the front and rear retaining bars to allow access to the receiver modules.

(5) Locate and remove the Control Processor PEC Assembly (Module 7).

(6) Ensure the link and DIL switch settings are as shown in BR 8385B, Cat 3B, Chap 13, Table 13.2.

(7) Refit the Control Processor PEC Assembly and replace the front and rear retaining bars removed in (4).

(8) Refit the top cover retained in (3) and secure using the clips provided.

(9) Ensure the receiver is switched to OFF and refit the mains supply connector.

Preliminary Checks of Receiver and Test Set

5 Prior to overall testing of Receiver, NSN 5820-99-723-3104, carry out the following preliminary connections and test procedures:

5.1 Switch the receiver and Test Set mains ON/OFF switch to OFF.

5.2 Ensure the Test Set mains voltage tapping of 100 V, 120 V, 220 V or 240 V, as indicated in the window of the combined mains plug and filter, is appropriate to the available mains supply before connecting the mains. To access and adjust the voltage adjuster, refer to Fig 1.7 and proceed as follows:

(1) Access the adjuster ① by opening the cover using a screwdriver ② and levering in the position indicated. The adjuster is located in the housing with the fuse carriers ③.

(2) Remove adjuster, rotate by hand and replace in the position in which the desired voltage is achieved ④.

(3) Replace the cover.

5.3 Interconnect the receiver, teleprinter and Test Set (Fig 1.8 refers) using the test leads contained in the lid of Test Set. To connect a TGN to the Test Set, disconnect PL1 at the rear of the Interface Unit Teleprinter (IUT) and connect the printer lead from the Test Set.

Note ...

The receiver rear panel connectors are identified on the receiver lid.

5.4 With mains supply connected to the receiver and Test Set, set mains ON/OFF switches to ON and allow a 30 minute warm-up period.

5.5 On completion of warm-up period, ensure a flashing TEST indication is not present on the receiver or Test Set. If a flashing TEST indication is present and persists on either or both units, refer to the appropriate sections of BR 8385B.

5.6 Check and record the voltage readings on the receiver front panel meter as follows:

(1) Set monitor switch on the Front Panel, Right to positions 1 to 5 in turn in order to measure the internal dc voltage outputs of +5 V, +12 V, -12 V and +24 V respectively on the front panel meter.

(2) Ensure the voltage indications are within 45% to 55% FSD and record the results at Item 1 of the Acceptance Performance Record Sheet (Fig 1.9 refers).

5.7 In the absence of a flashing TEST display, proceed with the following BITE tests:

(1) At the Test Set, refer to BR 8385B Annex A and perform BITE tests 1, 2 and 3 to ensure the correct operation of LCD panels, LEDs and keypads. On successful completion of these tests, adjust the Test Set controls to provide:

Frequency:	16 kHz
Mode:	MSK4
Baud Rate:	50 Baud
Encryption:	VVVV
Attenuation:	00 dB

(2) At the receiver, refer to BR 8385B, Cat 5A and perform BITE tests 1 to 8 inclusive and 10. On successful completion of these tests, record the results at Item 2 of the Acceptance Performance Record Sheet (Fig 1.9 refers) (tick box to indicate success).

(3) Set the receiver controls to provide the following reception parameters:

Frequency:	16 kHz
Mode:	MSK4
Baud Rate:	50 Baud
Bandwidth:	Normal
Encryption:	Automatic Encryption Recognition
AGC:	On
Attenuation:	0 dB
EDAC:	On
AF:	On

(4) Ensure that the receiver USE indicator is displayed after the USE keypad is depressed, that the TEST indicator is not flashing and that the receiver correctly performs the Delay Calibration test and display.

(5) Observe that the Test Set Delay Calibration (Delay Cal) LED flashes at the completion of the Delay Calibration test and repeats flashing approximately every 15 seconds.

(6) Ensure that after approximately 45 seconds from the completion of the Delay Calibration test and the subsequent changes of display to the previously set reception parameters, the FSF LED on the receiver extinguishes to indicate synchronisation to the signal.

TESTING RECEIVER OUTPUTS

6 To test receiver outputs using the Test Set, carry out the following procedure with all parameters set as in Para 4:

6.1 With reference to Fig 1.1, observe that the receiver displays VVVV encryptions in the RHS LCD panel and that the Test Set Receiver Output Monitor Channels 1, 2, 3 and 4 LEDs are flashing. Observe that the Test Set SYNC LED illuminates within 15 seconds of the channel LEDs illuminating.

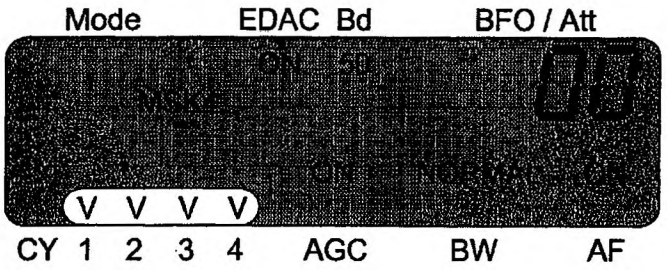


Fig 1.1 Receiver RHS LCD panel

6.2 Press the buttons PRN and 1, in sequence, on the LHS keyboard of the Test Set. With reference to Fig 1.2, check that the Test Set indicates P1 with a triangular indicator above the P in the LHS LCD panel for approximately 5 seconds and that the V28 LED illuminates.

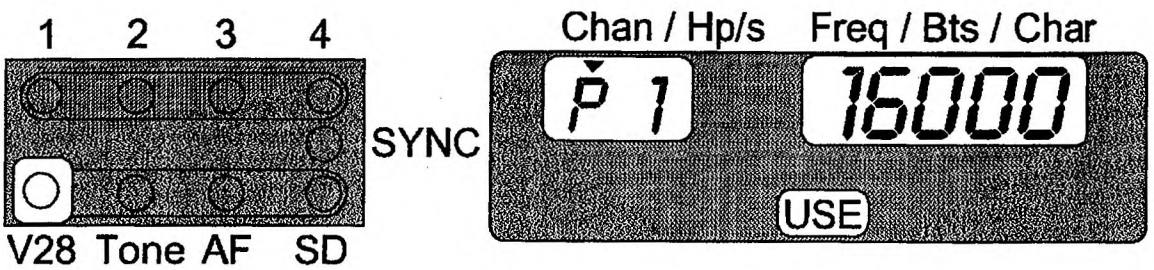


Fig 1.2 Test Set central and LHS panels

6.3 Check that the teleprinter prints the QBF message for Channel 1 and that the Test Set Print LED is flashing. Press PRN - 2, PRN - 3 and PRN - 4 in turn to obtain printouts of the test messages for channels 2, 3 and 4, in turn, and Test Set indications P2, P3 and P4 respectively.

6.4 Press PRN - 5 and check that the printout is the test message of Channel 1; this is, the normally selected channel in the receiver, but any of the other channels (2, 3 or 4) may have been selected as the 5th channel output. The Test Set should indicate PS in the LHS LCD panel.

6.5 Press PRN - 6, PRN - 7, PRN - 8 and PRN - 9 in turn and, referring to Fig. 1.3, check that the Test Set Tone LED is illuminated and P6, P7, P8 and P9 are indicated in the Test Set LHS LCD panel. Check that the test messages of channels 1 to 4 respectively are printed.

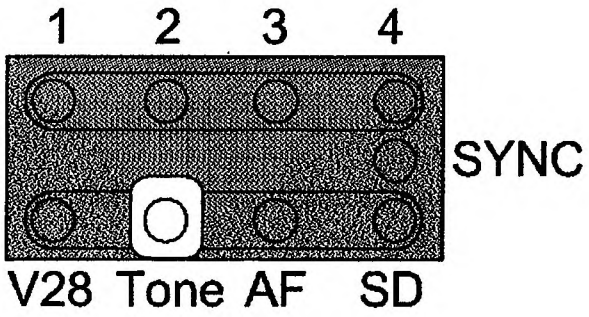


Fig 1.3 Test Set central panel

6.6 Select PRN - 0 and check that the Print LED on the Test Set is extinguished, the teleprinter ceases printing and the Test Set indicates PD for approximately 5 seconds.

6.7 Press the RUN button on the RHS keypad of the Test Set. Refer to Fig 1.4 and check the LHS LCD panel indicates an increasing Bit count, but the error count in the RHS LCD panel remains at 0000 indication. Press DISP - 1 keypads in sequence and check that the channel indication in the LHS LCD panel indicates D1 together with a triangular indicator above the zero.

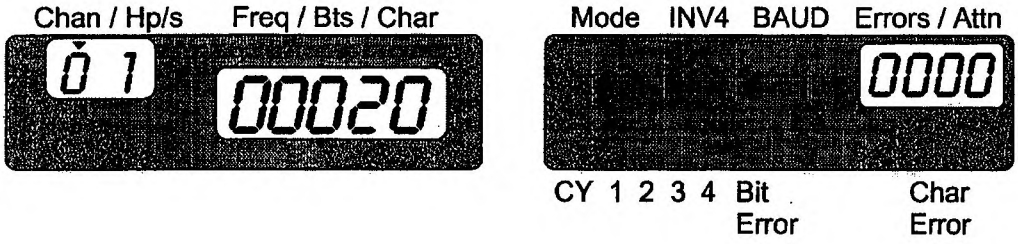


Fig 1.4 Test Set LHS/RHS LCD panels

6.8 Allow the channel display to extinguish. After approximately 5 seconds, press DISP - 2, - 3 and - 4 on the Test Set in sequence and check that the LHS LCD panel of the Test Set displays the Bit count for Channels 2, 3 and 4 respectively and with an increasing count.

6.9 Observe also, that for each channel, the error count in the RHS LCD panel remains at 0000.

6.10 Press the CER button on the RHS keypad of the Test Set and check that the Test Set indicates BER OFF and CER ON in the RHS LCD panel. Observe also the reduction of count in the LHS LCD panel as the Bit count changes to Character count.

6.11 Press the STOP - RES buttons to obtain a printout of numbers of Bits and Characters tested on each channel. Because of the high signal level input to the receiver, the Bit and Character error count should be zero.

Notes ...

(1) The results printout contains the information of the Test Set conditions (ie Frequency, Mode, Encryption, Baud Rate and Attenuation).

(2) Receiver output data (polarity) is also indicated as NORMAL or INVERTED.

6.12 For MSK modes, INVERTED polarity is produced when the Dual-In-Line (DIL) switch S16 on the Receiver Control Processor Module in the receiver is in the OPEN position.

Note ...

This is the preferred switch position for use in mobile platforms.

6.13 For FSK modes, the output polarity is determined by successive operations of the FSK button on the RHS keypad of the receiver to indicate FSK or -FSK in the RHS LCD panel, where the -ve sign is that associated with the BFO indication, "RECEIVER OUTPUT IS NORMAL" is associated with -FSK mode selection.

6.14 When the results printout is complete, the Test Set automatically commences a new 10.000 character per channel trial. During a trial, remove the signal output connector from the Test Set 100 ohm output. Observe that the error count in the RHS LCD panel of the test set begins to increment and the four EC LEDs are illuminated.

6.15 Replace the signal output connector within 30 seconds of its removal and note that the receiver maintains synchronisation and the Test Set error count no longer increases. Press STOP - CLEAR to remove the Error Rate test.

6.16 Set the meter switch on the Test Set to AF and press AF - 1 buttons of the LHS Keypad. Check that 01 appears in the channel position of the LHS LCD panel. The meter indicates the output level of the CW/Tape Recorder audio amplifier in dBm. The factory-set level is normally 0 dBm and is adjustable from the top of the AM/CW Demodulator Module. When the AF - 2 or AF - 3 buttons are depressed, the audio outputs of the RC and FDM audio amplifiers are monitored; these outputs are also factory-set to 0 dBm.

Note ...

If, for normal operational use, these outputs have been adjusted to an output other than 0 dBm, then no further adjustment should be made.

6.17 Press AF - 0 to remove the meter reading and extinguish the associated AF LED illumination. The meter reading will reduce to zero almost instantaneously and the AF LED will extinguish after approximately 5 seconds.

RECEPTION TESTS

7 Reception tests are performed on FSK, MSK and FH modes by injection of signals to the receiver aerial input from the Test Set. The errors in the recovered data from the receiver are assessed by the Test Set. Correct functioning of the receiver is determined by the number of errors in the recovered data.

Testing AM/CW Tests modes of reception

8 The equivalent of AM and CW mode reception is provided by audible monitoring of the receiver's loudspeaker output on any of the other mode tests. When a two-tone audio signal pattern has been successfully monitored, record at Item 3 on the Acceptance Performance Record Sheet by ticking the associated box.

Testing MSK and FSK modes of reception

9 To carry out receiver testing in MSK and FSK modes of operation, proceed as follows:

Set the receiver Test Set to the following parameters:

Frequency (FREQ):	16 kHz
Mode:	MSK4
Baud Rate:	50 Baud
Encryption:	VVVV
Attenuation:	41 dB

9.2 Press the USE keypad and ensure the USE indicator is displayed.

9.3 Set the receiver reception parameters as follows:

Frequency:	16 kHz
Mode:	MSK4
Baud Rate:	50 Baud
Bandwidth:	Normal
Encryption:	Automatic Encryption Recognition
AGC:	On
EDAC:	Off (press USE after selecting EDAC OFF)
Attenuation:	20 dB (note that receiver attenuation is in 10 dB steps)
AF:	Off

9.4 When the receiver acquires Fibonacci Sequence synchronisation and the Test Set acquires message synchronisation (SYNC LED illuminated), press RUN on the RHS keypad of the Test Set to start an Error Rate test.

9.5 Allow the test to be completed (after approximately 25 minutes) and the results to be printed. Check there are no more than 25 Bit Errors in any of the four channels.

9.6 On the Test Set, press STOP - CLR keypads and ensure the Test Set display panels revert to normal displays (ie not indicating Bits or Bit Errors in the LHS and RHS LCD panels respectively).

9.7 Perform a Bit Error Rate test on each of the modes indicated in Table 1.1 using the Test Set and receiver attenuations listed in the table. For MSK modes, all channels are pseudo Vallor encrypted and EDAC OFF is selected at the receiver.

9.8 Allow the test results to be printed for each mode; in each case, ensure the Bit Error count on any channel is not greater than the limit shown in Table 1.1.

9.9 Enter error count of the channel with the most errors for each mode at Items 4, 5, 6 and 7 of the Acceptance Performance Record Sheet.

TABLE 1.1 MSK AND FSK BIT ERROR RATES AT 16 kHz

MODE	BAUD RATE	RECEIVER BANDWIDTH	ATTENUATION (dB)		BITS PER CHANNEL	MAXIMUM ERROR COUNT
			TEST SET	RECEIVER		
MSK4	50	NORMAL	41	20	60,000	25
MSK4	50	WIDE	41	20	60,000	25
MSK2	50	NORMAL	44	20	60.000	25
MSK1	50	NORMAL	47	20	60,000	25
FSK	50	NORMAL	42	20	70,000	27

Note...

When WIDE bandwidth is selected on FSK and MSK modes, the AGC OFF facility is inhibited and for all MSK modes the Delay Calibration result will be in the range of 2 to 2.7 milliseconds.

Testing Empty Channel Filler (ECF)

10 To test Empty Channel Filler (ECF), proceed as follows:

10.1 Configure the Test Set. Receiver and teleprinter for MSK4 (50 Baud) operation as used in the Bit Error Rate test (Para 8.4 to 8.8 refers). Adjust the receiver attenuator to 0 dB and allow the receiver and Test Set to synchronise to the Fibonacci sequence and test message respectively.

10.2 Press ECF - 1, - 2, -3 -4 - USE buttons on the LHS keypad of the Test Set. Ensure the USE indicator on the Test Set is displayed and the ECF LEDs 1, 2, 3 and 4 in the middle of the Test Set front panel are all illuminated. Check that the receiver indicates the presence of ECF on the four channels.

10.3 On the Test Set, press PRN - 1 and ensure the printed message is RY1 repetitively. Press PRN 2, PRN - 3 and PRN - 4 in turn and, in each case, observe that the printed message is RY2, RY3 and RY4 repetitively for channels 2, 3 and 4 respectively.

10.4 Press PRN - 0 on the Test Set to terminate channel message printing.

10.5 Press ECF - 1 - USE buttons on the Test Set and check the Channel 1 ECF LED indicator on the receiver and Test Set is extinguished. Repeat this procedure for Channels 2, 3 and 4 sequentially until the four channels no longer indicate the presence of ECF.

Testing FH1 and FH3 modes of reception

11 To test the receiver in FH1 and FH3 modes of operation, proceed as follows:

11.1 Configure the Test Set to produce FH1 mode at 16 kHz by pressing F - USE buttons. Refer to Fig 1.5 and ensure '1' appears in the HP/s section at the extreme left of the LHS LCD panel and USE is displayed in the same panel.

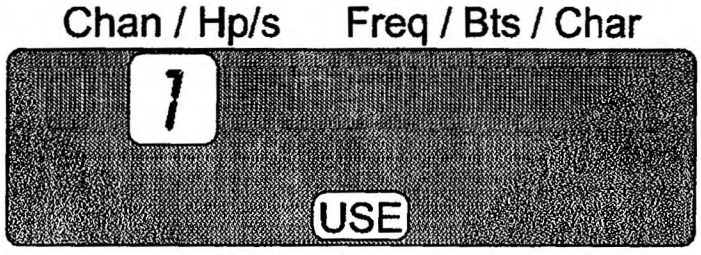


Fig 1 5 Test Set LHS LCD panel

11.2 Set the attenuator to 41dB and configure the receiver to receive an FH1 signal at 16 kHz by pressing F - USE buttons.

11.3 Refer to Fig 1.6 and check that FH1 appears in the receiver RHS LCD panel where the '1' is the M58 of the BFO frequency display. Check USE is displayed in the LHS LCD panel.

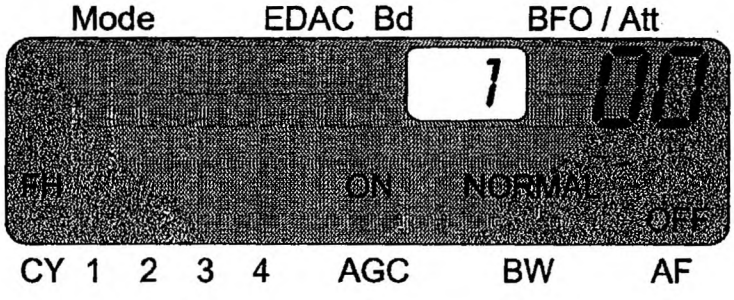


Fig 1.6 Receiver RHS LCD panel

11.4 Set the receiver attenuation to 40 dB and check that the FH/SD LED of the Test Set Receiver Output Monitor indicators is flashing at a slow rate. Allow the Test Set to synchronise to the message which may take up to 5 minutes.

11.5 When the SYNC LED illuminates, press the RUN button and allow a Bit Error Rate test to be performed and the results printed (the teleprinter must be set to 50 Baud operation). Check that the error count is not more than 22 Bit Errors in 1,400 Bits. Record the result at Item 8 on the Acceptance Performance Record Sheet.

11.6 Select STOP - CLR on the Test Set to terminate any further tests.

11.7 Repeat Paras 10.1 to 10.6 for FH3 mode by selecting F - HP/s - 3 - USE on the Test Set and F - 3 - USE on the receiver. With the same attenuation settings, the maximum error count is 22 Bit Errors. Record the result at Item 8 of the Acceptance Performance Record Sheet.

RECONNECTION OF THE RECEIVER

12 On completion of the reception checks, restore the receiver to normal connections by carrying out the following:

12.1 Switch the receiver and Test Set to mains OFF.

12.2 Disconnect the interconnections between the Test Set, receiver and teleprinter.

12.3 Connect Receiver, NSN 5820-99-723-3104 rear connectors.

12.4 Replace normal connections to teleprinter.

RE-VALIDATION OF THE RECEPTION SYSTEM

13 To re-validate the reception system by receiving a normal broadcast signal, proceed as follows:

13.1 Switch the receiver mains ON/OFF switch to ON.

13.2 Allow the receiver sufficient warm-up time to eliminate the flashing TEST indication.

13.3 Adjust the receiver to receive the broadcast on 15.980 kHz (if this is not available due to transmitter maintenance, adjust for reception at 19.580 kHz).

13.4 Ensure the signal is audible in the internal monitor loudspeaker and the receiver synchronises to the broadcast Fibonacci sequences. If appropriate, check that the decryption terminal acquires synchronisation and the broadcast message is printed.

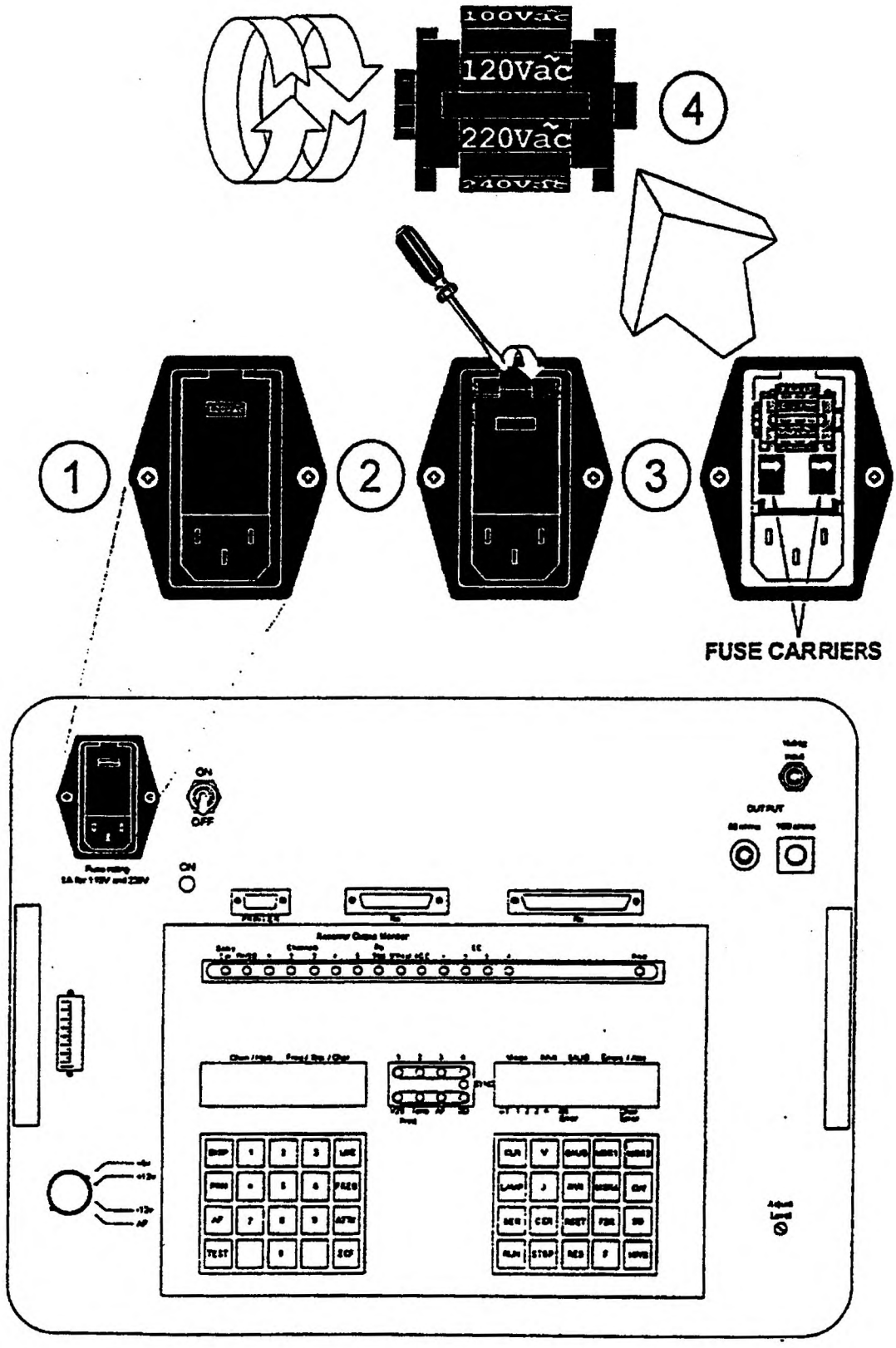


Fig 1.7 Test Set - voltage selector details

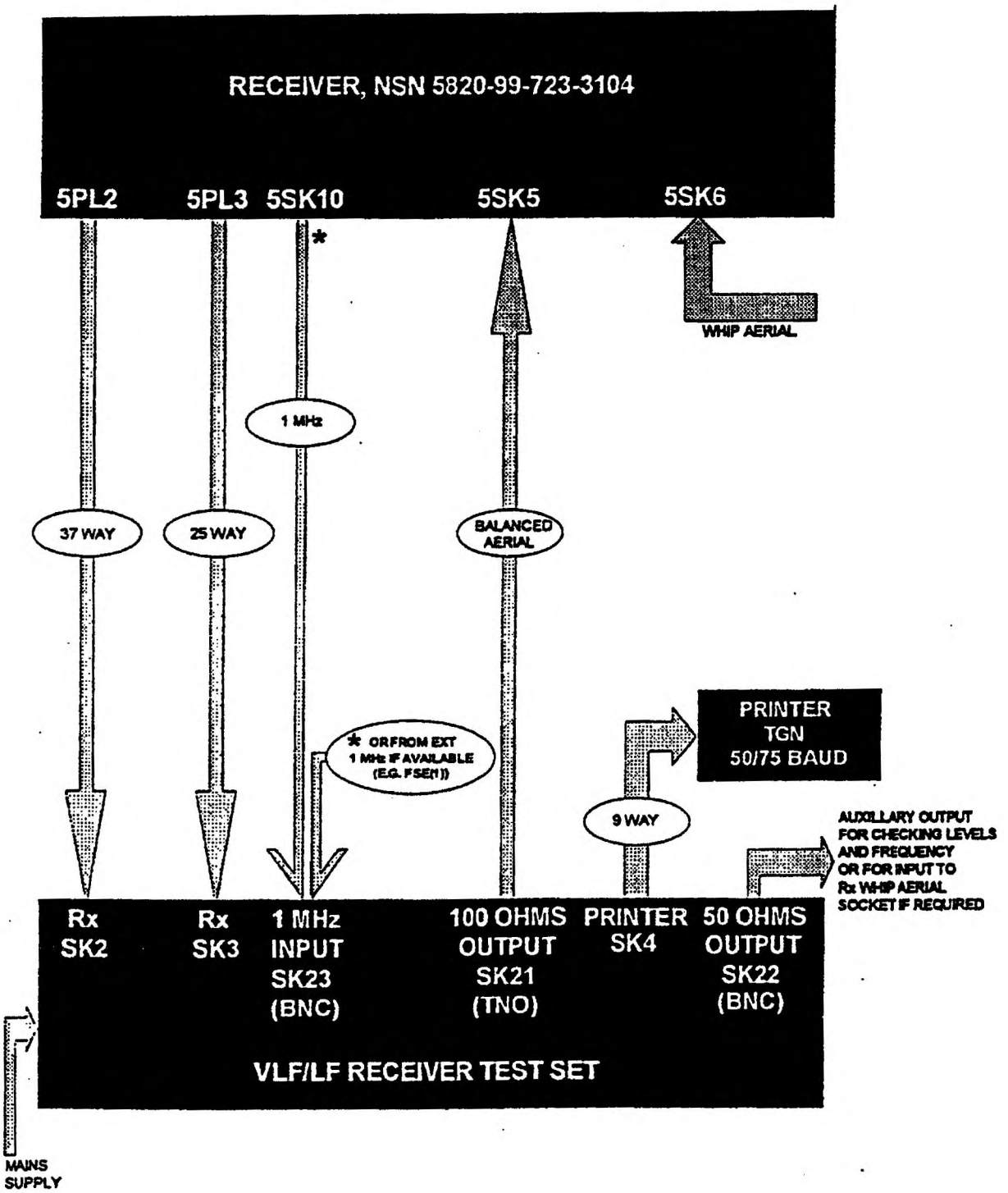


Fig 1.8 Receiver and Test Set interconnections

CLASSIFICATION (Completed Form) BR 8385A(4C) Amdt 2

CLASSIFICATION (Blank Form)

Form S . . . (See Note)
D . . .

ACCEPTANCE PERFORMANCE RECORD SHEET

OUTFITS CFD

HMS .....
Serial No .....

Item No.	BR 8385A(4C) Chap 1	OUTFITS CFD			
		TEST	RESULT		
1	Para 5	DC voltage monitoring Monitor meter readings (Tolerance 45 to 55% FSD)	Rx1	Rx2	Rx3
		Position 1: +5 V	- - - - -	- - - - -	- - - - -
		Position 2: +12 V SW	- - - - -	- - - - -	- - - - -
		Position 3: +12 V	- - - - -	- - - - -	- - - - -
		Position 4: 12 V	- - - - -	- - - - -	- - - - -
		Position 5: +24 V	- - - - -	- - - - -	- - - - -
2	Para 5	BITE tests 1 to 8 and 10			
		Test 1	- - - - -	- - - - -	- - - - -
		Test 2	- - - - -	- - - - -	- - - - -
		Test 3	- - - - -	- - - - -	- - - - -
		Test 4	- - - - -	- - - - -	- - - - -
		Test 5	- - - - -	- - - - -	- - - - -
		Test 6	- - - - -	- - - - -	- - - - -
		Test 7	- - - - -	- - - - -	- - - - -
		Test 8	- - - - -	- - - - -	- - - - -
		Test 10	- - - - -	- - - - -	- - - - -
3	Para 8	AM.CW reception test	- - - - -	- - - - -	- - - - -
4	Para 9	FSK reception test	- - - - -	- - - - -	- - - - -
5	Para 9	MSK4 reception test	- - - - -	- - - - -	- - - - -
6	Para 9	MSK2 reception test	- - - - -	- - - - -	- - - - -
7	Para 9	MSK1 reception test	- - - - -	- - - - -	- - - - -
8	Para 10	ECF test	- - - - -	- - - - -	- - - - -
9	Para 11	FH1/FH3 reception tests	- - - - -	- - - - -	- - - - -

CLASSIFICATION (Completed Form) Page No. 1

Note: The Form S or D number is allocated and appended by the Trials Authority when the record is used as an S or D Form.

Fig 1.9 Acceptance Performance Record Sheet

CHAPTER 2

SEA ACCEPTANCE TRIALS (SATs)

CONTENTS

Para
1 Object
2 Prerequisites
Conduct
3 Initial conditions
4 Pre-reception checks
5 Off-air reception checks

OBJECT

1 The object of SATs is to confirm satisfactory performance of Outfit CFD with the vessel at sea and to verify that the equipment is ready in all respects for operational use.

PREREQUISITES

2 The following requirements to be observed:

2.1 HATs. HATs to have been successfully completed on the following equipments:

(1) Outfit CFD (Chap 1 refers).

(2) VLF/LF Aerial Outfit (ie ALZ Fin Loops).

(3) VLF/LF Aerial Exchange Outfit EUD(1).

(4) Crypto equipments.

(5) Teleprinter terminals.

2.2 Associated Handbooks

BR 8385B Receiver, NSN 5820-99-723-3104

CONDUCT

Initial Conditions

3 Prior to conducting trial ensure the receivers and all associated equipments have been switched on for at least 30 minutes.

Pre-reception Checks

4 Carry out the pre-reception checks on each of the receivers contained in the Outfit CFD and record the results on the Performance Record Sheets (Chap 1, Paras 5 and 6 and Fig 1.1 refer).

Off-air Reception Checks

5 With the submarine dived, at broadcast reception depth and with a suitable aerial selected, the following off-air reception checks are to be conducted for all modes of transmission available at the time of the trial. If no transmission is available the Performance Record Sheet should be annotated with 'NA'.

Note ...

If reception is to be via the fin-loop aerial outfit no HF or UHF transmissions from the WT mast should be conducted whilst the trial is in progress to minimise possible rf interference. Alternatively, reception may he conducted via the buoy aerial outfit in its stowed position.

6 Carry out the off-air reception checks with each of the receivers contained in the Outfit CFD using the CSU and terminal equipments as appropriate (Chap 1, Paras 7 to 13 refer). Record the results on the Performance Record Sheet (Chap 1, Fig 1.1 refers).

SUB CATEGORY 5A

DIAGNOSTIC MAINTENANCE

CONTENTS

CHAPTER 1 Fault Diagnosis

CHAPTER 1

FAULT DIAGNOSIS

CONTENTS

Para
1 General
2 Receiver fault diagnosis
CSU and associated wiring fault diagnosis
3 Symptom
4 Test equipment requirements
5 Action

Figure
1.1 CSU output terminals
1.2 Outfit CFD wiring diagram
1.3 Revised interconnections for V28 data requirements within CFD(2) fits

GENERAL

1 Fault diagnosis within Outfits CFD is to module or unit level.

RECEIVER FAULT DIAGNOSIS

2 To identify a fault within Receiver, NSN 5820-99-723-3104 refer to BR 8385B, Sub-category 5A, Chap 1 - Fault Diagnosis.

CSU AND ASSOCIATED WIRING FAULT DIAGNOSIS (Figs 1.1, 1.2 and 1.3)

Symptom

3 No tone input to a user terminal when the CSU switches are set to select one or more channel tones from one receiver in the outfit.

Test Equipment Requirements

4 Headphone set terminated with crocodile clips.

Action

5 To locate the fault, proceed as follows:

(1) Remove and retain the two front panel screws securing the appropriate Terminal Chamber to the rack and withdraw chamber sufficient to access the ten side panel securing screws.

(2) Remove and retain the ten screws to release side panel.

(3) Remove signal input to receiver and select an MSK5 configured channel to provide continuous 1 kHz tone on the four channel outputs.

(4) Refer to Fig 1.2 and connect headphones across each of the four channel outputs at TB1 to ensure a 1 kHz tone is present on each channel.

(5) Remove and retain the two front panel screws securing the CSU to rack and withdraw unit sufficient to access the six quick release fasteners on the side panel.

(6) Release the six fasteners and remove side cover.

(7) Refer to Fig 1.1 and connect headphones across each of the four channel inputs from the relevant receiver terminal chamber to ensure a 1 kHz tone is present on each. If one or more tones are found to be absent, switch off receiver and check for obvious defects on cable between Terminal Chamber and CSU. Repair or renew, as necessary. (Sub-category 5B, Chap 1 refers to cable renewal).

(8) If the four channel tones are present at CSU inputs, visually inspect CSU for signs of damage or loose terminations.

(9) Switch off receiver and replace CSU as necessary(Sub-category 5B, Chap 1 refers to CSU replacement).

(10) On completion of a repair, switch on the receiver and, using the line output selector switches on the CSU, ensure each of the receiver channel outputs are available at the user terminal.

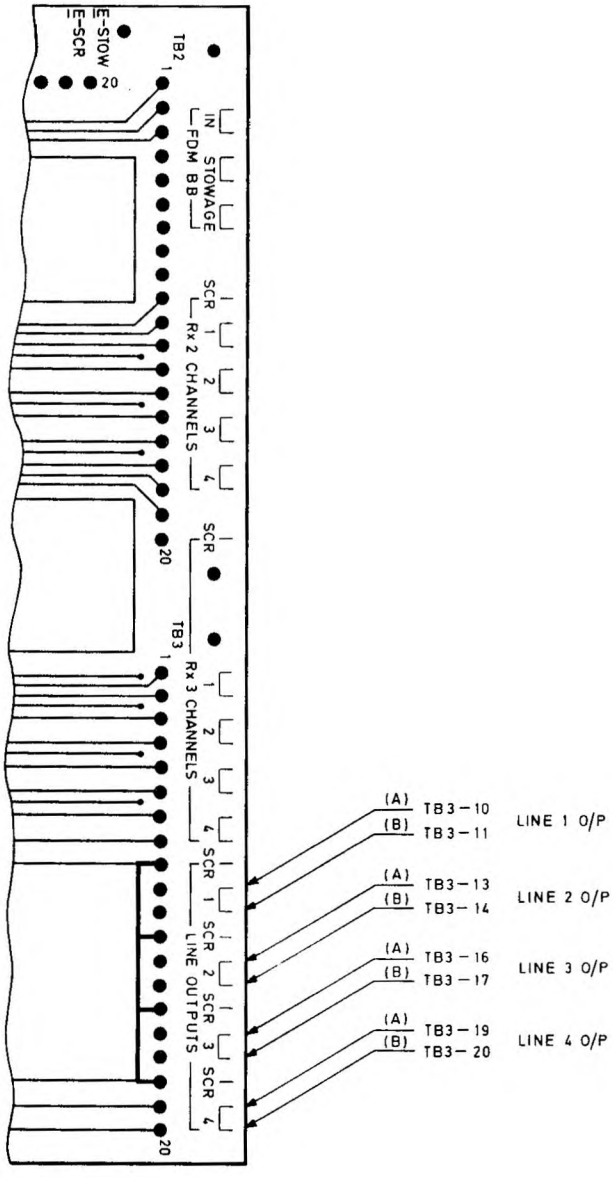


Fig 1.1 CSU output terminals

CHAPTER 1

REPAIR PROCEDURES

(COMPLETELY REVISED)

CONTENTS

Para
1 General
Unit removal and replacement
3 Receiver, NSN 5820-99-723-3104
7 Channel Selector Unit
9 Terminal Chamber
11 Cable Assembly 6 (TC to CSU) - removal and replacement

Figure
1.1 TCFS type connector installation/removal
1.2 Channel Selector Unit
1.3 Terminal Chamber

GENERAL

1 Repair procedures for the Outfit CFD are limited to repair by replacement of defective units, with the exception of Receiver, NSN 5820-99-723-3104, and to repair by replacement of Cable Assembly 6 (TC to CSU). Repairs to the receiver are limited to replacement of defective modules or mains supply fuses. A detailed description of repair and adjustment procedures for the receiver is contained in BR 8385B(5B).

CAUTION Some PECs within the Receiver, NSN 5820-99-723-3104 contain static sensitive devices. Use the Field Service Kit (0276-99-768-3928) and ensure correct handling procedures are observed at all times when working within the receiver.

2 An Electrostatic Protection Adaptor is supplied for use with Outfits CFD when carrying out receiver maintenance. With the receiver withdrawn from the CFD rack, the adaptor may be screwed into any one of the four vacated receiver fixing holes on the frame. This provides a suitable position to connect a wrist strap (as contained in the Field Service Kit) in order to protect CMOS devices on the receiver PECs from electrostatic voltages.

UNIT REMOVAL AND REPLACEMENT

Receiver, NSN 5820-99-723-3104

CAUTION Set mains switch on front panel to 'off/mains' and isolate mains supply to receiver before carrying out the following procedures.

3 To remove the receiver from the rack in positions where there is unrestricted space available, proceed as follows:

(1) Remove and retain four front panel screws securing the receiver to the rack frame and withdraw receiver to the full extent of the equipment runners.

(2) Disconnect the receiver rear connectors.

(3) At the rear of the receiver, remove and retain the nuts and washers on the earth stud, to release the earth cable, and the two screws securing the angle bracket of the swinging arm cable carrier to the receiver chassis.

(4) Manually release the front latches on the telescopic slides and withdraw the receiver from the runner assemblies.

(5) Refit screws, washers and nut retained in (3).

4 To remove the receiver where clearance in front of the rack is restricted, proceed as follows:

(1) Remove and retain four front panel screws securing the receiver to the rack frame.

(2) Extend telescopic slides sufficient to manually release front latches.

(3) Fully support the receiver and partially withdraw sufficient to access rear chassis components

(4) Disconnect the receiver rear connectors.

(5) At the rear of the receiver, remove and retain the nut and washers on the earth stud, to release the earth cable, and the two screws securing the angle bracket of the swinging arm cable carrier to the rear of the receiver chassis.

(6) Retain receiver in the supported position and insert telescopic runner assemblies into the rack.

(7) Withdraw receiver from the runner assemblies and refit the screws, washers and nut removed in (5).

5 To install the receiver in the rack where unrestricted front space is available, proceed as follows:

(1) Withdraw telescopic slides from the rack and ensure the rear latches operate.

(2) Remove and retain the washers and nut on the earth stud at the rear of receiver.

(3) Remove and retain the two screws fitted at the right hand rear of the receiver which are used to secure the swinging arm angle bracket to the receiver chassis.

(4) Slacken the two screws securing the angle bracket to the swinging arm assembly and separate to the full extent permitted by the slotted holes in the bracket. Tighten the two screws on completion.

(5) Set the swinging arm to a position enabling rear connectors to be fitted when the receiver is mounted in the telescopic runners.

(6) Locate guides on receiver into the telescopic runners and insert until the front latches engage.

(7) Secure the swinging arm angle bracket to the right hand rear of the receiver using the screws retained in (3).

(8) Connect receiver rear connectors and the earth lead using the washers and nut retained in (2).

(9) Fully insert receiver into the rack and secure with the four screws retained in Para 3(1) or 4(1).

(10) Restore mains supply and set mains switch to 'On'. Check operation of the receiver using the BITE tests detailed in BR 8385B, Sub-category 5A, Chap 1, Paras 7 to 24.

6 To install receiver where front clearance is restricted, proceed as follows:

(1) Withdraw the telescopic runners approximately 75 mm from the rack.

(2) Carry out the procedures detailed in Para 5(2) to 5(5).

(3) Locate guides on receiver into the telescopic runners and support receiver whilst extending the guides sufficiently to allow the front latches to engage.

(4) Complete the installation as detailed in Para 5(7) to Para 5(10).

Channel Selector Unit (Fig 1.2)

CAUTION Set mains switch on all receivers contained in the outfit to 'off/mains' before carrying out the following procedures.

7 To remove Channel Selector Unit, proceed as follows:

(1) Remove and retain the two front panel screws securing the unit to the housing framework on the RH outer side of the rack.

(2) Fully withdraw unit from the housing using the two handles provided on the front panel. Support unit when removed to prevent excessive strain on rear cable terminations.

(3) Release the six fasteners securing the side panel to the unit.

(4) Remove side panel and note taper pin termination connections at terminal blocks TB1, TB2 and TB3 mounted on the PEC.

(5) Extract the 20 AWG taper pins from the terminal blocks using taper pin insertion/extraction tool, NSN 5120-99-580-9627.

(6) Note the gland identity, as annotated on side cover, for each cable assembly.

(7) Release the occupied plastic gland nuts and slide the nuts with associated washers and grommets along the cableform for retention.

CAUTION When removing a cable assembly fitted with a TCFS type connector, the body of the connector must not be allowed to rotate when the backnut is being loosened. Failure to observe this precaution can result in the peripheral bonding of the cable assembly being broken.

(8) To remove the TCFS type connectors, refer to Fig 1.1 and use a spanner to hold the connector body steady whilst using another spanner to release the locking backnut.

(9) Slide the backnut along the cable and associated terminations for retention.

(10) Withdraw each cable and associated terminations through the empty apertures or the plastic gland shells to fully release the unit.

(11) Replace side cover using the six fasteners provided.

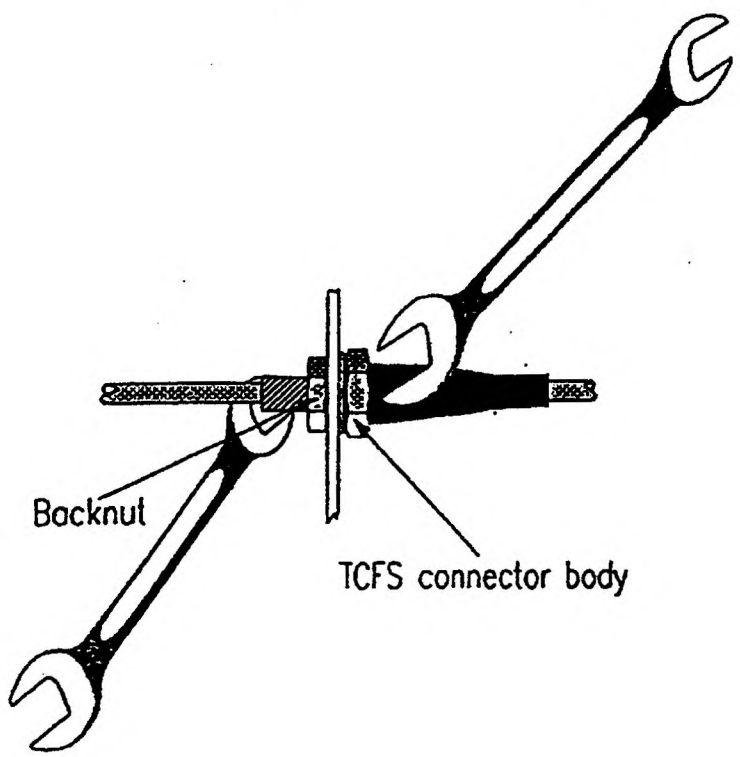


Fig 1.1 TCFS type connector installation/removal

8 To fit replacement Channel Selector Unit, proceed as follows:

(1) Remove plastic gland nuts, washers and grommets from the identical gland shells noted in Para 7(6).

(2) Release the six fasteners securing the side cover.

CAUTION When installing a cable assembly fitted with a TCFS type connector, the body of the connector must not be allowed to rotate when the backnut is being tightened. Failure to observe this precaution may result in the peripheral bonding of the cable assembly being broken.

(3) For cables fitted with a TCFS type connector, feed the cables with associated terminations through the appropriate empty apertures, positioning the threaded part of the connector within the aperture.

(4) Fit the backnut of the TCFS connector onto the cable assembly and, slide up to the threaded part of the connector.

(5) To install the TCFS type connectors, refer to Fig 1.1 and use a spanner to hold the connector body steady whilst using another spanner to tighten the locking backnut.

(6) Feed the remaining cable assemblies and associated terminations through the respective plastic gland shells ensuring that 100 mm of outer sheath on the assembly from Rx1 and 20 mm of outer sheath on the assemblies from Rx2 and Rx3, where fitted, protrude into unit.

(7) Fit washers and grommets, previously retained on the cable assemblies in Para 7(7), into position and secure using the plastic gland nuts.

(8) Insert taper pins into positions noted in Para 7(5) using the taper pin insertion/extraction tool.

(9) Secure side panel in position using the six quick release fasteners.

(10) Insert unit into housing until the two dowels on rear panel are sited in the locating holes on the rear locating bracket.

(11) Secure the unit in position using the two screws retained in Para 7(1).

(12) Switch on all receivers, remove aerial inputs and select an MSK4 configured channel on each. Check a 1 kHz tone is present at the user terminals for every switch position on CSU to ensure correct operation.

Terminal Chamber (Fig 1.3)

CAUTION. Set mains switch on the associated receiver to 'Off/Mains' before carrying out the following procedures.

Note ...

Modification No. 9 to Receiver Outfit CFD(2) changes the internal wiring of the Terminal Chamber so that V28 DC data outputs (6-0-6 V) are provided in place of Tone on/off outputs. The selection and distribution to the external broadcast reception signal equipment remains unchanged.

9 To remove the Terminal Chamber from the rack, proceed as follows:

(1) Remove and retain the two front panel screws securing the chamber to the housing framework on the LH outer side of the rack.

(2) Fully withdraw chamber from the housing using the two handles provided on the front panel. Support unit when removed to prevent excessive strain on the rear cable terminations.

(3) Remove and retain the ten screws securing the chamber side cover.

(4) Remove side panel and note taper pin termination connections at terminal block TB1.

(5) Extract the 20 AWG taper pins from TB1 using a taper pin insertion/ extraction tool, NSN 5120-99-580-9627.

(6) Note the gland position used for each cable assembly.

(7) Carefully release the occupied plastic gland nuts and slide the nuts with associated washers and grommets along the cableform for retention.

CAUTION. When removing a cable assembly fitted with a TCFS type connector, the body of the connector must not be allowed to rotate when the backnut is being loosened. Failure to observe this precaution may result in the peripheral bonding of the cable assembly being broken.

(8) To remove the TCFS type connectors, refer to Fig 1.1 and use a spanner to hold the connector body steady whilst using another spanner to release the locking backnut.

(9) Slide the backnut along the cable and associated terminations for retention.

(10) Withdraw each cable and associated terminations through the empty apertures or the plastic gland shells to fully release the chamber.

(11) Fit side cover with the ten screws retained in (3).

10 To fit replacement Terminal Chamber, proceed as follows:

(1) Remove and retain the ten screws securing the chamber side cover.

(2) Remove gland nuts, washers and grommets from the identical gland shells noted in Para 9(6).

CAUTION When installing a cable assembly fitted with a TCFS type connector, the body of the connector must not be allowed to rotate when the backnut is being tightened. Failure to observe this precaution may result in the peripheral bonding of the cable assembly being broken.

(3) For cables fitted with a TCFS type connector, feed the cables with associated terminations through the appropriate empty apertures, positioning the threaded part of the connector within the aperture.

(4) Fit the backnut of the TCFS connector onto the cable assembly and slide up to the threaded part of the connector.

(5) To install the TCFS type connectors, refer to Fig 1.1 and use a spanner to hold the connector body steady whilst using another spanner to tighten the locking backnut.

(6) Feed the remaining cable assemblies and associated terminations through the respective plastic gland shells ensuring that 20 mm of outer sheath protrudes into the chamber.

(7) Fit washers and grommets, previously retained on the cable assemblies in Para 9(7), into position and secure using the gland nut.

(8) Insert taper pins into the positions noted in Para 9(4) using taper pin insertion/extraction tool.

(9) Secure side panel in position using the ten screws retained in (1).

(10) Insert chamber into housing until the two dowels on rear panel are sited in the locating holes on the rear locating bracket.

(11) Secure chamber in position using the two screws retained in Para 9(1).

(12) Switch on the associated receiver, remove aerial input and select an MSK4 configured channel. Check a 1 kHz tone is present at the user terminals for every switch position on the CSU associated with the receiver.

CABLE ASSEMBLY 6 (TC to CSU) - REMOVAL AND REPLACEMENT

CAUTION Set mains switch on all receivers contained in the outfit to 'Off/Mains' before carrying out the following Procedures.

11 To remove and replace Cable Assembly 6, labelled 'TC to CSU' , proceed as follows:

(1) Refer to Para 7(1) to 7(3) to remove CSU from rack and access internal connections.

(2) Note relevant Cable Assembly 6 connections to terminal blocks TB1, TB2 or TB3 and extract the 20 AWG taper pins using taper pin insertion/extraction tool, NSN 5120-99-580-9627.

(3) Carefully release gland nut and slide the nut with associated washer and grommet along the cableform for retention.

(4) Refer to Para 9(1) to 9(3) to remove TC from rack and access internal connections.

(5) Note relevant Cable Assembly 6 connections at terminal block TB1 in the TC and extract the 20 AWG taper pins using insertion/extraction tool.

(6) Carefully release the gland nut and slide the nut with associated washer and grommet along the cableform for retention.

(7) Release cable assembly ties between TC and CSU and remove cable from equipment.

(8) Remove the gland nuts, washers and grommets retained on the defective cable and place on replacement cable.

(9) Using removed cable as a pattern, cut replacement cable to the required length, prepare cable ends and fit screen pigtails.

(10) Fit the cable marker sleeves provided to the appropriate cable cores and, using crimping tool NSN 5120-99-971-8815 set to 20 AWG, terminate each core and screen pigtails with the taper pin connectors provided.

(11) Position prepared cable assembly in position within the equipment and secure.

(12) With reference to Paras 8(3) and 10(3), feed cable ends through the appropriate glands at CSU and TC and insert taper pins into the appropriate positions, as noted in (2) and (5) respectively, using the insertion/extraction tool.

Note ...

Refer to Chap 2 for detailed wiring information.

(13) Fit gland washers, grommets and nuts into position and carefully tighten gland nuts ensuring there is no undue strain on cable core terminations.

(14) Switch on the relevant receiver, remove aerial input and select an MSK4 configured channel. Using headphones terminated with a crocodile clip, refer to wiring diagram in Chap 2 and ensure a 1 kHz tone is present at the CSU on each of the four re-wired channel inputs.

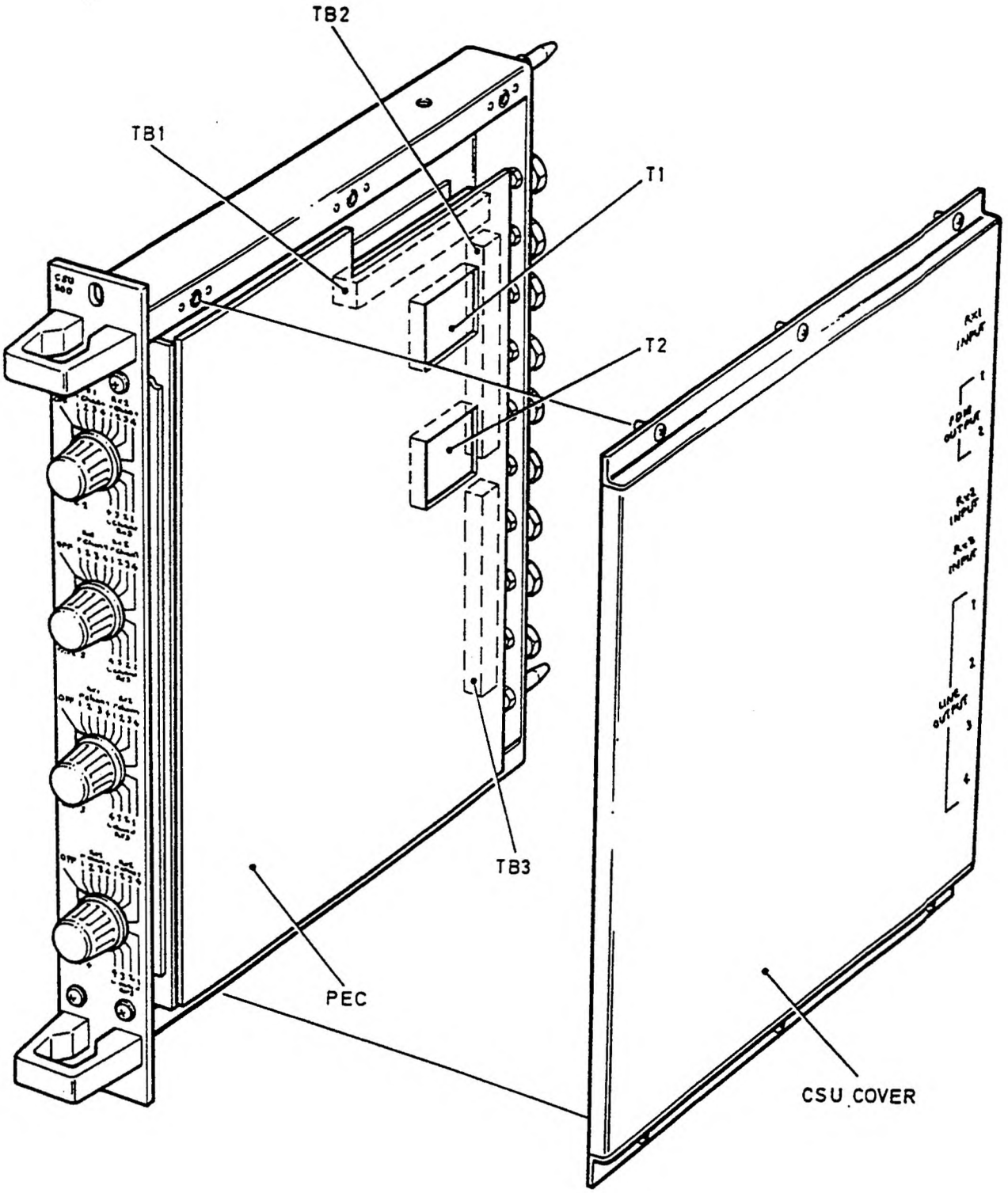


Fig 1.2 Channel Selector Unit

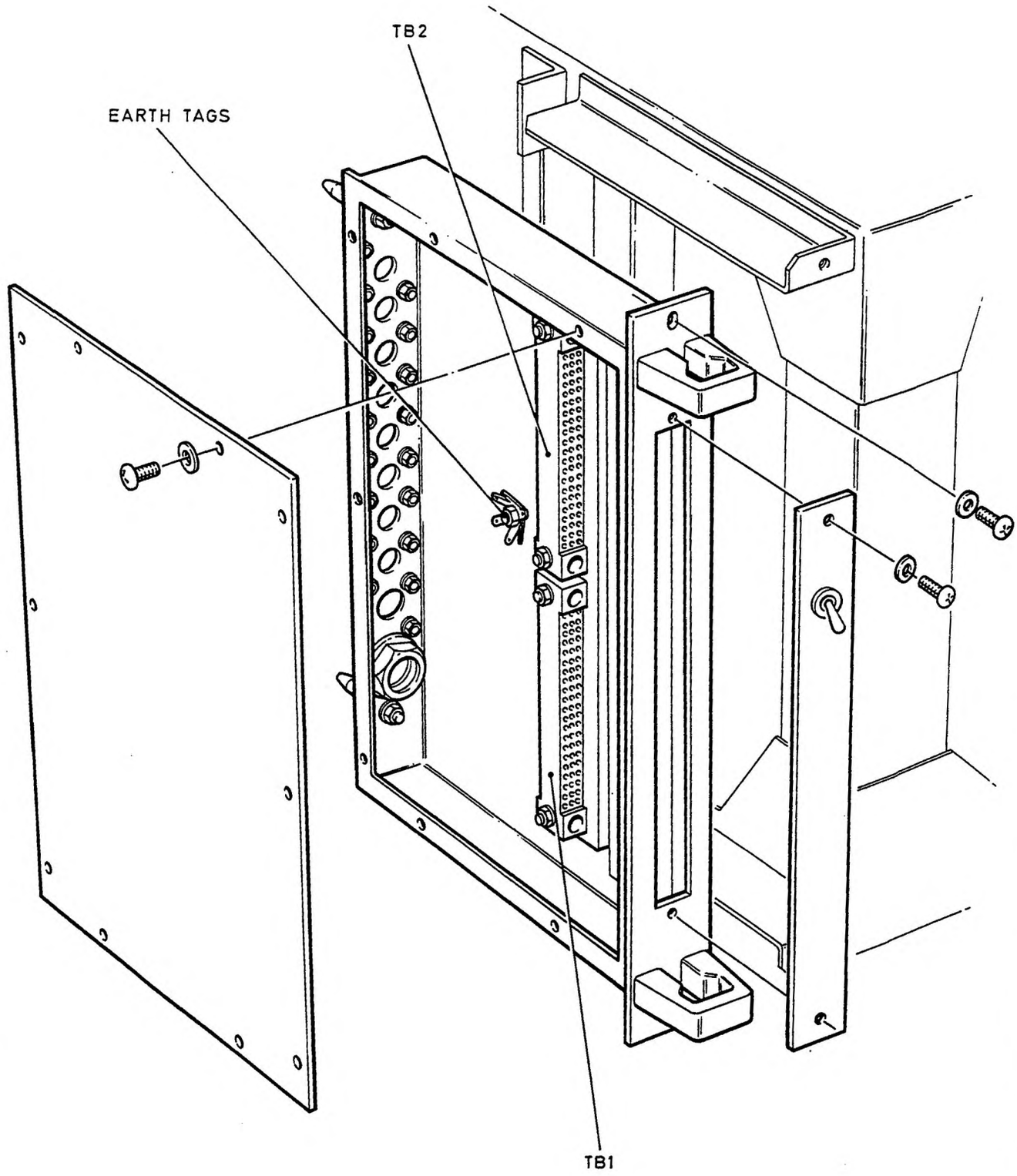


Fig 1.3 Terminal Chamber

4 Free connectors on the assemblies which mate with the fixed connectors on the receiver rear panel are designated according to the fixed connector identification.

5 External inputs to the rack, comprising mains supply, aerial and 1 MHz reference frequency, are interfaced at a connector plate, mounted on the rear of the rack, by TB3, SK1 and SK2 respectively. Interconnection of the inputs to the receiver rear panel is provided by cable assemblies 3 to 5 respectively.

6 Receiver outputs and BID 1150 codeword inputs are interfaced at the Terminal Chamber by cable assemblies 1 and 2.

Cable Assembly 6 (NSN 5995-99-761-9471)

7 Cable assembly 6 interconnects the required outputs from the Terminal Chamber to the Channel Selector Unit. In Outfit CFD(2) (ie two receiver configuration) and Outfit CFD(4) (ie three receiver configuration) further identical cable assemblies 6 are required to interconnect each receiver output to the Channel Selector Unit.

8 Cable cores within each cable assembly 6 are terminated at both ends by taper pin connectors.

Cable assemblies 7 and 8

9 Cable assembly 7 carries mains from TB3 to a switch mounted on the front panel of the Terminal Chamber. Cable assembly 8 returns the switched mains from the switch to 1B4 on the Fan Plate in the upper part of the rack.

EARTH WIRE INTERCONNECTION

10 An earth wire is incorporated with the cable assemblies to provide a common earth between receiver and rack. The wire is terminated at both ends by a ring tongue and interconnects the earth stud on the rear of the receiver to the earth stud on the rear of the rack frame.

FIXED CONNECTOR LOCATIONS (Figs 2.2 and 2.3)

11 Location of the fixed connectors mounted on the rear chassis of the receiver are identified in Fig 2.2. Location of the connector plate and the associated connectors are shown in Fig 2.3.

CONNECTION DETAILS (Figs 2.4 and 2.5)

12 Details of cable assembly interconnections and functions are shown in Figs 2.4 and 2.5 wiring diagrams. Individual cores of the multi-core cable assemblies are identified by numbered sleeves, the number designated corresponding to the associated pin connection on TB1 of the Terminal Chamber.

CHAPTER 2

WIRING DETAILS

CONTENTS

Para
1 General
2 Cable assembly identification
Cable assembly interconnections
3 Cable assemblies 1 to 5
7 Cable assembly 6
9 Cable assemblies 7 and 8
10 Earth wire interconnections
11 Fixed connector locations
12 Connection details
13 Direct external connections to receiver

Figure
2.1 Cable assembly interconnections
2.2 Receiver rear connectors
2.3 Connector plate (front view)
2.4 Wiring diagram - Outfits CFD
2.5 Revised interconnections for V28 data requirements within CFD(2) fits
2.6 Mod 7 wiring diagram (where applicable) for S and T Class submarines

GENERAL

1 This chapter contains details of the internal cable assembly interconnections between Rack, NSN 5975-99-761-9470 (CFD(2) incorporates a Terminal Chamber), Receiver NSN 5820-99-723-3104 and Channel Selector Unit, (NSN 5895-99-750-9019 or 5820-99-253-4762) for a two receiver or three receiver installation.

CABLE ASSEMBLY IDENTIFICATION

2 Each rack in the Outfit CFD incorporates six cable assemblies, identified for descriptive purposes in the chapter as cable assembly 1 to cable assembly 8, and an earth wire. The cable marking for each assembly is as follows:

Cable assembly 1 - 012/12605A to 5PL2
Cable assembly 2 - 013/12605A to 5PL3
Cable assembly 3 - 016/12605A to 5PL1
Cable assembly 4 - 015/12605A to 5SK5
Cable assembly 5 - 017/12605A to 5SK9
Cable assembly 6 - 014/12605A TB1 to CSU
Cable assembly 7 - To TB3
Cable assembly 8 - To TB4

CABLE ASSEMBLY INTERCONNECTIONS (Fig 2.1)

Cable Assemblies 1 to 5

3 Cable assemblies 1 to 5 provide the connections to fixed terminations at the rear of the receiver. The assemblies are attached to a swinging arm cable carrier within the rack to prevent damage when withdrawal or insertion of the receiver occurs.

DIRECT EXTERNAL CONNECTIONS TO RECEIVER

13 Direct inputs/outputs available at the rear of the receiver comprise:

(1) Whip aerial input - 5SK6

(2) RF Monitor output - 5SK7

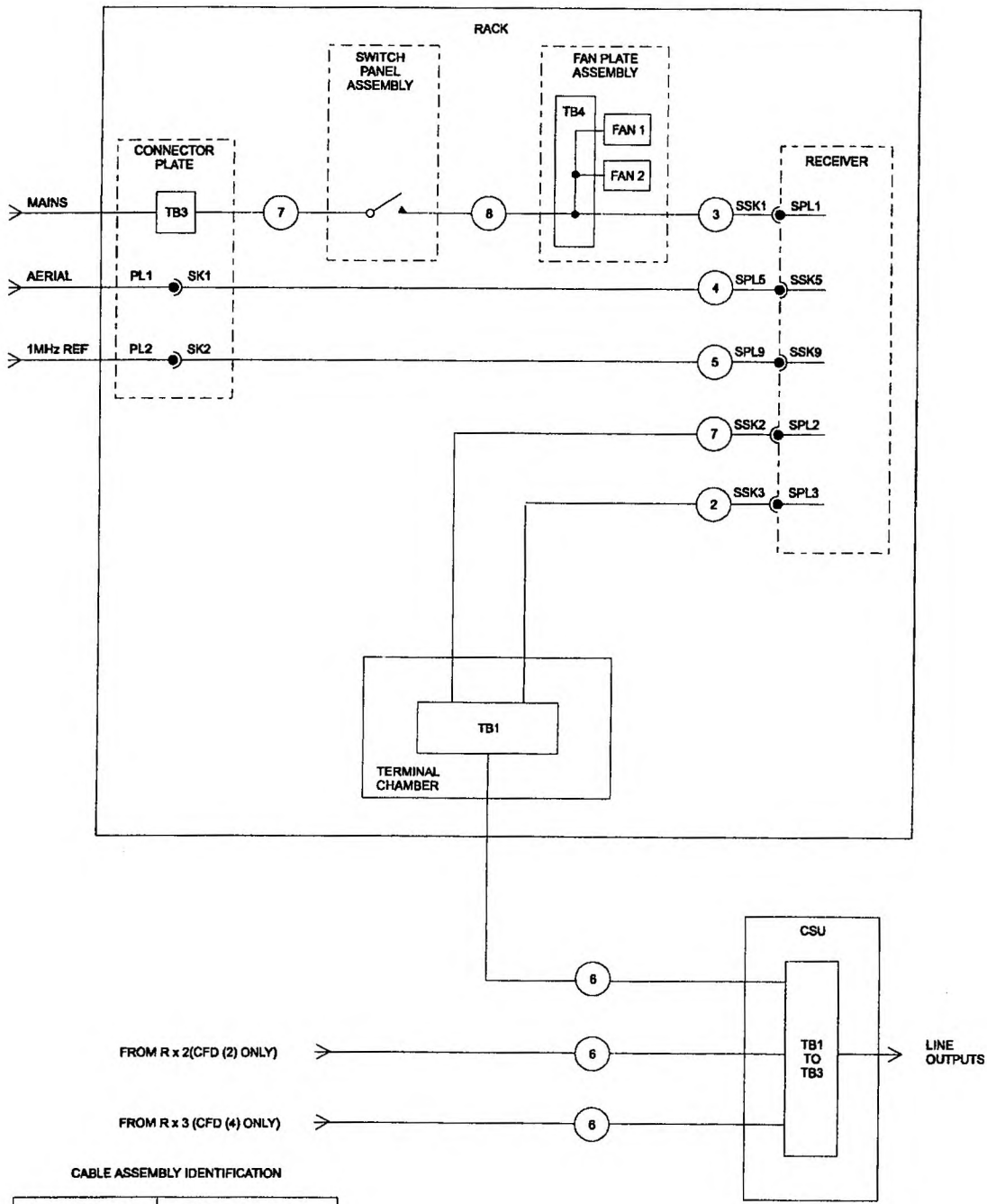
(3) IF Monitor output - 5SK8

(4) 1 MHz output - 5SK10

14 Where two receivers are fitted in a single CFD rack in S and T Class submarines, the mains supply for each is individually fed direct from a CFD Power Supply Change Over Unit (Receiver Outfit CFD Mod. No. 7 refers) incorporating two associated mains supply switches SW1 and SW2. When either (or both) mains switches are set to ON, a further mains supply is automatically fed directly to the cooling fans in the CFD rack. For wiring details of the modified mains supply to receivers and fans, refer to the block diagram shown in Fig 2.6.

Note ...

The CFD Power Supply Change Over Unit (5820-99-524-2208) is not an integral part of Outfit CFD.



CABLE ASSEMBLY IDENTIFICATION

CABLE ASSEMBLY	CABLE ASSEMBLY
1	012/12605A TO SPL2
2	013/12605A TO SPL3
3	016/12605A TO SPL1
4	015/12605A TO SSK5
5	017/12605A TO SSK9
6	014/12605A TB1 TO CSU
7	TO TB3
8	TO TB4

Fig 2.1 Cable assembly interconnections

UK RESTRICTED

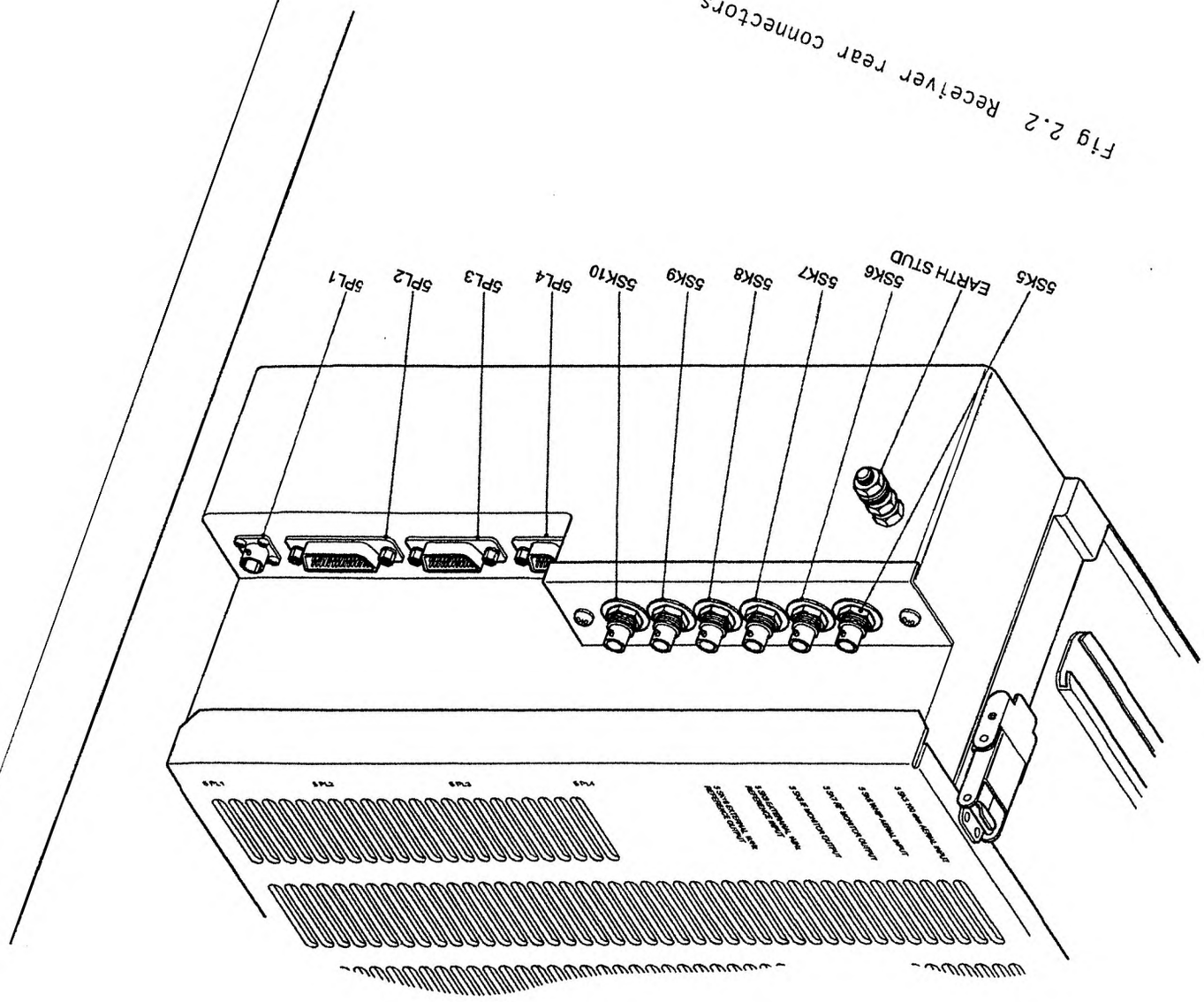


Fig 2.2 Receiver rear connectors

Amdt 5
Dec 00

UK RESTRICTED

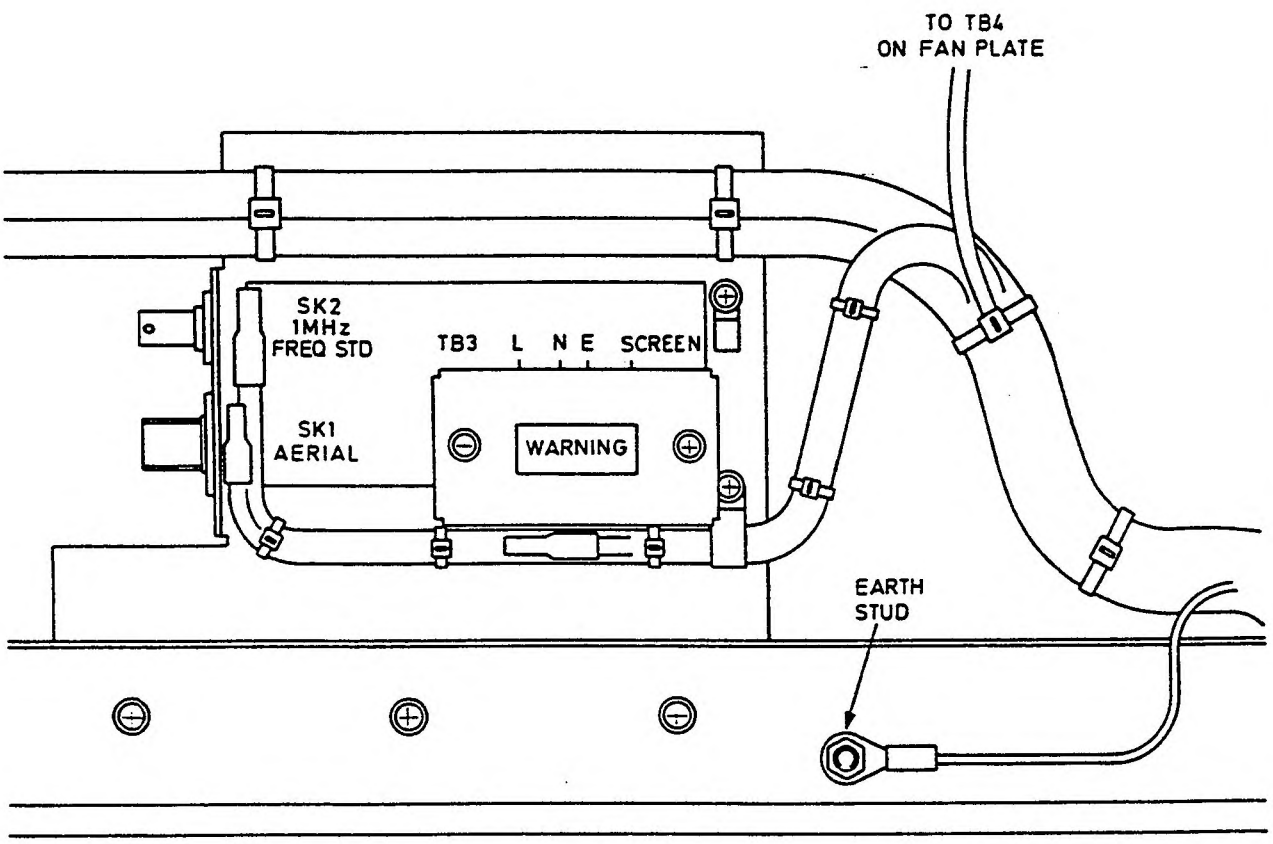


Fig 2.3 Connector plate (front view)

SUB-CATEGORY 5C

PREVENTIVE MAINTENANCE

CONTENTS

CHAPTER 1 Maintenance Procedures

(5) Refit receiver into rack (Sub-category 5B, Chap 1, Para 4 or 5 refers).

(6) Set receiver mains switch to 'On' and wait 30 minutes before carrying out BITE testing, as detailed in BR 8385B, Sub-category 5A, Chap 1, Paras 7 to 24, to check receiver operation.

(7) Repeat procedures (1) to (6) for remaining racks.

Clean and inspect CSU

4 Implement the following procedures to clean and visually inspect the CSU for evidence of damage or deterioration:

(1) Remove and retain the two front panel screws securing the CSU to rack and withdraw unit sufficient to access the six quick release fasteners on the side panel.

(2) Release the six fasteners, remove side access panel and visually inspect the internal wiring for signs of damage or deterioration. Ensure all taper pin connections are located and secure.

(3) Remove accumulated dust using a soft brush and vacuum cleaner.

(4) Replace side cover and secure using the six fasteners.

(5) Secure unit to the rack using the two screws retained in (1).

Clean and inspect TC(s)

5 Implement the following procedures to clean and visually inspect the TC for evidence of damage or deterioration:

(1) Remove and retain the two front panel screws securing the TC to the rack and withdraw chamber sufficient to access the ten screws securing the side panel.

(2) Remove and retain the ten screws to release side panel and visually inspect the internal wiring for signs of damage or deterioration. Ensure all taper pin connections are located and secure.

(3) Remove accumulated dust using soft brush and vacuum cleaner.

(4) Replace side cover and secure using the ten screws retained in (2).

(5) Secure chamber to rack using the two screws retained in (1).

(6) Repeat procedures (1) to (5) for remaining chambers.

M02 INSPECT EARTH BONDING AND CHECK CONTINUITY

Requirements

6 The following items are required for this routine.

(1) Insulation, Continuity and Voltage Test Set (NSN 6625-99-531-3341)

(2) Emery cloth

CHAPTER 1

MAINTENANCE PROCEDURES

CONTENTS

Para
1 Receiver maintenance
MO1 Clean and inspect
2 Requirements
Maintenance procedure
3 Clean and inspect rack(s)
4 Clean and inspect CSU
5 Clean and inspect TC(s)
MO2 Inspect earth bonding and check continuity
6 Requirements
7 Maintenance procedure

RECEIVER MAINTENANCE

1 The Maintenance Operations (MOPs) contained in this chapter are for Outfit CFD equipments excluding Receiver, NSN 5820-99-723-3104. All MOPs for the receiver are detailed in BR 8385B, Sub-category 5C, Chap 1 and should be scheduled in conjunction with Outfit CFD MOPs.

MO1 CLEAN AND INSPECT

Requirements

2 The following items are required to carry out this maintenance routine:

(1) Vacuum cleaner

(2) Soft brush

Maintenance Procedure

Clean and inspect rack(s)

3 Implement the following procedures to clean and visually inspect each rack for evidence of damage or deterioration:

(1) Set the receiver mains switch to 'Off' and remove receiver from rack (Sub-category 5B, Chap 1, Para 2 or 3 refers).

(2) Remove accumulated dust from rack interior using a soft brush and vacuum cleaner.

(3) Visually inspect rack wiring, rear connectors and receiver rear connectors for signs of damage or deterioration.

(4) Ensure correct operation of the swinging arm and check that attaching cableforms are securely tied in position and show no evidence of damage or deterioration.

Maintenance Procedure

WARNING	REMOVE MAINS SUPPLY INPUT TO THE RECEIVER IF EARTH BONDING IS TO BE DISCONNECTED.

7 To inspect earth bonding and check the continuity, proceed as follows:

(1) Visually inspect earth bonding for damage or corrosion. Repair any damage, as necessary, or if corrosion is present release the nuts and bolts securing the bonding and clean affected parts using emery cloth. Refit on completion.

(2) Ensure that all nuts and bolts on bonding arrangements are tight.

(3) Use the Continuity Tester to ensure the continuity resistance of the earth bonding is <0.1 ohms. If the test fails, investigate bonding, rectify and repeat test.

(4) Repeat procedures (1) to (3) for remaining racks.

CATEGORY 6

DESIGN AUTHORITY MAINTENANCE SCHEDULES

CONTENTS

CHAPTER 1 Design Authority Maintenance Schedule

CHAPTER 1

DESIGN AUTHORITY MAINTENANCE SCHEDULE

CONTENTS

Schedule

1 Outfits CFD

SCHEDULE 1

DESIGN AUTHORITY MAINTENANCE SCHEDULE Issued for the guidance of those organisations not in receipt of Schedules from a Service Maintenance Authority.		
Maint Op No	JOB DESCRIPTION	Per
M01	Clean and Inspect	4M
M02	Inspect Earth Bonding and Check Continuity Note ... MOPs for Receiver, NSN 5820-99-723-3104 are detailed in BR 8385B, Sub-category 4B, Chap 1 and should be scheduled in conjunction with the above MOPs	4M
EQUIPMENT DESCRIPTION : Outfits CFD - BR 8385A		

CATEGORY 7

PARTS CATALOGUE

CONTENTS

CHAPTER 1 Outfit CFD Parts List

CHAPTER 1

OUTFIT CFD PARTS LIST

CONTENTS

ITEM	NATO STOCK NO	DESCRIPTION	REDIFON REF DRWG NO.	QUANTITY		
				CFD (2)	CFD (4)	CCT REF
1	5975-99-761-9470	Rack		2	3	
2	5820-99-723-3104	Receiver		2	3	
3	5895-99-750-9019	Channel Selector Unit (vertically mounted)		1		
4	5820-99-253-4762	Channel Selector Unit (horizontally mounted)			1	
5	-	Cable Assembly	012112605A to 5PL2	2	3	
6	-	Cable Assembly	013/12605A to 5PL3	2	3	
7	5995-99-761-9471	Cable Assembly	014/12605A TB1 to CSU	2	3	
8	-	Cable Assembly	015/12605A to 5SK5	2	3	
9	-	Cable Assembly	016/12605A to 5PL1	2	3	
10	-	Cable Assembly	017112605A to 5SK9	2	3	
11	5935-99-913-8325	Socket, UHF twin, fixed		2	3	SK1
12	*	Socket, BNC, 50Σ		2	3	SK2
13	*	Block, terminal		2	3	TB3
14	4940-99-806-5834	Adaptor, Electrostatic Protection		1	1	
15	5820-99-542-2208	Fan Supply Changeover Unit (NOT part of CFD)	602624-00	1	-	
16	4140-99-734-5008	Top Cover	802848-00	2	3	

* Yet to be codified