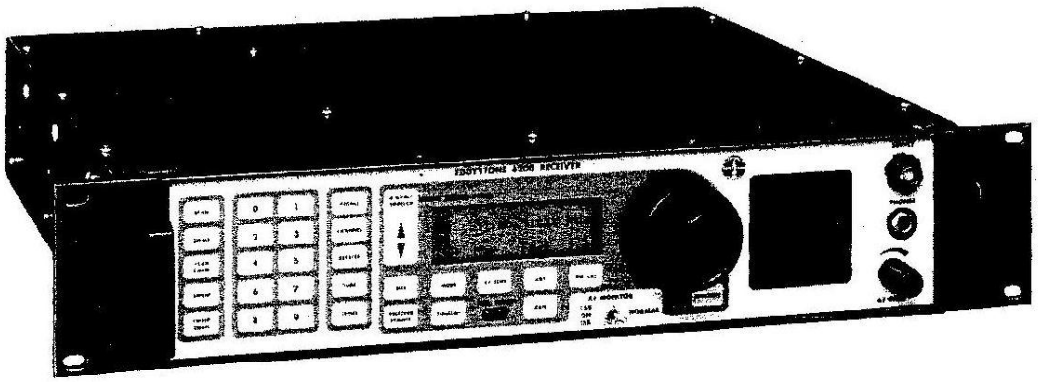
Eddystone

6200
RECEIVER
SERIES

INSTALLATION NOTES
OPERATING INSTRUCTIONS



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6200 AMENDMENT for O.S. 1.6 ONWARDS

The following amendments to the standard 6200 Receiver Operator's Handbook and Workshop Manual, only apply for 6200 Receivers fitted with software O.S. 1.6 onwards.

SECTION ONE : INTRODUCTION

1.1 GENERAL DESCRIPTION

6200 Receivers fitted with software 1.6 onwards have a received channel number output function available when the AUX1 rear panel connector is fitted. This connector is fitted on /B option receivers. This new function however is not available if the /A sub-octave preselector is also fitted or if the /T real time clock is fitted.

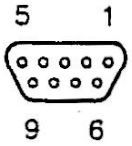
The channel number is output on four binary coded, open collector lines. These indicate which of channels 01 to 15 are being used as the received channel (i.e. the channel which is actually being received as opposed to the one being displayed). If channel 00, the free tuning channel, or any of channels 16 to 99 inclusive is being received, the four lines are all switched off.

SECTION TWO : INSTALLATION

2.2.5 AUX 1 Connector (/B Option only)

This additional auxiliary connector is fitted on /B option receivers. As detailed in Figure 2.8, this connector outputs the Antenna setting for the selected channel (see section 3.2.6) and, if the received channel number is 01 to 15 inclusive, that channel's number in binary coded form. When fitted on receivers which also have the /T (Time Scanning) option, the channel number outputs only are replaced by outputs which indicate when a time scanned channel is selected (see section 3.7).

Figure 2.8
AUX 1 Connector



view into 9 way
female connector (1)SK6

Pin	Description		
	Standard (i.e. not /T)	/T Option (not DAT)	/T Option (with DAT)
1	Ground.	Ground.	Ground.
2	Channel LS+1 bit.	Time scanned channel selected and signal present.	Time scanned channel selected (200mS pulse delayed by 300mS).
3	Channel MS bit.	Not used.	Not used.
4	Antenna 1.	Antenna 1.	Antenna 1.
5	Antenna 3.	Antenna 3.	Antenna 3.
6	Channel LS bit.	Time scanned channel selected.	Time scanned channel selected (200mS pulse).
7	Channel MS-1 bit.	Not used.	Time scanned channel deselected (200mS pulse).
8	Antenna 0.	Antenna 0.	Antenna 0.
9	Antenna 2.	Antenna 2.	Antenna 2.

All outputs are open collector transistors, 100mA maximum current, +50V maximum voltage with internal 10Ω (125mW) current limiting resistors fitted. Individual outputs will be on, pulling a line to ground when the state indicated is set. In the case of the channel number, outputs 2, 3, 6 and 7 will all be off when the received channel is 00 or 16-99 inclusive. Channel number 01 will cause the LS bit output only to be on, with a binary coded sequence following, ending with channel 15 putting all outputs on.

WARNING

Care must be taken that the maximum current rating of 100mA from any output is not exceeded. If it is, then damage to the internal current limiting resistors or the output transistors may occur. Each wanted output must therefore be connected to a positive supply, not exceeding 50V dc, via a resistive load which limits the current to less than 100mA. This would be 500Ω minimum at 50V down to about 40Ω minimum at 5V.

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Eddystone Radio Ltd. July 2000

--- End of 6200 O.S. 1.6 Amendment ----

6200 AMENDMENT FOR O.S. 1.4 ONWARDS

The following amendments to the standard 6200 Receiver Operator's Handbook and Workshop Manual, only apply for 6200 receivers fitted with software O.S. 1.4 onwards. The software fitted can be determined by selecting BITE test 99 (section 3.3.2).

SECTION ONE : INTRODUCTION

6200 receivers fitted with software O.S. 1.4 onwards, have an additional feature which allows all front panel controls (except SUPPLY, AF GAIN and AF MONITOR) to be disabled by the use of a hardwired link on the rear panel REMOTE connector. This helps to ensure that the settings of receivers intended for remote control only, cannot be unintentionally altered locally. If this feature is required, this new input on the REMOTE connector can be shorted to ground via the remote control input plug, so that when this plug is connected, the front panel controls are automatically disabled. To regain local use of the front panel controls, the remote plug has to be removed and the power supply momentarily switched off.

Note that the controls can still be disabled or enabled by the front panel RECEIVER REMOTE switch (see Sections 2.4.1, 3.1.5 and 3.2.1) or by remote control commands DC01 and DF02 (see Section 2, Tables 2.4 and 2.5). However, the new rear panel link has priority over these other methods.

SECTION TWO :INSTALLATION

2.2 EXTERNAL CONNECTIONS

2.2.4 Remote Control Connector

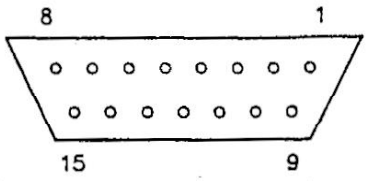
The connector is detailed in Figure 2.7 of this amendment (overleaf). If required, the new 'Remote Priority' input pin 6, can be linked to one of the ground pins 9-11 inside the remote input plug. When this is plugged into the REMOTE connector, the front panel controls are then automatically disabled.

2.4 REMOTE CONTROL

2.4.1 Introduction

Note that accidental local operation can now also be avoided by grounding the new rear panel 'Remote Priority' Input. This is more secure than pressing **[RECEIVER REMOTE]** on the front panel and indeed has priority over this switch (and remote control disable/enable keyboard commands). In all cases, if the front panel controls are disabled, the display will show **Remote** on the top line.

Figure 2.7
REMOTE Connector



view into 15 way
female connector (1)SK3

Pin	Description
1	Not used.
2	BITE Good, open collector transistor output - 50mA max. current - 30v max. voltage - transistor 'on' when BITE test(s) indicate no faults - internal 220Ω, 0.5W current limiting resistor fitted.
3	*Spare Input.
4	*Spare Input.
5	*Spare Input.
6	*Remote Priority Input - pull to ground to disable front panel controls (except SUPPLY, AF GAIN and AF MONITOR). Open-circuit input and momentarily switch off power to receiver to enable controls.
7	*Scan/Sweep Hold Input - pull to ground to halt scan or sweep - open-circuit to move onto next channel or frequency step.
8	12v dc Output - 50mA max. for external equipment.
9	Ground.
10	Ground.
11	Ground.
12	Remote Control RS232/V28 Serial Data Input.
13	Ground for Pin 12.
14	Ground for Pin 15.
15	Remote Control RS232/V28 Serial Data Output.
	* - Note these inputs are internally pulled up to +5v via 10kΩ resistors. Do not exceed 5v on these inputs under any circumstances.

SECTION THREE : OPERATION

3.1 CONTROLS

3.1.5. Miscellaneous Controls and Displays

Note that the RECEIVER REMOTE key is disabled along with all other controls (except SUPPLY, AF GAIN and AF MONITOR) when the rear panel Remote Priority Input is grounded.

3.2.1 Switching On

Note that if the top line of the display shows **Remote** and pressing **[RECEIVER REMOTE]** does not enable the front panel controls, this may be due to the rear panel Remote Priority Input being grounded or it may be due to a previous remote control keyboard lockout command. In either case, remove any inputs to the rear panel REMOTE connector and momentarily switch off the power supply.

BOUND AT REAR

CIRCUIT DIAGRAMS

INTERCONNECTIONS etc.	BP2808 -	Line to pin 6 of (1)SK3 now becomes 'Remote Priority'.
FRONT PANEL BOARD	BP2809 -	Line to D2 of 4IC8 now becomes 'Remote Priority' (was 'Spare').

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File 20014amd

Eddystone Radio Ltd February 1995

---- End of 6200 O.S. 1.4 Amendment ----

6200 AMENDMENT FOR O.S. 1.3 ONWARDS

The following amendments to the standard 6200 Receiver Operator's Handbook and Workshop Manual, only apply for 6200 receivers fitted with software O.S. 1.3 onwards. The software fitted can be determined by selecting BITE test 99 (section 3.3.2).

SECTION ONE : INTRODUCTION

6200 receivers fitted with software O.S. 1.3 onwards, have an additional feature which can allow most DAT (Digital Audio Tape) recorders to be controlled by the time scanning/parallel data facilities available when /T and /B options are both fitted. It should be noted however, that when the these options are required together, either 'normal' or 'DAT' recorder control must be specified at time of order. Constant (for 'normal') or momentary (for 'DAT') recorder control signals are then factory programmed as specified. Note also that the 'DAT' option is not available on the receivers fitted with the /A option sub-octave preselector. The pre-programmed setting can be determined by selecting BITE test 97 which shows either 'N' or 'D' in the top left hand corner of the display. If not specified (or if the /T option is supplied without the /B option) 'N' will be selected.

Note also on these receivers that the internal current limiting resistors on the **AUX 1** rear panel output (see section 2.2.5 below) are reduced in value. This allows the Antenna and Time Scanning control outputs to drive lower impedance loads.

SECTION TWO :INSTALLATION

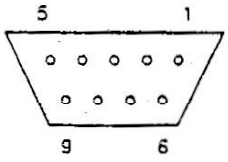
2.2 EXTERNAL CONNECTIONS

2.2.5 AUX 1 Connector (/B Option only)

This additional auxiliary connector is fitted on /B option receivers and is detailed in Figures 2.8 and 2.8a. This connector outputs the Antenna setting selected for the received channel (see section 3.2.6). When fitted on receivers which also have the /T (time scanning) option, outputs are provided to indicate when time scanned channels are selected (see section 3.7). These outputs can be factory programmed to provide either continuous control/indication when a time scanned channel is selected or, except on /A option receivers, separate momentary control signals when such channels are selected or deselected. The former 'normal' mode is suitable for general use and the latter 'DAT' mode is suitable for the control of most DAT type recorders.

Note that when supplied with the sub-octave preselector, /A option, the Antenna setting is 2 bit binary coded and is not available if the time scanning, /T option is also fitted.

Figure 2.8
AUX 1 Connector
(except when fitted on /A option receivers)



view into 9 way
female connector (1)SK6

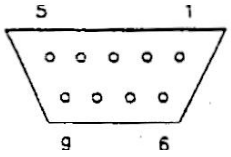
Pin	Description ('N' for normal, 'D' for 'DAT' mode)
1	Ground.
2N	Time scanned channel selected and signal present.
2D	Time scanned channel selected (200ms pulse delayed by 300mS).
3	Spare unprogrammed.
4	Antenna 1.
5	Antenna 3.
6N	Time scanned channel selected.
6D	Time scanned channel selected (200mS pulse).
7N	Spare unprogrammed.
7D	Time scanned channel deselected (200mS pulse).
8	Antenna 0.
9	Antenna 2.

All outputs are open collector transistors, 100mA maximum current, +50V maximum voltage with internal 10 Ohm (125mW) current limiting resistors fitted. Individual outputs will be on, pulling an output load to ground, when the state indicated is set. Pins 2, 6 and 7 are only operative under the conditions stated and when the /T (Time Scanning) option is also fitted.

WARNING ⚠

Care must be taken that the maximum current rating of 100mA from any output is not exceeded. If it is, then damage to the internal current limiting resistors or the output transistors may occur. Each wanted output must therefore be connected to a positive supply not exceeding 50V dc via a resistive load which limits the current to less than 100mA. This would be 500 Ohms minimum at 50V to about 40 Ohms minimum at 5V.

Figure 2.8a
AUX 1 Connector
(when fitted on /A option receivers)



view into 9 way
female connector (1)SK6

Pin	Description ('T' when fitted with /T option)
1	Ground.
2	Antenna (most significant bit, 'Y' of 'XY')
2T	Time scanned channel selected and signal present.
3	Spare.
4	Spare.
5	Spare.
6	Antenna (least significant bit, 'X' of 'XY')
6T	Time scanned channel selected.
7	Spare.
8	Spare.
9	Spare.
	Both outputs are open emitter transistors, supplying approximately +10V dc at currents up to 50mA maximum. Internal 120 Ohm (500mW) current limiting resistors are fitted. Individual outputs will be high when the state indicated is set. Note that the Antenna outputs are 2 bit binary coded, i.e. Antenna 0 is '00', Antenna 1 is '01', Antenna 2 is '10' and Antenna 3 is '11'.
	WARNING ⚠
	Care must be taken that the maximum current rating of 50mA from any output is not exceeded. If it is, then damage to the internal current limiting resistors may occur. Each wanted output must therefore be connected to ground via a resistive load which limits the current to less than 50mA (approximately 80 Ohms minimum).

SECTION THREE : OPERATION

3.3 BITE (Built-in-Test-Equipment)

3.3.2 Active BITE

Note that BITE test 97, when the /T option is supplied, now also indicates whether the AUX 1 time scanning control outputs are factory programmed for 'normal' or 'DAT' operation. This is shown by an 'N' or 'D' indicator in the top left hand side of the display.

3.7 SCANNING BY TIME OPERATION (/T Option Receivers Only)

Note again the extra display information provided in the clock setting BITE test 97 (see 3.3.2 above).

When the receiver also has the 8 bit parallel data output, /B option fitted, the scanning by time control outputs depend on whether the receiver has been factory programmed for 'normal' or 'DAT' operation. The output connections are detailed in section 2.2.5 of this supplement.

When programmed for 'normal' ('N' displayed on BITE test 97) two outputs as described in section 3.7 of the handbook/manual are provided. One provides a constant active signal whilst a time scanned channel is selected. The other provides a constant signal whilst a time scanned channel is selected and a signal above the set threshold level is present in that channel. One or other of these outputs can control external equipment, such as a tape recorder, which requires a single constant control signal to hold it in the desired state whilst a channel is selected.

When programmed for 'DAT' ('D' displayed on BITE test 97) three outputs are provided. Each provides a 200mS period low going pulse. One output provides a pulse immediately a time scanned channel is selected. Another provides a pulse delayed until 300ms after a time scanned channel is selected. The third provides a pulse immediately all time scanned channels are deselected. It should be noted that pulses are produced only when going between having a channel selected and having no channel selected (and vice-versa). They are not produced when going directly between one time scanned channel and another. When leaving the time scanning mode of operation before waiting for a channel to be deselected, a ('stop') pulse is automatically produced on the third output. These outputs can be used to control external equipment which requires momentary 'start' and 'stop' control signals (such as most DAT recorders). The first and/or second outputs can be used to start the equipment either immediately or sequentially and the third output can be used to stop the equipment.

SECTION SIX : SPARES

6.6 WIDEBAND RF INPUT BOARD : CIRCUIT REF. 6

Ref.	Description	Manufacturer-Type	Part No.
R31	4X10R SIL (/B Option only)	Bourns 4608X-102-100	21-1544
R32	4X10R SIL (/B Option only)	Bourns 4608X-102-100	21-1544

BOUND AT REAR

CIRCUIT DIAGRAMS

WIDEBAND RF INPUT BOARD BP2810 R31 and R32 to read '4x10R'

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File 20013amd

Eddystone Radio Ltd January 1995

---- End of 6200 O.S. 1.3 Amendment ----

6100/6200 SYNTHESISER MODULE SUPPLEMENT

The following supplement to the standard 6100 and 6200 Receiver Workshop Manuals details variations in the mixer and synthesiser integrated circuits fitted in the Synthesiser Module printed circuit board, circuit reference 5. Note the type of IC fitted does not affect the receiver circuitry, performance or test procedures.

SECTION SIX : SPARES

6.5 SYNTHESISER BOARD : CIRCUIT REF. 5

IC5	Synthesiser IC #	Plessey NJ88C24MADP	44B-661
		or Plessey NJ88C24MAMP	44C-50
IC9	Synthesiser IC #	Plessey NJ88C24MADP	44B-661
		or Plessey NJ88C24MAMP	44C-50
IC14	Synthesiser IC #	Plessey NJ88C24MADP	44B-661
		or Plessey NJ88C24MAMP	44C-50
IC16	Mixer	Plessey SL641C	44A-11
		or Plessey SL1641C	44A-143
IC25	Synthesiser IC #	Plessey NJ88C24MADP	44B-661
		or Plessey NJ88C24MAMP	44C-50

Synthesiser ICs IC5,9,14 and 25 can be DIL (44B-661) or SM (44C-50) but will all be the same on any one module and will use the appropriate PCB (14184PE onwards for DIL or 16117PA onwards for SM).

File 200syn.a

Eddystone Radio Ltd April 1998

--- End of 6100/6200 Synthesiser Module Supplement ----

SECTION ONE : INTRODUCTION

WARNING

Before connecting the unit to the power supply, SECTION TWO : INSTALLATION must be read especially with regard to the instructions concerning wiring of the mains connector. Information about first aid in the case of electric shock and about the 'Health and Safety at Work Act 1974 (United Kingdom)' is bound at the rear in Appendix A.

Two books are available for the 6200 receiver. The 'Operator's Handbook' covers the first three sections while all seven, complete with circuit diagrams, are available in the 'Workshop Manual'. The sections are described as follows:-

SECTION ONE : INTRODUCTION which includes safety warnings, a general description of the unit, it's options and ancillaries, a data summary and typical performance.

SECTION TWO : INSTALLATION which details physical dimensions and fittings and all external connections. Setting-up procedures, fuse details and remote control details are also given.

SECTION THREE : OPERATION which describes all the unit's controls and their use (signal reception, BITE, channelised operation, scanning and sweeping).

SECTION FOUR : CIRCUIT DESCRIPTION which explains operation with reference to the block and circuit diagrams bound at the rear.

SECTION FIVE : MAINTENANCE which details alignment and setting-up procedures as well as access to the various modules.

SECTION SIX : SPARES which lists all printed circuit and related electronic components used in the equipment.

SECTION SEVEN : PRINTED CIRCUIT BOARDS which shows printed circuit board layouts and component positions.

1.1 GENERAL DESCRIPTION

The Eddystone 6200 is a digitally synthesised, high performance, microprocessor controlled receiver covering the range 1600kHz to 29999.990kHz with 10Hz resolution. Operation down to 10kHz (with reduced performance below 400kHz) is available as an option. Comprehensive facilities are provided for the reception of AM, CW, SSB and FSK signals, with inbuilt FSK demodulation as an option. ISB operation is also provided on the /3 variant.

Comprehensive remote and automatic control facilities allow control using a computer or a dedicated remote control unit over a 1200 Baud RS232 serial link. The Eddystone 6850 Remote Control Unit can control up to sixteen 6200 receivers using a 1771 Multi-

address Selector. The Eddystone 6860 RS232/RS422 Remote Interface Adaptor enables control over RS422 links and the Eddystone 1778 (V22) Modem allows long distance control over a single pair of wires. A wide range of 1200 Baud, asynchronous compatible 'off the shelf' Modems, line drivers and multiplexers etc. can also be used in a remote control system.

A 99 channel non-volatile memory is provided for storage of all major receiver parameters. These memories can be scanned as required or used to store the end frequencies for automatic sweep tuning. Audio squelch and a signal detected output, with adjustable threshold level, and an external scan/sweep hold input are provided. These can be used with the scanning and sweeping facilities to control the operation of the receiver depending on the input signal level. An extra non-volatile memory is provided for direct entry of tuned frequency etc. (the 'free tuning' channel). A real time clock is provided as an option which allows channel scanning by time of day or week.

Built-In-Test-Equipment is provided to monitor and test the signal path and the synthesiser circuitry. The information provided assists fault finding to module level.

Independent rear panel audio outputs are provided for connection to an external loudspeaker and 600Ω lines. This line output can also be used to drive the Eddystone 1529/20 FSK Demodulator or other similar audio driven equipment. Other rear panel connections provide for RF muting (derived from an associated transmitter), for diversity AGC operation /IF muting and BITE error indication.

The 6200 has two variants, each of which can be supplied with various options. The variant is indicated by the number after '6200/' on the serial plate. The options fitted to a particular variant are indicated by the letters after '6200/'. A list of the variants is given in Table 1.1 and the options in Table 1.2.

Table 1.1
6200 Variants

Suffix	Variant
/2	Without ISB operation.
/3	With ISB operation.

Table 1.2
6200 Options

Suffix	Option
/A	With internal sub-octave preselector giving operation down to 10kHz (reduced performance below 400kHz, sub-octave above 1.6MHz).
/B	With 8 bit parallel data output (O/C collector), indicating selected antenna number (enabling control of antenna selecting switches or other similar equipment). This output can be factory programmed to provide other status/control signals if required. This is not available with option A where coded voltage outputs are used.
/C	With additional customer specified filters (to a maximum of two).
/F	With wideband input giving operation 10kHz -30MHz (reduced performance below 400kHz).
/I	With 1.4MHz intermediate frequency output (not available on ISB variants).
/K	With internal FSK demodulator (85-1100Hz shifts with corresponding Baud rates up to 300 Baud and RS232 data output).
/P	With low level RF output to drive an Eddystone 1161/1 Panoramic Display Unit (with /A option only).
/S	With external standard input requiring 8720kHz at 0dBm (no internal master oscillator fitted).
/T	With real time clock allowing channel scanning by time of day or week.
/X	With internal, higher stability, oven controlled oscillator.
/Y	Extended LF audio response (AM) to line output on BNC connector.

Also note options /I, /P, /S and /Y are mutually exclusive.

A 6200/3AKX, for example, has ISB reception, the sub-octave preselector fitted, FSK demodulation facilities and a higher stability internal frequency master.

1.2 DATA SUMMARY

Frequency Coverage	1600kHz to 29999.990kHz 10kHz to 29999.990kHz (/A and /F)
Tuning Step	Adjustable in range 10Hz to 99.99kHz (10Hz increments). Automatic variable rate can also be set with a minimum step of 10Hz.
Reception Modes	AM mode for A2A and A3E. CW mode for A1A. FSK mode for F1B or F1D (/K option receivers or any receiver with external 1529/20 FSK Demodulator). USB/LSB modes for H2A, H3E, R2A, R3E, J2A and J3E. ISB mode for B8A and B8E (ISB variants only). The use of other external audio driven demodulators will enable most other signal modes to be received.
Bandwidths	6kHz and 2.4kHz symmetrical. 0.3-2.7kHz (i.e. 2.4kHz wide) only on SSB and ISB. Up to two extra bandwidths can be fitted to customer's requirement (/C option receivers)
Gain Control	Slow, medium and fast AGC or approximately 100dB manual gain control. An internal option switch enables variable threshold or normal AGC to be selected. In all cases, the RF sensitivity control provides up to at least 30-50dB extra manual gain control. A diversity AGC link is provided on the rear panel.

Data Summary (continued)

B.F.O. Range	±2.4kHz in 100Hz steps (CW and FSK modes).
Antenna Input	50Ω unbalanced input, BNC connector. Overload protection is provided for continuous application of an emf of 30V rms from a 50Ω source and 50V rms with link fitted on /A option. Internal reed relay controlled (by contact to ground) from associated transmitter open circuits receiver antenna input during transmission.
R.F. Selectivity	Wideband over specified range on all but /A option which has sub-octave filters above 1600kHz.
Squelch	Audio squelch (and scan halt) are derived from carrier/sideband level. The squelch threshold can be adjusted from the front panel. An separate rear panel output is provided to indicate when a signal is present above the set threshold.
Audio Outputs	1W maximum into 8Ω external loudspeaker (2W into 4Ω). 1W maximum into front panel monitor speaker. 20mW maximum into 600Ω line. 10mW maximum into low/medium impedance headphones.
Intermediate Frequencies	45MHz first I.F. 1.4MHz second I.F.
Display	Twenty character, four line liquid crystal display with led back lighting. The display shows all information relevant to the selected operating mode. Vertical bargraphs are displayed, when appropriate, to show signal strength and squelch level simultaneously. When manual gain is selected, a single bargraph is displayed to show the gain level setting. Two separate leds are provided for FSK signal tuning on the /K option.

Controls	Thirty-one key, sealed membrane keyboard with 'key pressed' sounder. A multi-function control knob is provided for frequency tuning, channel selection etc. A single dedicated control knob is provided for AF Gain. On ISB variants, a two position toggle switch is provided to enable local monitoring of upper or lower sideband. On all variants a push button power supply switch is provided.
FSK Operation	On /K option receivers, FSK signals with shifts between 85Hz and 1100Hz and corresponding rates of up to 300 Baud can be demodulated. An RS232 output is provided on the rear panel with two front panel leds to assist tuning. These will be equally illuminated when an FSK signal, with traffic, is correctly tuned.
BITE	BITE provides continuous fault monitoring and enables a wide range of individual tests to be made, thus assisting fault finding to module level.
Stored Channels	A maximum of 99 channels can each be stored with frequency, mode, bandwidth, AGC, RF sensitivity and BFO offset settings. On /B option receivers, the selected antenna can be stored and outputed, also on /T option receivers, the scan start and stop times. Channel contents can be interrogated and changed without interruption of the signal being received. All the channel memories are non-volatile using lithium battery backed up RAM. This retains it's contents for a total of at least ten years of equipment life without external power applied.

Data Summary (continued)

Scanning	Any number of the 99 stored channels can be automatically scanned with a dwell time on each channel of between 0.1 and 9.9 seconds (0.1 second steps). If squelch is selected, the scan will halt on channels with signals above the set threshold and remain there for a hang period after the signal ceases. This hang period can be set between 0 and 9 seconds (1 second steps). At all times, the scan position can be altered using the main control knob and can be stepped on or halted using the rear panel hold scan/sweep input. Scanning by time of day/week is also available on the /T option.
Sweeping	Automatic tuning using the selected step can be performed using the frequencies stored in adjacent channel memories as limits. The receiver remains on each step for the selected dwell period. If a step of 5kHz or more and squelch are selected, the sweep will halt on steps with signals above the set threshold, and remain there for a hang period after the signal ceases. This hang period can be set between 0 and 9 seconds (1 second steps). At all times, the sweep position can be altered using the main control knob and can be stepped on or halted using the rear panel hold scan/sweep input.
Remote Control	All major functions, except audio gain, can be controlled and interrogated using 1200 Baud asynchronous data at RS232 level (or RS422 level using adaptors).
Power Supplies	100/150V and 200/260V AC (40-60Hz, single phase). AC consumption approximately 20 to 30 VA. Operation from a 19-32V DC supply (negative ground) will continue in the absence of an AC supply. DC current consumption approximately 1.8A at 19V to 1A at 32V.

Data Summary (continued)

Height	Rack mounting, 88mm (2U).
Width	Rack mounting, 483mm (19in.).
Depth	Rack mounting, approx. 440mm (intrusion into rack including allowance for cabling).
Weight	Rack mounting, approx. 12kg.
Environmental	Operational, -15 to +55deg.C Storage, -20 to +70deg.C Relative humidity, 95% at 40deg.C Bump/vibration, meets MPT1204 and CEPT requirements.
MTBF	At least 30,000 Hours (to BT HRD4).
MTTR	Approximately 30 minutes.

1.3 TYPICAL PERFORMANCE

The following performance figures are typical within the specified frequency range of the receiver, except when the /A or /F option is fitted. Then, there is a gradual decrease in the sensitivity and intercept point specified, below about 400kHz.

Typical Performance (continued)

Sensitivity

For SINAD (S+N/N) ratios >10dB

Mode	I/P dBuV emf	B/W kHz
AM (1kHz, 60%)	+5	6
AM (1kHz, 60%)	+1	2.4
CW (1kHz tone)	-8	2.4
FSK (1.7kHz tone)	-5	2.4
SSB/ISB (1kHz tone)	-5	0.3-2.7 (2.4 total)

These correspond to a noise figure of 12dB.

Filter Bandwidths

Bandwidth (kHz)	-6dB (min.) (kHz)	-60dB (max.) (kHz)
6	6	20
2.4	2.4	3.8
2.4 (USB)	+0.3 to +2.7	-0.4 to +3.4
2.4 (LSB)	-0.3 to -2.7	+0.4 to -3.4

Up to two other bandwidths can be supplied on /C option receivers.

Image/IF Rejection

First image rejection > 100dB.
Second image rejection > 80dB.
I.F. rejection > 100dB.

Master Frequency Stability

1ppm standard.
0.1ppm on /X option receivers.
(both over -10 to +50 deg.C).

AGC Range

4dB change in audio output for a 100dB rise in input above AGC threshold (typically +3dBuV emf). AGC attack time nominally 5-10mS. AGC decay time nominally 300mS, 1.5secs or 3secs (switchable).

Inter-modulation (in band)

The level of third order intermodulation products produced by two (1kHz/1.6kHz) in-band signals, each of +90dBuV emf, will be at least 45dB below that of either signal.

Typical Performance (continued)

Third Order Intermodulation (out of band)	With a wanted signal of +10dBuV emf producing standard output, two unwanted signals adjusted to produce a third order intermodulation product at the wanted frequency, must be greater than +90dBuV emf when at least 30kHz removed from the wanted frequency. This is equivalent to a third order intercept point of +17dBm.
Second Order Intermodulation (out of band)	With a wanted signal of +10dBuV emf producing standard output, two unwanted signals adjusted to produce a second order intermodulation product at the wanted frequency, must be greater than +80dBuV emf when each is approximately half the wanted frequency. This is equivalent to a second order intercept point of +37dBm. Note that this figure is increased for wanted frequencies above 1600kHz when the sub-octave preselector is fitted (/A option receivers).
AM Cross-Modulation	With a wanted signal of +60dBuV emf producing standard output, an unwanted signal, of level +100dBuV emf at 20kHz off-tune, modulated 30% at 1kHz, will produce an output at least 30dB below standard output.
Blocking	With a wanted signal of +60dBuV emf, output will be affected by less than 3dB by an interfering signal 20kHz off-tune at level +110dBuV emf (AGC on or off).
Reciprocal Mixing	The level of a signal 20kHz removed from the tuned frequency will be at least +95dBuV emf to produce a noise signal equivalent to 0dBuV emf at the tuned frequency (USB/LSB/ISB modes).
Antenna Radiation	The level of radiated signals at the antenna socket will be less than 2uV pd (across 50Ω over 10kHz to 110MHz).

--oOo--

SECTION TWO : INSTALLATION

WARNING

⚠ Before connecting to the power supply, the sub-sections 2.2.1 AC Supply Connector, 2.3.1 AC Supply and 2.3.2 Fuses must be read.

2.1 PHYSICAL DIMENSIONS AND FITTING

2.1.1 Accessories Kit

A kit of accessories is supplied with the receiver. The contents of the kit should be checked against Table 2.1.

Table 2.1
Contents of Accessories Kit LP5547

Quantity	Description	Part No.
1	Mains Connector and Lead	33-336
1	4 Way Shell (dc supply)	33-721
2	Sockets for above (dc supply)	33-722
1	25 Way 'D' Plug	33-428
1	15 Way 'D' Plug	33-194
1 (on /B)	9 Way 'D' Plug	33-313
1	25 Way Cover	33-704
1	15 Way Cover	33-753
1 (on /B)	9 Way Cover	33-752
1	BNC Plug	33-264
1 (on /I, /P or /S)	BNC Plug	33-264
1	2A Fuse	8-18
1	3.15A Fuse	8-37
1	1A(T) HRC Fuse	8-74

2.1.2 Rack Mounting

The receiver can be installed directly in 483mm (19in.) racking using four suitable screws. Plain washers or plastic cup washers should be used beneath the screwheads to prevent damage to the paint finish. Fixing slots conform to the standard spacing of 76.2mm. Overall dimensions of the receiver are shown in Figure 2.1. Telescopic slides may be used with rack mounted receivers to allow convenient access to rear mounted connectors etc. The rack aperture dimensions to accommodate these are given in Figure 2.2. Telescopic slides (Figure 2.3) are supplied in pairs. Each slide has three sections. One is fixed to the receiver and another to

the rack frame. The third moveable section (the beam) connects the two fixed sections together and allows the receiver to be withdrawn from the rack, holding the former at the fully extended position. Pressing the retaining clip on each beam will, when fully extended, allow the receiver to be withdrawn clear of the rack. Re-assembly is the reverse of the above. It is important that each slide is securely fixed by three M4x8mm screws along each side of the receiver and that the rack slides are similarly supported throughout their length.

Rack mounted receivers may easily be converted to cabinet mounting and vice-versa. The accessories required are listed in Table 2.2.

Table 2.2
Accessories Available to Order

Description	Catalogue No.
Telescopic Slide Kit (rack mounting)	LP5332
Cabinet Kit	LP5333
Anti-Vibration Mounting Kit (for use with LP5333)	LP5334
External Loudspeaker Unit	1615
Headphones	1588

2.1.3 Cabinet and Anti-Vibration Mounting

A cabinet with, if required, anti-vibration mountings, is available for the receiver, see Table 2.2. The dimensions of the receiver and cabinet with anti-vibration mountings are shown in Figure 2.1A. Fixing of the anti-vibration mounts to the mounting surface and if not already fitted, to the cabinet, is as follows.

1) If access to the underside of the mounting surface (i.e. the desk or shelf) is available, drill four groups of four clearance holes on the centres shown in Figure 2.4. This enables the anti-vibration mountings to be bolted to the surface. If access to the underside is not available, these holes must be tapped to take suitable screws.

2) If the anti-vibration mounts are not already fitted to the cabinet, drill four 6.5mm diameter holes in the bottom side of the cabinet on the centres shown in Figure 2.4. It is important that these holes will lie exactly at the centre of each of the four groups of four clearance holes drilled in the mounting surface. Use of a common template is strongly recommended.

3) Secure the anti-vibration mountings to the mounting surface

and then fix the cabinet to the mountings using M6x20mm screws (via the strengthening sections provided).

4) Fit the receiver into the cabinet, ensuring the earthing strap from the receiver earth terminal to the cabinet is correctly fitted.

Figure 2.1
Dimensions of Receiver in all Mounting Styles

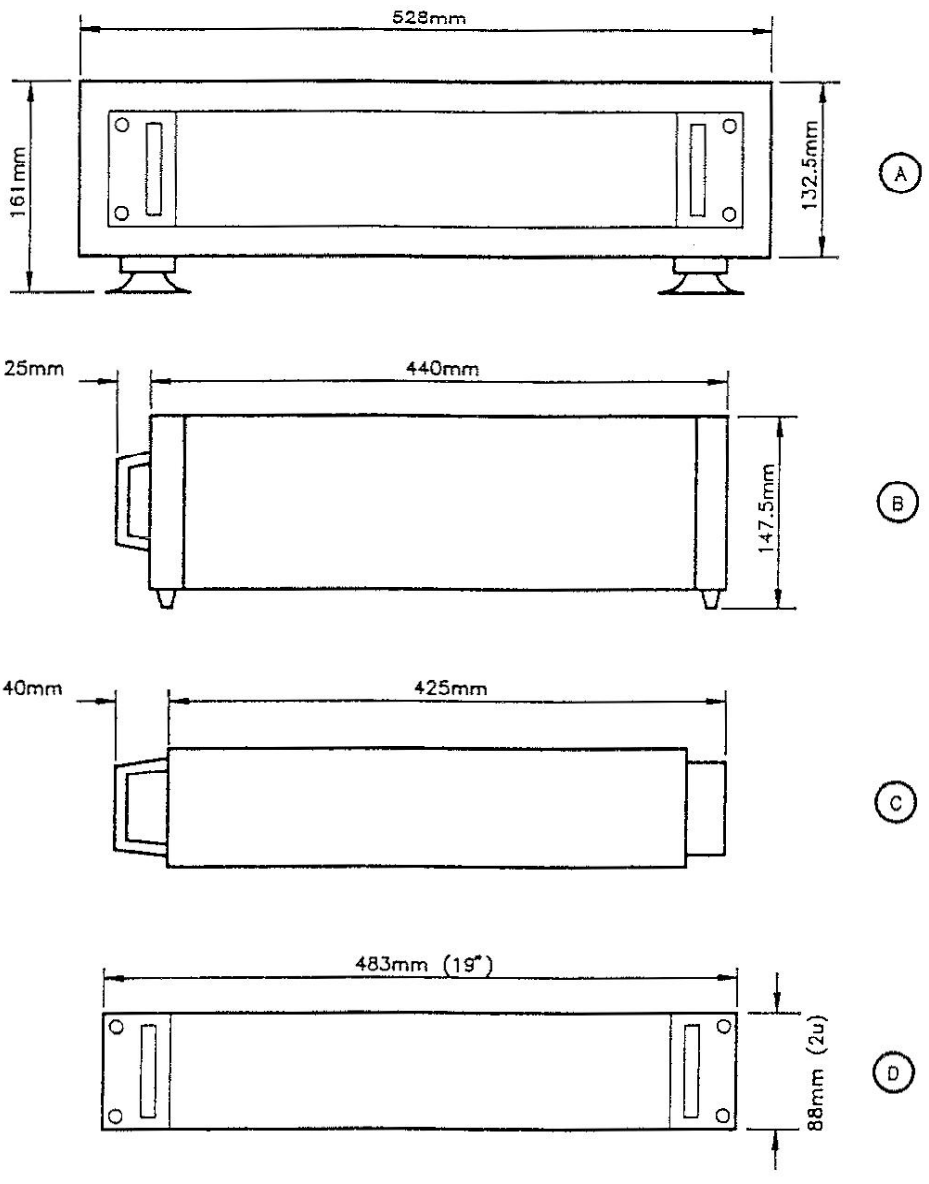


Figure 2.2
Rack Aperture Dimensions for Telescopic Slides

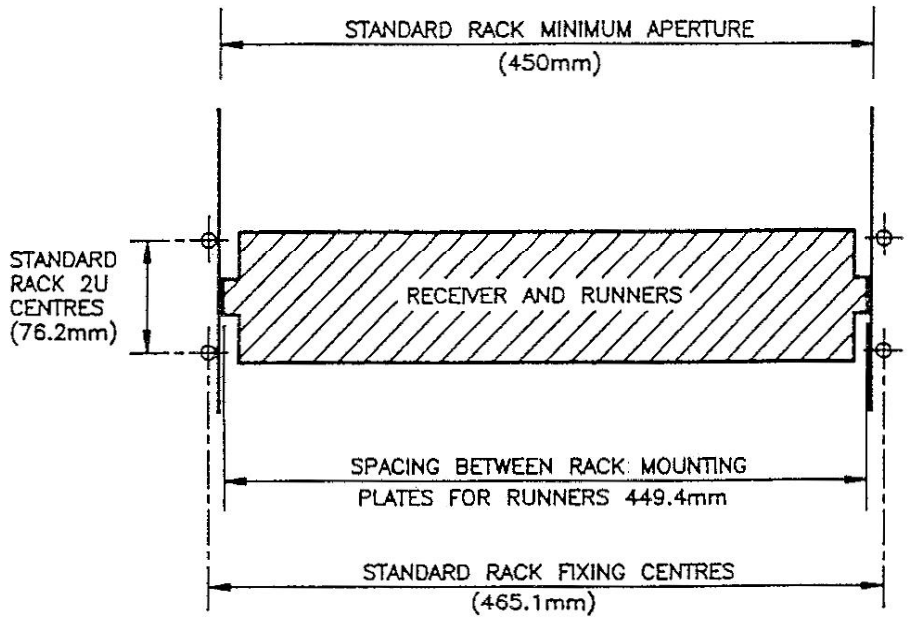


Figure 2.3
Telescopic Slide

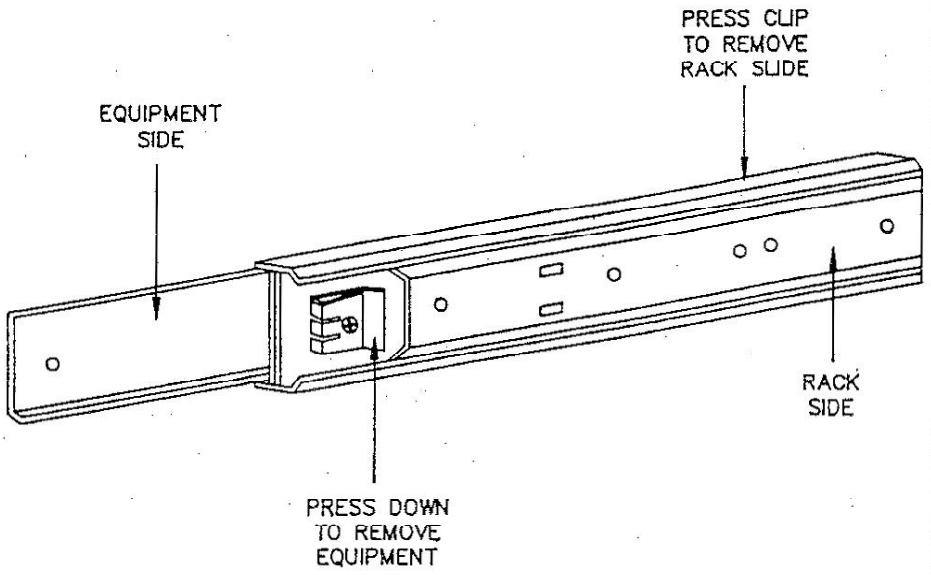
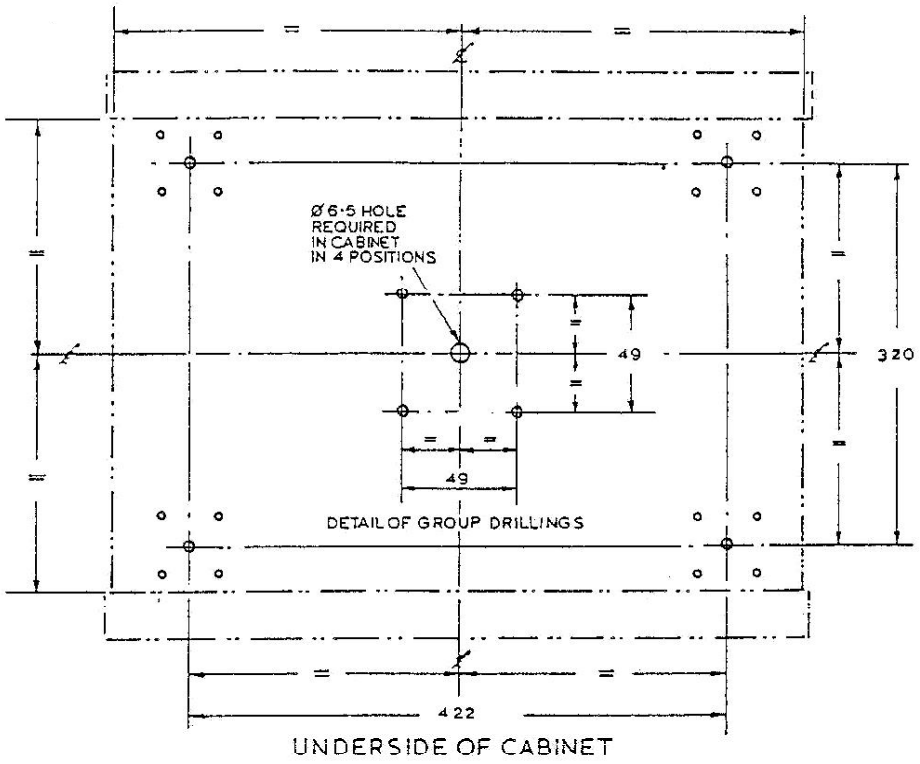


Figure 2.4
Drilling Details for Fixing Anti-Vibration Mountings



2.2 EXTERNAL CONNECTIONS

All external connections are made at the rear of the receiver with the exception of the headphone jack on the front panel (see layout BP2963 bound at the rear of the manual).

2.2.1 AC Supply Connector

The AC SUPPLY socket accepts a 40-60Hz mains supply, within the range specified, using a standard I.E.C. connector.

WARNING

⚠ The AC mains supply **MUST** be completely disconnected from the receiver whilst the rear panel supply voltage connector is adjusted to suit the local supply conditions.

If a moulded plug and lead is used, a connector to suit the local supply arrangements can be fitted to the free end, observing the colour code which is as follows :-

LINE	-	**BROWN**
NEUTRAL	-	**BLUE**
EARTH	-	**GREEN/YELLOW**

The following additional information is issued in accordance with British Standard BS415 and concerns mains supply connections for the United Kingdom.

'If the colours of the wires in the mains lead of this apparatus do not correspond with the coloured markings identifying the terminals in your mains connector (or plug) proceed as follows.

1) The **GREEN/YELLOW** wire must be connected to the plug terminal marked E or ⏚ or coloured either **GREEN** or **GREEN/YELLOW**.

2) The **BLUE** wire must be connected to the plug terminal marked **N** or coloured either **BLUE** or **BLACK**.

3) The **BROWN** wire must be connected to the plug terminal marked L or coloured either **BROWN** or **RED**.

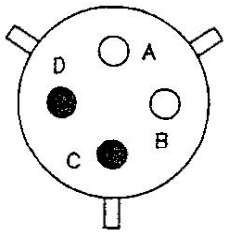
4) If a 13A (BS1363) Fused Plug is used for connection to the supply outlet, the plug **MUST** be protected by a **3A FUSE**. If another type of plug is used, a fuse of the appropriate rating must be fitted either in the plug or the adaptor or at the distribution board.

2.2.2 DC Input Connector

The receiver may be powered from an external dc supply of +19v to +32v (negative ground). Connections are shown in Figure 2.5.

An earth terminal is provided to allow the chassis of the receiver to be bonded directly to adjacent metalwork.

Figure 2.5
DC INPUT Connector

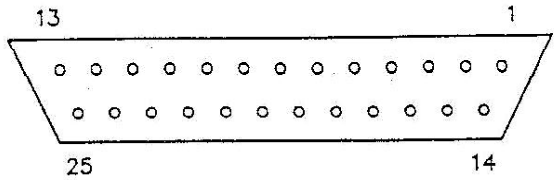


view into 4 way
male connector (1)PL1

Pin	Description
A	Ground (0v).
B	+19v to +32v dc.
C	Not used.
D	Not used.

2.2.3 Ancillaries Connector

Figure 2.6
ANCILLARIES Connector



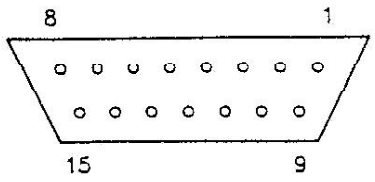
view into 25 way
female connector (1)SK2

Pin	Description
1	Audio Output - 1W into 8Ω or 2W into 4Ω.
2	FSK Output - standard RS232 - /K option only.
3	Signal Present Indicator open collector transistor output - 50mA max current - 30v max. voltage - transistor 'on' when signal not present - internal 220R, 0.5W current limiting resistor fitted.
4	Diversity AGC (except LSB on ISB).
5	12v dc Output - 50mA max for external equipment.
6	600R Line Output)
7	600R Line Output (CT)) except LSB on ISB
8	600R Line Output) -(preset by 7RV6).
9	RF Mute - ground to mute - input pulled up to +12v through internal 10k resistor.
10	Diversity AGC (LSB on ISB) - ISB variants only.
11	600R Line Output) LSB on ISB only
12	600R Line Output (CT)) - ISB variants only
13	600R Line Output) - (preset by 8RV5).
14	Ground for pin 1 - unmuted.
15	Ground for pin 1 - muted via PHONES socket.
16	Ground for pin 4.
17	Ground for pin 5.
18	Ground for pin 6.
19	Ground for pin 7.
20	Ground for pin 8.
21	Ground for pin 9.
22	Ground for pin 10.
23	Ground for pin 11.
24	Ground for pin 12.
25	Ground for pin 13.

Note all external connections must be adequately screened.

2.2.4 Remote Control Connector

Figure 2.7
REMOTE Connector



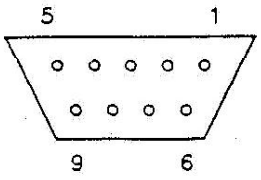
view into 15 way
female connector (I)SK3

Pin	Description
1	Not used.
2	BITE Good, open collector transistor output - 50mA max current - 30v max. voltage - transistor 'on' when receiver selected or BITE test(s) indicate no faults - internal 220R, 0.5W current limiting resistor fitted. *Scan/Sweep Hold Input - pull to ground to halt scan or sweep - open-circuit to move onto next channel or frequency step.
3	Spare.
4	Spare.
5	Spare.
6	Spare.
7	*Scan/Sweep Hold Input - pull to ground to halt scan or sweep - open-circuit to move onto next channel or frequency step.
8	12v dc Output - 50mA max for external equipment.
9	Ground.
10	Ground.
11	Ground.
12	Remote Control RS232/V28 Serial Data Input.
13	Ground for Pin 12.
14	Ground for Pin 15.
15	Remote Control RS232/V28 Serial Data Output.
	* - Note these inputs are internally pulled up to +5v via 10kOhm resistors. Do not exceed 5v on these inputs under any circumstances.

2.2.5 AUX 1 Connector (/B Option only)

This additional auxiliary connector is fitted on /B option receivers. As detailed in Figure 2.8, this connector outputs the Antenna setting selected for the received channel (see section 3.2.6). When fitted on receivers which also have the /T (Time Scanning) option, outputs are provided which indicate when a time scanned channel is selected (see section 3.7). This connector also has spare output lines which may be programmed to provide other status signals to specific customer requirements.

Figure 2.8
AUX 1 Connector



view into 9 way
female connector (1)SK6

Pin	Description
1	Ground.
2	Time scanned channel selected and signal present.
3	Spare Unprogrammed.
4	Antenna 1.
5	Antenna 3.
6	Time scanned channel selected.
7	Spare Unprogrammed.
8	Antenna 0.
9	Antenna 2.
	All outputs are open collector transistors, 10mA maximum current, +50v maximum voltage with internal 1kOhm (125mW) current limiting resistors fitted. Individual outputs will be on, pulling an output load to ground, when the state indicated is set. Pins 2 and 6 are only operative when the /T (Time Scanning) option is also fitted.

2.2.6 ANTENNA Connector

Antenna input connection is by 50 Ohm BNC socket (1)SK1.

2.2.7 AUX 2 Connector (/I, /P or /S Options only)

This additional 50 Ohm BNC auxiliary socket, (1)SK4, is fitted on /I, /P or /S option receivers.

On /I option receivers, it provides a 50 Ohm buffered output at the receiver's final 1.4MHz I.F. Note that this is not available on ISB variants.

On /P option receivers, it provides a 50 Ohm buffered output of the signal present at the ANTENNA input, amplified by about 6dB. This is normally used to feed equipment, such as panoramic display units (e.g. the Eddystone 1161/2) which requires an input at the original signal frequency.

On /S option receivers, it provides a 50 Ohm input for an external frequency standard. An input level of greater than 0dBm at 8720kHz will lock the receiver to the external standard.

2.3 SETTING UP PROCEDURES

2.3.1 AC Supply

WARNING

The AC mains supply **MUST** be completely disconnected from the receiver whilst the mains voltage selector, located on the back panel, is adjusted for the local supply.

2.3.2 Fuses

AC FUSE (1)FS1 : 1A(T) HRC anti-surge 20mm cartridge fuse in series with the LINE mains supply input.

DC FUSE (1)FS2 : 2A 20mm cartridge fuse in series with the mains transformer secondary.

DC FUSE (1)FS3 : 3.15A 20mm cartridge fuse in series with the external +ve DC Supply input line.

2.3.3 AGC Preset Option

Internally fitted link(s) enable either conventional or variable threshold AGC to be selected. One link is positioned in the middle of the Main Board which, in turn, is located underneath the top dust cover. Note that this link will also be underneath the FSK Board if that is fitted. On ISB variants, a second identical link is situated towards the rear left of the ISB Board, which is also located underneath the top cover.

The link(s) should be in position 'A' (or not fitted) if conventional AGC is required, or in position 'B' if variable threshold AGC is required. In the latter case, when AGC is on (Slow, Med or Fast) AGC threshold is set by the IF GAIN/SQUELCH up and down keys. On ISB variants, both links must be set to the same position.

2.3.4 Line Level Setting

The rear panel line output levels are set internally.

Except for LSB reception on ISB mode, the line level is set by (7)RV6. This preset control is fitted at the front right hand corner of the Main Board. This is the large printed circuit board situated in the centre of the receiver, below the top dust cover.

On ISB variants, the line level of LSB signals received on ISB mode is set by (8)RV5. This preset control is fitted at the front left hand corner of the ISB Board. This board is situated on the right hand side of the receiver, below the top dust cover.

The top dust cover has to be removed to enable these controls to be adjusted. The line level controls have a small integral 'knob' with a screwdriver slot to distinguish them from other preset potentiometers in the receiver. **IT IS IMPORTANT** that no other internal preset are adjusted unless as part of the maintenance procedure.

The line level is generally set to give 0.5mW (-3dBm) into 600 Ohm loads for ssb signals above the AGC threshold. This ensures that the line output will not normally exceed the 20mW available, when the receiver is being used in any mode, with AGC selected.

2.3.5 FSK Idle Setting (/K Option only)

The FSK demodulator board is fixed onto the Main Board which, in turn, is located underneath the top dust cover.

The Idle Setting Switch, 11SW1 permits either a 'high' or a 'low' output to be set when FSK mode is deselected. It may be adjusted as follows :-

Switch away from printed circuit board edge..output held at -9v.
Switch towards printed circuit board edge....output held at +9v.

2.3.6 Antenna Overvoltage Protection (/A Option only)

Two levels of overvoltage protection are available adjusted by plug link 13LK1.

Link 0-1 Over voltage protection diodes limit input voltage to 30Vrms while surges are dealt with by arrester device.

Link 1-2 Additional protection is provided to the above by circuitry that open circuits the antenna and grounds the receiver antenna input. Protection is provided up to 50Vrms (continuous).

2.4 REMOTE CONTROL

2.4.1 Introduction

Full digital remote control and interrogation of the receiver is possible via the serial data input and output lines (pins 12 and 15 of the rear panel REMOTE connector, (1)SK3). If control without revertive checks or status interrogation is required, just the serial data input is used. All functions can be controlled apart from supply switching, loudspeaker monitoring, audio line output level and real time clock setting (/T option receivers). A complete list of commands is given in Table 2.4 with additional information in Figures 2.12, 2.13 and 2.14. Examples of use are given in Table 2.5.

The control signals are at standard RS232/V28 levels at the connector. The data rate is fixed at 1200 Baud asynchronous with one start and two stop bits. The receiver is thus compatible with a wide range of standard asynchronous Modems (including the Eddystone 1778) multiplexers and line drivers. It is also compatible with synchronous data communications equipment which can be fitted with asynchronous adaptors.

The principal Modem options are :-

a) V22 (1200 Baud, asynchronous) allowing control over a two wire link (e.g. Eddystone 1778 Modem).

b) V23 (1200 Baud, full duplex) allowing control over a four wire link.

Note that no control lines are provided for the Modem/multiplexers etc. These may require their RTS lines to be set true (i.e. at logic 0, a positive RS232 level). If required, this can be done with a link in the Modem connector to a convenient fixed output signal. Such equipment will usually also need internal switches set to match the Baud rate etc. of the receiver. In all cases, the equipment's operating manual should be consulted before attempting installation.

If an Eddystone 6860 RIA is used to convert the levels to RS422 (V11), control over two twisted pairs is possible, without additional line drivers, over distances up to 1/1.5km.

Remote control can be provided from an Eddystone 6850 Remote Control Unit (RCU) which operates in exactly the same way as the receiver itself. Alternatively a personal computer can be programmed to provide exactly whatever control is required. In all cases, the link between receiver and controller need not necessarily be maintained and no memory of the receiver's status kept at the controller end.

The 6850 RCU can control up to sixteen 6200 receivers via an Eddystone 1771 Multi-Address Selector. This unit provides remote data buffering and routing to the receivers as well as selecting the audio feed for the RCU. The 6850 can control up to fifteen 6200 receivers via the Eddystone 6870 Multi-Address Selector. This is a simplified version of the 1771 unit, which requires each receiver to have its external address lines suitably wired (see section 2.4.4). If these lines are left open circuit, the self-addressing facility will be disabled (the display showing **Receiver No. 0** on BITE test 98) and a 1771 will be required to access individual receivers in a multi-receiver system.

When the 6850 RCU or personal computer is used, error protection is normally provided in three ways to ensure correct remote operation. These are:-

a) By providing an exclusive OR (EOR) checksum with each data transfer.

b) By providing redundancy in the code words chosen so that not all combinations are used.

c) By providing a revertive data 'echo' whereby the control data sent is reverted, after use, to the controller for checking by comparison (5mS after the data has finished being received).

The majority of the front panel controls, on the receiver itself, can be 'locked out' or disabled by pressing **[RECEIVER REMOTE]** on the receiver. **Remote** will then be shown at the top of the receiver's display. This helps prevent accidental local operation of the receiver. It should be noted that the receiver will always respond to valid remote commands, whether or not the keyboard is locked out. The RECEIVER REMOTE key itself (as well as the local audio and supply controls) will not be disabled and therefore to regain local control, press **[RECEIVER REMOTE]** again.

N.B. Input commands should be separated by at least 10mS.

2.4.2 Control Inputs

These are shown in Figure 2.9. The first control byte has data 00. This is followed by two or more bytes. Details of the bytes are shown in Figures 2.10 and 2.11. Note that the receiver will respond to codes containing 1, 1.5 or 2 stop bits. One start bit is used throughout.

The first byte has to contain 00 data to act as a synchronising byte. This is followed by two or more bytes depending on the action required (see Table 2.4) with a maximum gap of 250mS (0ms minimum) between bytes. A longer gap can be allowed if specified by the customer at time of ordering.

The form of three byte commands is given in Figure 2.10 which gives a typical example.

Figure 2.9
Control Inputs

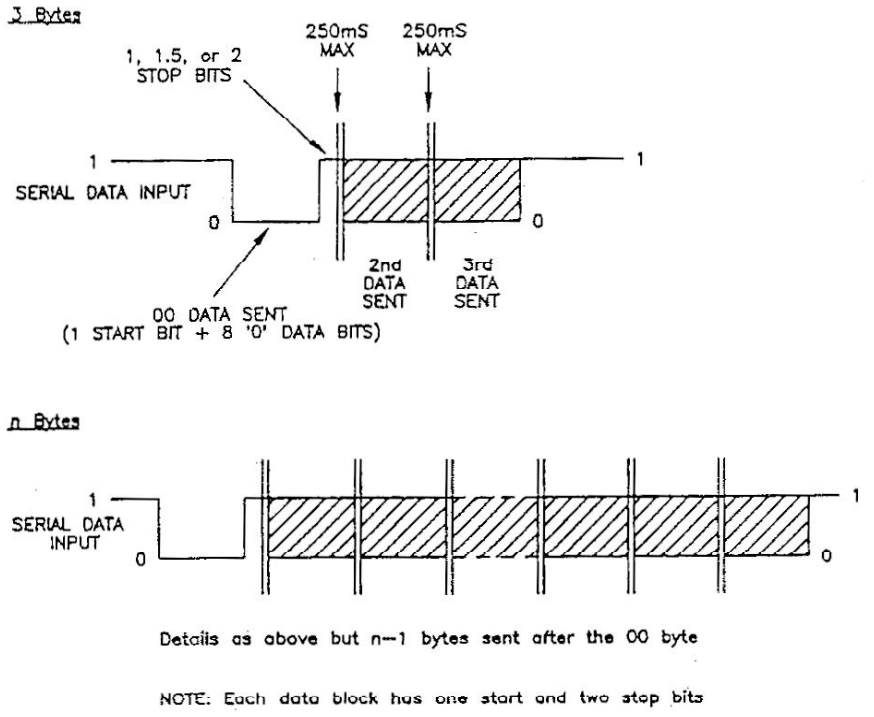
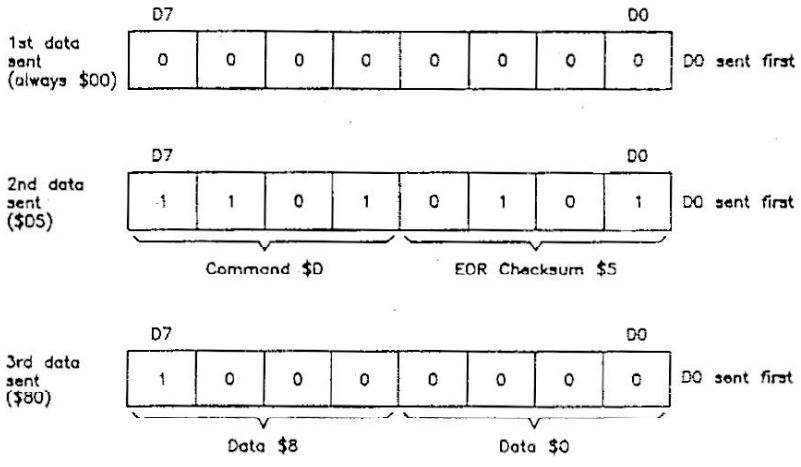


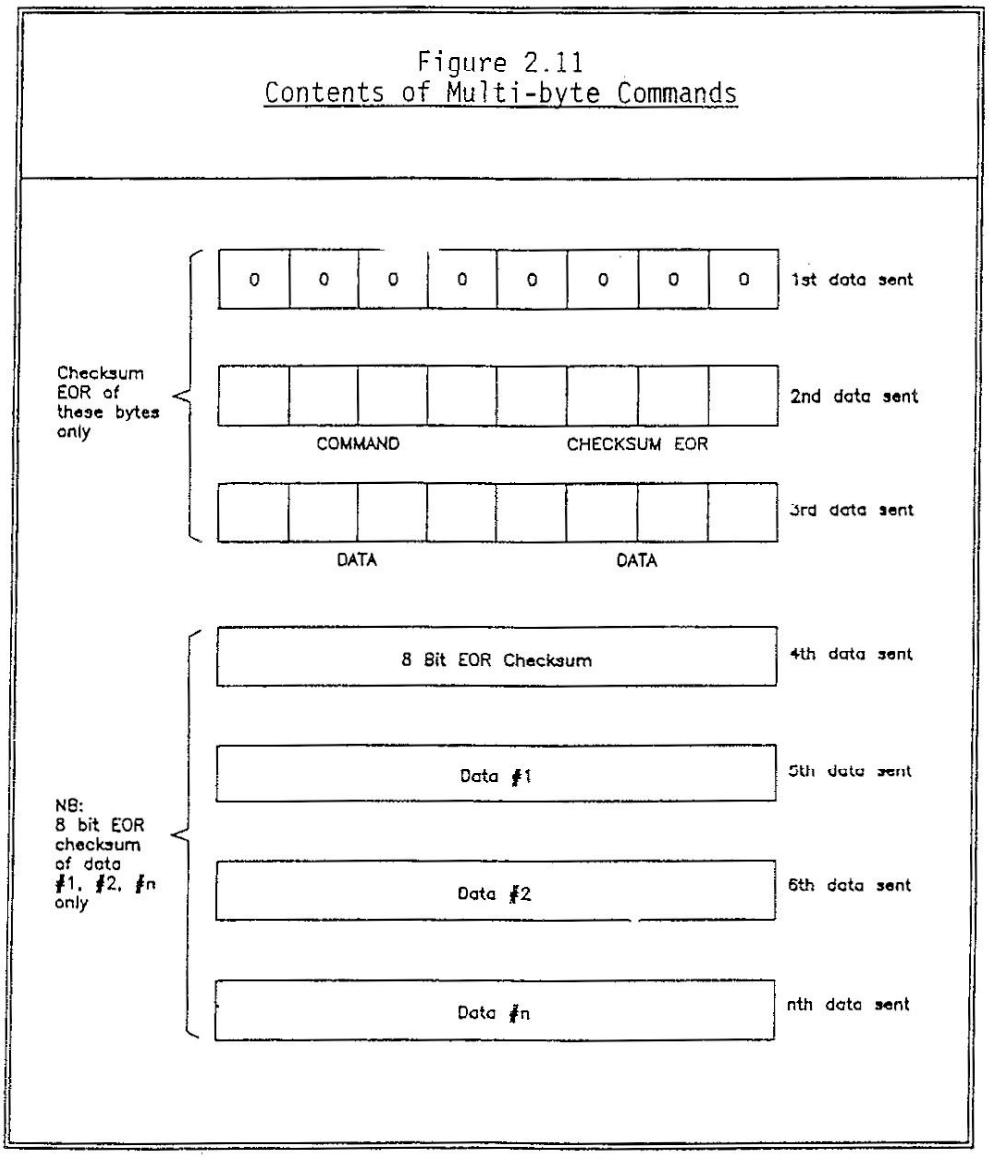
Figure 2.10
Contents of Three Byte Commands
Typical Control Code - $D580



The two bytes sent after the initial 00 byte are described as the control code and consist of the parts shown in Figure 2.10 (start and stop bits are not shown). The checksum is sent as the 4 bit EOR of the rest of the command and data nibbles (excluding all start and stop bits). The example control word in hexadecimal (hex) form is $D580 ($ denotes hex). This will be the method used to define all of the control words. Where longer strings of data are defined, the same convention will be used with each data byte being represented by two symbols (e.g. XX or YY) to represent the two hex numbers contained therein.

Multi-byte commands are detailed in Figure 2.11. These are used to load complete channel memories etc. with just one command sequence. Note that the data is in binary coded decimal (bcd) for numerical settings such as tuned frequency etc. Note also that the control word is followed by the eight bit EOR of data bytes 1 to n that follow.

Figure 2.11
Contents of Multi-byte Commands



2.4.3 Control Outputs

Reverted control outputs from the receiver are in the same form as the inputs **except that the leading 00 byte is not reverted.**

N.B. Data is reverted approximately 5mS after the end of the data received (to allow the controller to 'turn around').
Two stop bits are sent after each byte with zero gap to the next byte's start bit. It should be noted however, that this will be compatible with 1 and 1.5 bit stop systems, since the now 'surplus' stop bits effectively become part of the 250mS maximum gap between bytes. The content of the reverted data is identical to that sent except in the case of interrogation or status checking commands. Here, the data required is reverted in addition to the control code sent, in the form shown in Figure 2.11. In situations where strings of commands are being sent and data reverted, the next command must not be sent until all the data from the previous command has been reverted or timed out.

Table 2.4
Complete List of Serial Control Codes

X = checksum nibble) where a nibble is four bits or
Y = data nibble) half a transmitted byte.

Note that if data errors are detected at the receiver, no data is reverted. Examples of use are given in Table 2.5.

Code in hex	Action	Data reverted
1XYY	Increment channel 00 frequency. If RATE is set to 0.00kHz, YY is used to increment the frequency in a variable rate manner. YY must be in the hex range $80 to $FC, corresponding to frequency increments between about 110kHz and 10Hz respectively. Values of YY outside this range will not have a useful action. If RATE is not set to 0.00kHz, this command will increment the frequency by one step at the set RATE (i.e 10Hz to 99.99kHz). In this case YY must equal $FF for the command to be valid.	None.
2XYY	Decrement channel 00 frequency. If RATE is set to 0.00kHz, YY is used to decrement the frequency in a variable rate manner. YY must be in the hex range $80 to $FC, corresponding to frequency increments between about 110kHz and 10Hz respectively. Values of YY outside this range will not have a useful action. If RATE is not set to 0.00kHz, this command will decrement the frequency by one step at the set RATE (i.e 10Hz to 99.99kHz). In this case YY must equal $FF for the command to be valid.	None.
3XYY	Set channel 00 BFO offset. YY is the offset and must be in the bcd range 00 to 24 (corresponding to 0.0 to +2.4kHz) for the command to be valid. For negative offsets, the most significant bit of YY must be set at 1 (e.g. A4 to set -2.4kHz) for the command to be valid.	As sent.

Table 2.4 (continued)

Code in hex	Action	Data reverted
4XYY	Interrogate channel memory time scan start/stop settings (/T option only). Reverts contents of channel memory specified. YY is the channel number and must be in the bcd range 00 to 99 for the command to be valid.	$4XYYXXY_1Y_2--Y_{15}Y_{16}$ where XX is the 8 bit EOR of the YY pairs, which con-tain the channel status as shown in Figure 2.14.
5XYY	Set channel 00 Antenna number. YY is the Antenna number and must be in the bcd range 00 to 03 for the command to be valid.	As sent.
6XYY	Set BITE mode and test number. YY is the test number and must be in the bcd range 00 to 99 for the command to be valid.	As sent.
7XYY	Set IF Gain or Squelch level. If AGC is off in the **received** channel, this command sets the manual IF Gain level. If AGC is on (Slow, Med or Fast) in the **received** channel, this command sets the Squelch threshold level. In the latter case, if variable threshold AGC is internally selected, it simultaneously sets the AGC threshold level. YY is the gain/threshold level and must be in the hex range $00 (maximum gain/minimum threshold) to $3F (minimum gain/maximum threshold) for the command to be valid.	As sent.
8XYY	Interrogate channel memory contents. Reverts contents of channel memory specified. YY is the channel number and must be in the bcd range 00 to 99 for the command to be valid.	$8XYYXXY_1Y_2--Y_{15}Y_{16}$ where XX is the 8 bit EOR of the YY pairs which con-tain the channel status as shown in Figure 2.12.

Table 2.4 (continued)

Code in hex	Action	Data reverted
9XYY	Load channel number. Sets channel specified to be the displayed channel on the receiver. YY is the channel number and must be in the bcd range 00 to 99 for the command to be valid. This command is not operative in RECALL or TUNE modes.	As sent.
AXYY	Set sweep start channel. Sets channel specified to be the sweep start channel. YY is the channel number and must be in the bcd range 01 to 98 for the command to be valid.	As sent
BXYY	Toggle channel scan bit. Sets channel specified to be scanned if not already set and vice-versa. YY is the channel number and must be in the bcd range 01 to 99 for the command to be valid.	As sent.
CXYY	Store channel memory contents. Copies channel 00 contents into channel number specified. YY is the channel number and must be in the bcd range 01 to 99 for the command to be valid.	As sent.
D580	Initialise. Command used by Eddystone RCUs when first accessing or if re-initialising a remotely controlled receiver. Sets RECALL mode and reverts the contents of the received and displayed channel, the IF Gain level, the Squelch/AGC threshold setting, Squelch on or off, tuning rate and scan/sweep hold status.	D580XXY_1Y_2--$Y_{23}Y_{24}$ where XX is the 8 bit EOR of the YY pairs, which con-tain the received channel status etc. as shown in Figure 2.12.

Table 2.4 (continued)

Code in hex	Action	Data reverted
DC01	Disable keyboard. 'Locks out' the controlled receiver's front panel keys and main control knob, to prevent local use. Note that the receiver power on default always enables these controls.	As sent.
DF02	Enable keyboard. Enables the controlled receiver's front panel keys and main control knob, to allow local use. Note that the receiver power on default also enables these controls.	As sent.
D683	Block interrogate channels 00-49 memory contents. Reverts the contents of channels 00-49 inclusive, in one string of data. Note, on the /T option, time scan start/stop settings are not reverted.	D683XX followed by 50 groups of Y_1Y_2--$Y_{15}Y_{16}$ (each group as in Fig. 2.12). The first group reverted is channel 00 and the last is channel 49. Note XX is to be discarded.
D904	Block interrogate channels 50-99 memory contents. Reverts the contents of channels 50-99 inclusive, in one string of data. Note, on the /T option, time scan start/stop settings are not reverted.	D904XX followed by 50 groups of Y_1Y_2--$Y_{15}Y_{16}$ (each group as in Fig. 2.12). The first group reverted is channel 50 and the last is channel 99. Note XX is to be discarded.

Table 2.4 (continued)

Code in hex	Action	Data reverted
D085	Status Interrogate. Reverts all significant receiver status and settings apart from channel memory contents.	D085XXY_1Y_2--$Y_{23}Y_{24}$ where XX is the 8 bit EOR of the following twelve YY pairs which contain the status and settings of the receiver as shown in Figure 2.13.
D386	Fast Status Interrogate. Reverts the received signal strength reading and the states of the signal present detector and passive BITE error indicators. This short command enables frequent updating of just these, often rapidly changing, readings.	D386XX$Y_{23}Y_{24}$ where $Y_{23}Y_{24}$ contains the signal strength data in the hex range $00 (minimum) to $3F (maximum) etc. as shown in Fig. 2.13. Note that the EOR, XX, equals $Y_{23}Y_{24}$ in this case.
DA07	Select RECALL mode.	As sent.
D508	Select TUNE mode.	As sent.
DC89	Select CHANNEL mode.	As sent.
DF8A	Select RECEIVE mode.	As sent.
D60B	Select SCAN mode.	As sent.
D98C	Select DWELL mode.	As sent.
D00D	Select SWEEP mode.	As sent.
D30E	Select RATE mode.	As sent.
DA8F	Select BITE mode.	As sent.
D397	Select Squelch on.	As sent.
DC98	Select Squelch off.	As sent.

Table 2.4 (continued)

Code in hex	Action	Data reverted
DF9B	Select frequency display (Function).	As sent.
D01C	Select BFO offset display (Function).	As sent.
D99D	Select Antenna No. display (Function).	As sent.
D31F	Select 6.0kHz IF Filter in channel 00.	As sent.
D5A2	Select 2.4kHz IF Filter in channel 00.	As sent.
DC23	Select Opt. Filter No.1 in channel 00. Valid on /C option receivers only.	As sent.
D3A4	Select Opt. Filter No.2 in channel 00. Valid on /C option receivers only when both extra filters are fitted.	As sent.
DA25	Select AGC, Slow decay, in channel 00.	As sent.
D926	Select AGC, Med. decay, in channel 00.	As sent.
D0A7	Select AGC, Fast decay, in channel 00.	As sent.
DFA8	Select AGC Off in channel 00.	As sent.
D629	Select AM Mode in channel 00.	As sent.
D9AE	Select CW Mode in channel 00.	As sent.
D32C	Select FSK Mode in channel 00.	As sent.
DA34	Select USB Mode in channel 00.	As sent.
D33D	Select LSB Mode in channel 00.	As sent.
D03E	Select ISB Mode in channel 00. Valid on ISB variants only.	As sent.
D3B5	Select Max RF Sensitivity in channel 00.	As sent.
D0B6	Select Med RF Sensitivity in channel 00.	As sent.
D638	Select Min RF Sensitivity in channel 00.	As sent.
D6B0	Put displayed channel into scan sequence.	As sent.
DF31	Remove disp'd channel from scan sequence.	As sent.

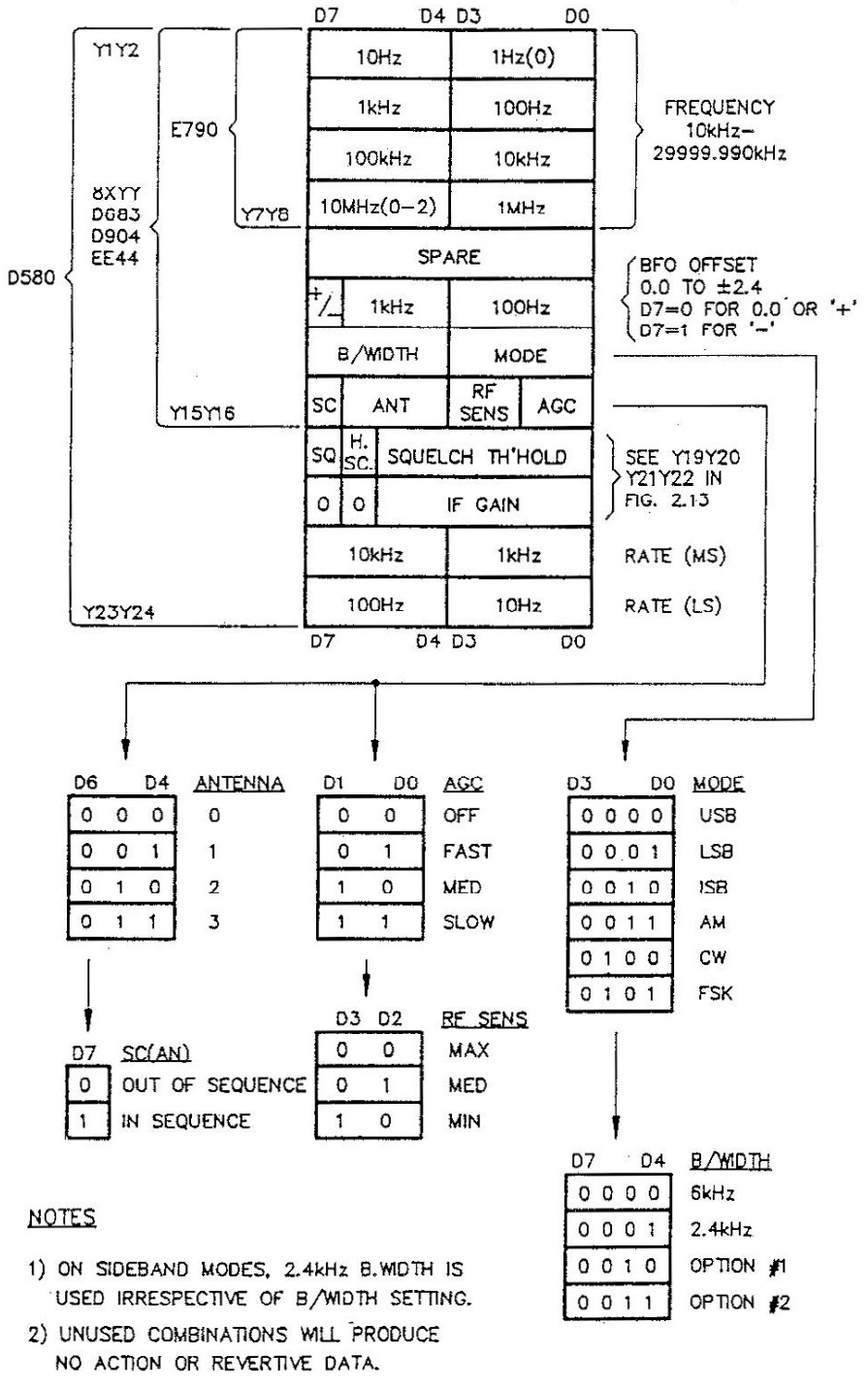
Table 2.4 (continued)

Code in hex	Action	Data reverted
ED03XX $Y_9Y_{10}Y_{11}Y_{12}$	Set tune/sweep rate. Sets tuning or frequency sweep step to that specified. $Y_9Y_{10}Y_{11}Y_{12}$ is the rate step and must be in the bcd range 0000 (00.00kHz) to 9999 (99.99kHz) for the command to be valid, see Figure 2.13. XX is the 8 bit EOR of the following two YY pairs.	As sent.
E428XX $Y_{13}Y_{14}0Y_{16}$	Set dwell/hang periods. Sets dwell and hang periods to that specified. $Y_{13}Y_{14}$ is the dwell period and must be in the bcd range 00 (0.0secs) to 99 (9.9secs) for the command to be valid. Y_{16} is the hang period and must be in the bcd range 0 (0secs) to 9 (9secs) for the command to be valid, see Figure 2.13. XX is the 8 bit EOR of the following two YY pairs.	As sent.
E790XXYY $Y_1Y_2Y_3Y_4$ $Y_5Y_6Y_7Y_8$	Load channel frequency only. Sets frequency specified into channel memory number specified. YY is the channel memory number and must be in the bcd range 00 to 99 for the command to be valid. Y_1 to Y_8 give the required frequency as shown in Figure 2.12. XX is the 8 bit EOR of the following five YY pairs.	As sent.
EE44XXYY Y_1Y_2---- --$Y_{15}Y_{16}$	Load all channel status. Sets all status specified into channel memory number specified. Note, on the /T option, time scan start/stop settings are not loaded. YY is the channel memory number and must be in the bcd range 00 to 99 for the command to be valid. Y_1 to Y_{16} give the required status as shown in Figure 2.12. XX is the 8 bit EOR of the following nine YY pairs.	As sent.

Table 2.4 (continued)

Code in hex	Action	Data reverted
E259XXYY Y_1Y_2---- --$Y_{15}Y_{16}$	Load channel memory, time scan, start/stop times. Sets all status specified into channel memory number specified. YY is the channel memory number and must be in the bcd range 00 to 99 for the command to be valid. Y_1 to Y_{16} give the required status as shown in Figure 2.14. XX is the 8 bit EOR of the following nine YY pairs.	

Figure 2.12
Channel Setting and Status Contents



NOTES

1) ON SIDEBAND MODES, 2.4kHz B.WIDTH IS USED IRRESPECTIVE OF B/WIDTH SETTING.
2) UNUSED COMBINATIONS WILL PRODUCE NO ACTION OR REVERTIVE DATA.

Figure 2.13
General Setting and Status Contents

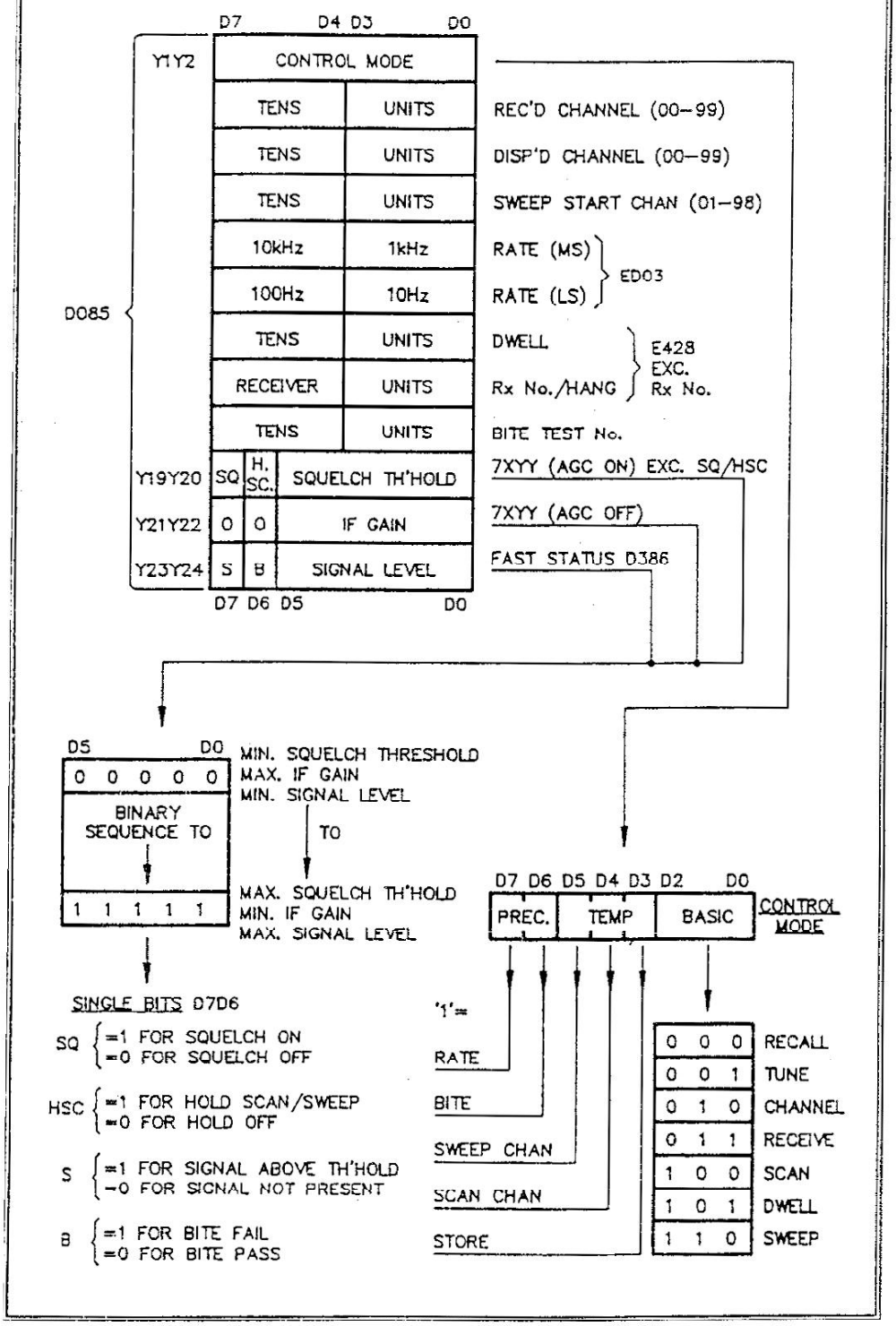
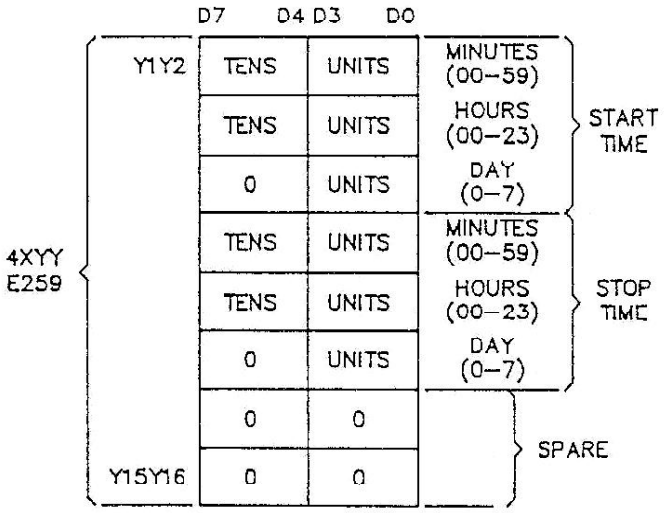


Figure 2.14
Channel Time Scan Status
(/T Option Receivers Only)



NOTES

1) THE START AND STOP TIMES ARE SPECIFIED USING THE 24 HOUR CLOCK WITH VALID TIMES 00:00 TO 23:59 INCLUSIVE (HOURS:MINUTES)

2) THE DAY IS EXPRESSED AS A NUMBER 0–7 INCLUSIVE. THE NUMBERS 1–7 REPRESENT THE DAY OF THE WEEK RELATIVE TO THE REAL TIME CLOCK DAY OF THE WEEK (ALSO DISPLAYED AS A NUMBER 1 -7). THE NUMBER 0 REPRESENTS 'NO DAY SPECIFIED' THUS CAUSING A DAILY SCAN RATHER THAN A WEEKLY SCAN.

3) 'NIBBLES' GIVEN AS '0' MUST BE SENT AS 0 WHEN USING THE LOAD CODE E259 ETC. NOTE HOWEVER THEY MAY NOT NECESSARILY BE REVERTED AS 0's USING THE INTERROGATE CODE 4XYY.

Table 2.5
Simple Examples of Control Sequences

The wide range of control codes available enable remote or automatic control systems to be designed to meet most requirements. It should be noted however, that in any particular system, not all of the codes need to be generated or used. Some examples of use are given below.

Code in hex	Examples of Use
1XYY and 2XYY	These codes are intended to provide rapid knob controlled search tuning with the receiver previously set to RECALL mode ($DA07) and with the rate set as required ($ED03XXY$_9Y_{10}Y_{11}Y_{12}$). It can also be used for remotely controlled frequency sweeping by setting the rate to the required step and sending $11FF or $22FF repeatedly to step the receiver tuned frequency up or down respectively. Generally the minimum period between steps should be in the order of 100-200mS. This method allows the remote controller to have immediate indication of the sweep frequency. It is important to note that, to retain maximum speed of operation, no confirming data is reverted. This means, if any data is lost, the actual frequency may not be that expected. Therefore, the actual frequency should be verified by sending $8800 at the end of each tuning sequence.
6XYY	This code enables remote or automatic fault finding by sending $6XYY (where YY is the number of the test to be performed) then sending $D386 (after a brief period of about half to one second) to interrogate the BITE error bit. Note that this leaves the receiver in BITE mode.
8XYY, D683 and D904	These codes are used to interrogate, singly or in blocks, the contents of the channel memories (including the free-tuning channel 00). They can also be used to transfer the contents of channels, via a controller, to the channel memory in another receiver, i.e. 8XYY, followed by EE44XXYYY$_1$Y$_2$----Y$_{15}$Y$_{16}$ after changing the receiver accessed.

Table 2.5 (continued)

Code in hex	Examples of Use
9XYY	This code can be used in conjunction with other codes to perform various operations on the stored channels. For example, to set the receiver to receive on channel 53, send $9F53 followed by, after 100-200mS, $DF8A, the code for RECEIVE. In common with with local operation, the command will only be valid if the channel specified contains a frequency (i.e. not a clear channel).
AXYY	This code sets the sweep start channel. Note that it can change the start channel during sweep operations to dynamically change the sweep frequency limits (the required ranges being pre-loaded into the channel memories).
BXYY, D6B0 and DF31	These codes determine if a particular channel is in or out of the scan sequence. BXYY can be used whilst scanning to dynamically modify the sequence (remove channels) whilst scanning is in progress. D6B0 and DF31 only operate on the channel being displayed. For example to set channel 44 to be scanned, send $9944 (display channel 44) followed by, after 100-200mS, $D6B0.
CXYY	This code enables storage of channel settings (equivalent to using STORE under local control). It thus enables shifting and modification of memories, in the same manner as performed locally, when used in conjunction with $9XYY (load channel number) and $D508 (select tune mode). For example to copy the contents of channel 37 into channel 52, send $9D37, $D508 and $CB52 in sequence (with 100-200ms gaps).
D580	This is a special code used by Eddystone RCUs to first access or to re-initialise a remotely controlled receiver. The code puts the receiver into RECALL mode (i.e. operates as a conventional free-tuning receiver) and reverts the tuned frequency etc. at which the receiver is operating. Signal reception is therefore unaffected. This code can also be used by other remote control units, particularly those which have their own channel memory storage and do not use that in the receiver.

Table 2.5 (continued)

Code in hex	Examples of Use
D085	This code reverts all essential receiver settings (apart from channel memories) and can thus be used to initialise remote control units.
D386	This code enables rapid interrogation of all receiver status which is liable to be rapidly changing and which changes independently from the remote control unit. Received signal strength is reverted as well as the states of the signal present and passive BITE error indicators. If the remote control unit is required to display received signal strength, signal present and BITE error, send $D386 every 100-200mS when no other command is being sent. An additional advantage in doing this is that, if power to the receiver is removed or if the remote link fails, then the controller will be warned by the absence of reverted data. Note that if the receiver's scan or sweep mode is in use, too frequent use of $D386 will effectively lengthen the dwell period
DC01 and DF02	These codes remotely enable or disable the receiver's own front panel keys and main control knob (though not the audio and supply switch controls which are always enabled). This helps prevent accidental local use. It is important to note that when the receiver goes through 'power on reset', these controls are always enabled.
DF9B, D01C and D99D	These codes are only used to alter the 'conventional receiver display' contents as does the receiver's FUNCTION switch. They do not however have any affect on how the receiver is updated by the various remote control codes.
7XYY, D397 and DC98	These codes set gain/threshold levels and switch Squelch on or off. Note that they apply to the received channel, i.e. they are not stored differently in different channels. 7XYY sets IF Gain if the received channel has AGC Off selected. Otherwise, it sets Squelch Threshold. In this latter case, if variable threshold AGC is set internally in the receiver, it simultaneously sets AGC Threshold.

Table 2.5 (continued)

Code in hex	Examples of use
D31F	This code sets 6.0kHz IF Filter (Bandwidth) in the free-tuning channel 00. This is one of many codes used to control individually the reception mode settings of channel 00. When the receiver is in RECALL mode, these settings operate immediately on the signal being received. In combination with other codes, they can be used to set up a channel for storage. For example, after loading channel 00 as required, send $CB10 to store the data in channel memory 10. During data shifting (see CXYY example) these codes can be used to modify parts of a channel memory before loading into another channel memory. For example, $9D37, $D508, $D31F and $CB52 in sequence (with 100-200mS gaps) copies the contents of memory 37 into memory 52 with the Bandwidth altered to 6.0kHz.
E790 etc.	This code enables setting the tuned frequency of any channel specified. It can be used to load channel frequencies for later use or to load the frequency of the channel being received. This means that frequency scanning can be performed directly from the remote control unit, with frequency and scanning rate being set by that unit rather than by the receiver. The minimum dwell period however, would be limited to about 250mS. Loading 'zero' frequency into a channel would effectively 'clear' that channel. If several channels are to be cleared, it is usually more convenient to load zero frequency into the free-tuning channel 00 and transfer it to the channels to be cleared using the CXYY code. For example, to clear channels 15, 21 and 36, send $E790000000000000, $C815, $CF21 and $C936 in sequence, with suitable gaps.
EE44 etc.	This is an extension of the $E790 code which loads all the channel settings. This also allows scanning with the remote control unit determining all reception settings for each scanned frequency.

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SECTION THREE : OPERATION

This section starts with a description of each front panel control. A quick reference guide is given in Table 3.1 with the various display formats shown in Figures 3.1 to 3.4. Signal Reception, BITE (Built-in-Test-Equipment), Channelised Operation, Scanning and Sweeping are then detailed separately. A special section covering Scanning by Time is provided for /T option receivers. Each of these separate sections should be read and understood before proceeding to the next. Note however, that basic use of the receiver does not require all of them to be studied.

3.1 CONTROLS

A front panel view of the receiver, showing all the controls, is given on BP2848 bound at the rear of the manual. Certain controls have different uses depending on the current receiver operating mode. If a control has no function in the current mode, then a distinctive warble tone is sounded.

3.1.1 Receiver Operating Mode Keys

These are grouped either side of the numerical keys on the left hand side of the front panel, except for RATE and BITE which are situated close to the display. The display indicates the mode selected. These keys control the mode of operation of the receiver control system (as opposed to the mode of signal reception and demodulation). The operating mode selected affects the action of other front panel controls.

RECALL 	This mode initially copies the contents of the channel memory being received into the free tuning channel 00. The receiver is tuned to this channel and the channel data controls are enabled to allow the received frequency, bandwidth etc. to be adjusted. Selection of this mode immediately allows the 6200 to be used as a conventional free-tuning receiver, starting from the actual frequency etc. being received (no matter what previous operating mode was in use). RECALL mode should therefore be selected if simple control without all the other operating facilities is required or if instant display and control of a signal is required.

CHANNEL

When in this mode, the contents of the channel memories can be interrogated (without breaking into the signal being received). The number of the channel to be viewed can be entered using the numerical keys and can be incremented or decremented using the main control knob. Alternating bars, beneath the displayed channel number digits, will appear if the channel being displayed is not the channel being received. Note that CHANNEL mode should be selected before other channel operations to ensure that channel contents are viewed before they are used or modified (this has to be done before STORE or SCAN CHANNEL are selected). The first channel displayed when selecting CHANNEL mode directly after RECALL or TUNE mode, will be the channel to which the receiver was originally tuned, or was being displayed, respectively. When in CHANNEL mode, the signal reception settings (frequency etc.) cannot be directly altered by the channel data keys.

RECEIVE

Tunes the receiver to the channel selected in CHANNEL mode. The signal reception settings will remain as initially displayed and cannot be altered by the channel data keys. CHANNEL and TUNE modes can then be used to interrogate, load or modify memories (apart from the selected RECEIVE channel memory) without breaking into the signal being received. This mode is generally used to tune the receiver, for long periods, to specific frequencies, signals etc. which require no further receiver adjustment.

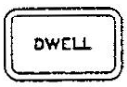
TUNE

This mode initially copies the contents of the channel memory being displayed into the free tuning channel 00. The channel data controls are enabled to allow the contents to be altered so that new settings can be loaded back into the original, or a different memory, using CHANNEL and STORE modes. The settings do not have to be altered whilst in channel 00 thus allowing a memory's contents to be duplicated in another channel memory. This mode is used to load or alter channel memories whilst the receiver stays tuned to the channel selected in RECEIVE mode (without breaking into the received signal as long as its channel contents are not altered).

STORE

This copies the contents of the free tuning channel 00 into the channel memory selected in CHANNEL mode. CHANNEL mode must be selected before STORE is used. The operating mode will automatically return to CHANNEL after the store operation is completed. STORE is used to copy signal reception settings into a chosen memory or to transfer new or modified settings, entered during TUNE mode, to a chosen memory. Note that the contents of channel memories 01 to 99 can only be altered locally by use of the STORE mode (i.e. they are not free-tuning). Note also that use of STORE does not put channels in or out of the scan sequence.

DWELL

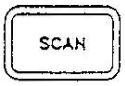


In this mode, the display indicates the scan/sweep dwell and hang periods (0.0 to 9.9 and 0 to 9 seconds respectively). Dwell and hang times are entered together using the numerical keys. Turning the main control knob steps through the channel numbers of those channels set to be scanned. A small letter s, on the right hand side of the channel number displayed, indicates that the channel is set to be scanned. If no channels are set to be scanned, turning the main control knob will sound the 'invalid' tone and no channel number will be displayed. In this mode, channels can be removed from the scan sequence by pressing SCAN CHAN, whilst they are being displayed.

SCAN CHANNEL

Use of this key whilst in CHANNEL mode toggles the displayed channel in or out of the scan sequence. A small letter s, on the right hand side of the displayed channel number, indicates that the channel is set to be scanned. In DWELL mode this key can be used to remove channels from the scan sequence. Note that the free-tuning channel 00 cannot be in the scan sequence.

SCAN

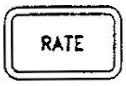


In this mode, the receiver continually scans the selected channel memories in order of channel number, staying on each channel for the selected dwell period (as long as at least two channels are set to be scanned). If SQUELCH is selected, AGC is on and a signal above the squelch threshold is detected, the receiver will stay on that channel and remain there for the selected hang period after the signal drops below the squelch threshold. Note that the receiver can be made to stay on a particular channel by selecting RECEIVE mode or can be made to operate as a free-tuning receiver, starting on a particular channel's settings, by selecting RECALL mode. The scan sequence can be simultaneously controlled using the main control knob (channel data settings cannot be directly adjusted whilst scanning). Except on /T option receivers, when a dwell period of 0.0 seconds is selected, the main control knob has sole control of the scan sequence and thus provides 'tuning by channel'. On /T option receivers, selecting a dwell of 0.0 secs initiates 'time scanning'.

SWEEP CHANNEL

Use of this key whilst in CHANNEL mode selects the displayed channel to be the start channel for the frequency sweep sequence. In CHANNEL mode the display indicates which is the selected sweep start channel and which is the sweep stop channel (always one channel number higher). There can only be one start channel selected at any time and therefore when a new one is selected, it replaces the original one. Note that channel 99 and the free-tuning channel 00 cannot be the sweep start channel.

RATE

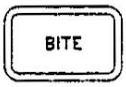


In this mode, the display shows the selected step (0.00 to 99.99kHz) for frequency tuning using the main control knob and for automatic sweep mode tuning. A new rate can be entered using the numerical keys or a variety of commonly used rates can be selected using the main control knob. Note that 0.00kHz rate indicates automatic variable rate for frequency tuning using the knob but is invalid for sweep mode tuning. The channel number displayed in RATE mode indicates the selected sweep start channel. Any other mode can be selected whilst in RATE mode by pressing the appropriate key. If the RATE key is pressed whilst in RATE mode, operation returns to the mode previously in use.

SWEEP

In this mode, the receiver continually sweeps or tunes between the frequency stored in the selected sweep start channel and that stored in the next highest numbered channel (for example 45 and 46). Other signal reception settings remain as stored in the start channel. The sweep can be in ascending or descending frequency and proceeds in the step set in RATE mode (note 0.00kHz is invalid). The receiver remains on each step for the selected dwell period. If the step is 5kHz or greater, SQUELCH is selected and AGC is on, the receiver will halt on a step which contains a signal above the squelch threshold and will remain there for the selected hang period after the signal drops below the squelch threshold. The sweep sequence can be simultaneously controlled by the main control knob (channel data settings cannot be directly adjusted whilst sweeping). If a dwell of 0.0 seconds has been selected, the knob has sole control of the sweep sequence and thus provides tuning with fixed steps between defined frequency limits.

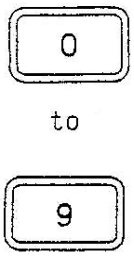
BITE



When in this mode, the full BITE facilities are available. The required BITE test number (00 to 99) can be entered using the numeric keys and can be incremented or decremented using the main control knob. The display shows the selected BITE number, a description of the test being made and the result, PASS or FAIL. Unused tests are shown as SPARE. Test 98 displays the receiver number when this is externally set in certain remote control systems (see 2.2.4). Test 99 displays information about the software supplied inside the receiver. This includes the software operating system number (as O.S. X.X) and the Eddystone part number of the program EPROM fitted (as XXXXXPX). Adequate time should be allowed for tests to settle especially when signal paths are being checked. When the receiver is not in BITE mode, a letter B will appear at the top right of the display if the BITE circuitry detects a potential fault at the point at which the receiver is currently operating. In this situation the receiver will automatically perform a reset sequence approximately every 12 seconds. Intermittent appearances of this BITE warning, when the receiver is being rapidly tuned, can occur and do not necessarily indicate a fault.

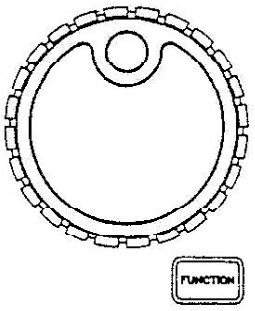
3.1.2 Numerical Keys

These keys are grouped with the receiver operating mode keys on the left hand side of the front panel. The numerical information displayed, and thus the action of the numerical keys, depends on the receiver operating mode selected.

0 to 9  	These are used to enter numerical data, the content of which depends on the receiver operating mode. The tuned frequency is entered in RECALL or TUNE modes. The channel number in CHANNEL mode. The dwell and hang times in DWELL mode. The tuning rate in RATE mode and the BITE test number in BITE mode. On /T option receivers, they are also used to enter time scanning start/stop times when in CHANNEL mode.

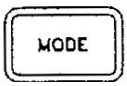
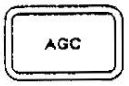
3.1.3 Main Control Knob and Function Switch

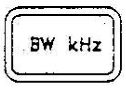
These are situated on the right hand side of the display. The action of the knob depends on the receiver operating mode selected and, in some modes, the parameter selected by the associated FUNCTION switch.

 	This knob is used to increment or decrement data depending on the receiver operating mode and, on some modes, the parameter selected by the FUNCTION switch. In RECALL or TUNE modes, the knob controls the tuned frequency, BFO offset or the Antenna setting. The parameter to be altered is set by repeatedly pressing the FUNCTION switch until the one required is displayed. When used to control the frequency, the knob can be used to 'fill-in' trailing zeros of a numerical keypad entry. This also enables an incorrect entry to be quickly finished so that it can be restarted. In CHANNEL mode, the knob alters the displayed channel number. In DWELL mode it shows the channels set to be scanned. In RATE mode it selects commonly used frequency tuning steps. In SCAN and SWEEP modes it alters the scan or sweep position and in BITE mode it steps through the BITE tests.

3.1.4 Channel Data Keys

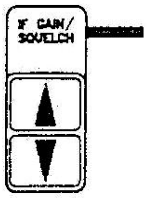
These are grouped just below the central display with each key being adjacent to the part of the display to which it corresponds. These keys, along with the numeric keys and the main control knob are used to directly alter the contents of the free-tuning channel 00 in RECALL and TUNE modes only. All such settings are capable of being independently stored in channel memories 01 to 99 using STORE mode. Note that on all modes but RECALL and TUNE, the channel data keys are invalid and the settings described cannot be altered at will.

MODE 	This key steps through the signal demodulation settings AM, CW, FSK, USB, LSB and, on ISB variants, ISB. AM provides envelope detection, CW provides product demodulation with variable injection from the BFO and also switches in an audio low pass filter cutting off at about 1.3kHz. FSK also provides this last choice but without the filter (for FSK demodulation). USB, LSB and ISB provide product demodulation with a fixed zero offset BFO frequency.
RF SENS 	This key steps through the RF signal input attenuator settings of Max (no attenuation), Med (10dB attenuation) and Min (an unspecified attenuation level of at least 30dB).
AGC 	This key steps through the AGC settings of AGC on with Slow, Med, or Fast decay times and AGC Off. In the last case, the IF GAIN/SQUELCH up/down keys set the receiver gain level. Otherwise, when AGC is on, these keys determine the signal threshold level used by the squelch, scan/sweep halt and signal present detector functions. If variable threshold AGC has been internally selected (see 2.3.3) these up/down keys set equal AGC and squelch level thresholds simultaneously. Twin vertical bargraph displays, adjacent to the IF GAIN/SQUELCH up/down keys, indicate the gain, signal and AGC threshold/squelch levels.

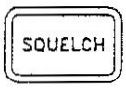
BAND-WIDTH 	This key steps through the I.F. bandwidth settings available, showing the total passband in kHz. 6.0kHz and 2.4kHz are provided as standard. Up to two additional bandwidths are provided on /C option receivers. Other non-standard bandwidths may be provided to customer's specific requirements. Note that when USB, LSB or ISB modes are selected, the bandwidths selectable are automatically limited to those suitable (2.4kHz only on standard receivers). In this situation, returning to AM, CW or FSK modes will also automatically return the bandwidth setting to that previously selected.

3.1.5 Miscellaneous Controls and Displays

The remaining controls and displays can generally be used in any receiver control mode although, in some cases, they may not provide a useful action.

IF GAIN/ SQUELCH 	These keys control the manual gain level when AGC Off is selected. In this case, the single vertical bargraph display adjacent to these keys indicates the gain level. Maximum gain is set when the bargraph is at maximum height. When AGC Slow, Med or Fast is selected, these keys control the squelch, scan/sweep halt and signal present detector threshold level. They also control the AGC threshold level when variable threshold level AGC is internally selected (see 2.3.3). In these situations the vertical bargraph adjacent to these keys indicates the squelch/AGC threshold level with maximum threshold level set when the bargraph is at maximum height. The second vertical SIGNAL bargraph indicates the received signal strength. The two bargraphs are equally calibrated and thus signals giving a SIGNAL bargraph reading lower than the adjacent threshold bargraph setting, will cause the audio to be muted. Note that the IF GAIN/SQUELCH up/down keys auto-repeat with a warning tone when the limits are reached. IF Gain and Squelch levels are also stored separately so that re-adjustment is not necessarily required when going between AGC on and off.

SQUELCH



This key toggles on or off the audio squelch circuit and the scan/sweep halt detector. Note that the signal present detector operates independently of this key. When on, SQ is shown towards the left of the main display'.

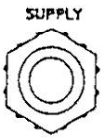
RECEIVER REMOTE

This key is used to 'lock-out' all of the front panel controls except for the RECEIVER REMOTE key itself, the SUPPLY and AF MONITOR switches and the AF GAIN control. This is generally done in remote controlled receiver systems to reduce the possiblity of accidental changes being made locally. The key is pressed again to regain local control (remote control can performed in both situations).

FSK TUNE

These LEDs are used to assist tuning of fsk signals when the /K (internal FSK demodulator) option is fitted. In this circumstance, when an active FSK signal is correctly tuned, both leds will be equally illuminated. If they are not, the main tuning control knob should be adjusted to alter the tuned frequency in the correct direction.

SUPPLY

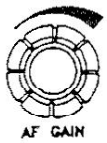


This push button is used to switch the mains or dc supply to the receiver on or off. A mechanical green indicator shows when it is in the on position.

PHONES

This is a standard mono audio connector jack for headphones etc. Alternative rear panel high level audio output connections allow optional muting of that output when a jackplug is inserted into the PHONES connector. The front panel monitor speaker is always muted in this situation.

AF GAIN



This knob sets the level of the front panel monitor loudspeaker. It also sets the output level from the front panel PHONES jack and from the rear panel high level audio output connector.

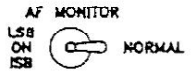
AF MONITOR  	This toggle switch (fitted on ISB variants only) determines the source for the high level audio fed to the front and rear panel loudspeaker outputs and the PHONES output. For AM, CW, FSK, USB, LSB or for the USB side of an ISB signal, the switch should be set to normal. For the LSB side of an ISB signal, LSB on ISB should be selected.

Table 3.1
Receiver Operating Modes

CONTROL MODE	DISPLAY	MAIN KNOB	NUMERICAL KEYS	CHANNEL DATA KEYS	BASIC OPERATION
RECALL	CONVENTIONAL RECEIVER DISPLAY	CHANGES * FREQUENCY OR BFO OR ANTENNA SELECTION	* LOAD FREQUENCY ONLY	* ENTER CHANNEL DATA	RECEIVER OPERATES CONVENTIONALLY STARTING AT CHANNEL BEING RECEIVED
TUNE	CONVENTIONAL RECEIVER DISPLAY	CHANGES * FREQUENCY OR BFO OR ANTENNA SELECTION	* LOAD FREQUENCY ONLY	* ENTER CHANNEL DATA	RECEIVER OPERATES CONVENTIONALLY STARTING AT CHANNEL BEING DISPLAYED
STORE	TEMPORARY MODE ONLY	INVALID	INVALID	INVALID	DATA COPIED FROM FREE TUNING CHANNEL 00 INTO CHANNEL DISPLAYED
RECEIVE	CONVENTIONAL RECEIVER DISPLAY	INVALID	INVALID	INVALID	RECEIVE ON CHANNEL DISPLAYED (CHANNEL DATA ENTRY INHIBITED)
CHANNEL	CONVENTIONAL RECEIVER DISPLAY	ALTERS CHANNEL NUMBER	ENTER CHANNEL NUMBER	INVALID	CHANNEL SELECTED FOR 'TUNE','RECEIVE' 'SCAN CHAN','SWEEP CHAN' OR 'STORE' MODES
SCAN CHANNEL	TEMPORARY MODE ONLY	INVALID	INVALID	INVALID	CHANNEL DISPLAYED TOGGLED IN OR OUT OF SCAN SEQUENCE
DWELL	DWELL, HANG AND SCAN CHANNELS	DISPLAYS SCAN CHAN NUMBERS	ENTER DWELL/ HANG PERIODS (SECS)	INVALID	DISPLAY/ENTRY OF SCAN/SWEEP PARAMETERS
SCAN	CONVENTIONAL RECEIVER DISPLAY	ALTERS SCAN POSITION	INVALID	INVALID	SCANS EACH CHANNEL IN SCAN SEQUENCE STAYS ON EACH FOR 'DWELL'
SWEEP CHANNEL	TEMPORARY MODE ONLY	INVALID	INVALID	INVALID	CHANNEL DISPLAYED SET AS SWEEP START CHANNEL
RATE	SWEEP START CHANNEL AND TUNING/SWEEP RATE	SELECTS COMMONLY USED RATES	ENTER TUNING RATE (kHz)	INVALID	DISPLAY/ENTRY OF TUNING RATE. SWEEP START CHANNEL DISPLAY
SWEEP	CONVENTIONAL RECEIVER DISPLAY	ALTERS SWEEP POSITION	INVALID	INVALID	SWEEPS FROM FREQUENCY IN 'START' TO THAT IN NEXT CHANNEL
BITE	BITE TEST No. TEST AND REPORT	ALTERS BITE TEST NUMBER	ENTER BITE TEST NUMBER	INVALID	BITE TESTS PERFORMED

* IN FREE-TUNING CHANNEL 00

Conventional Receiver Display

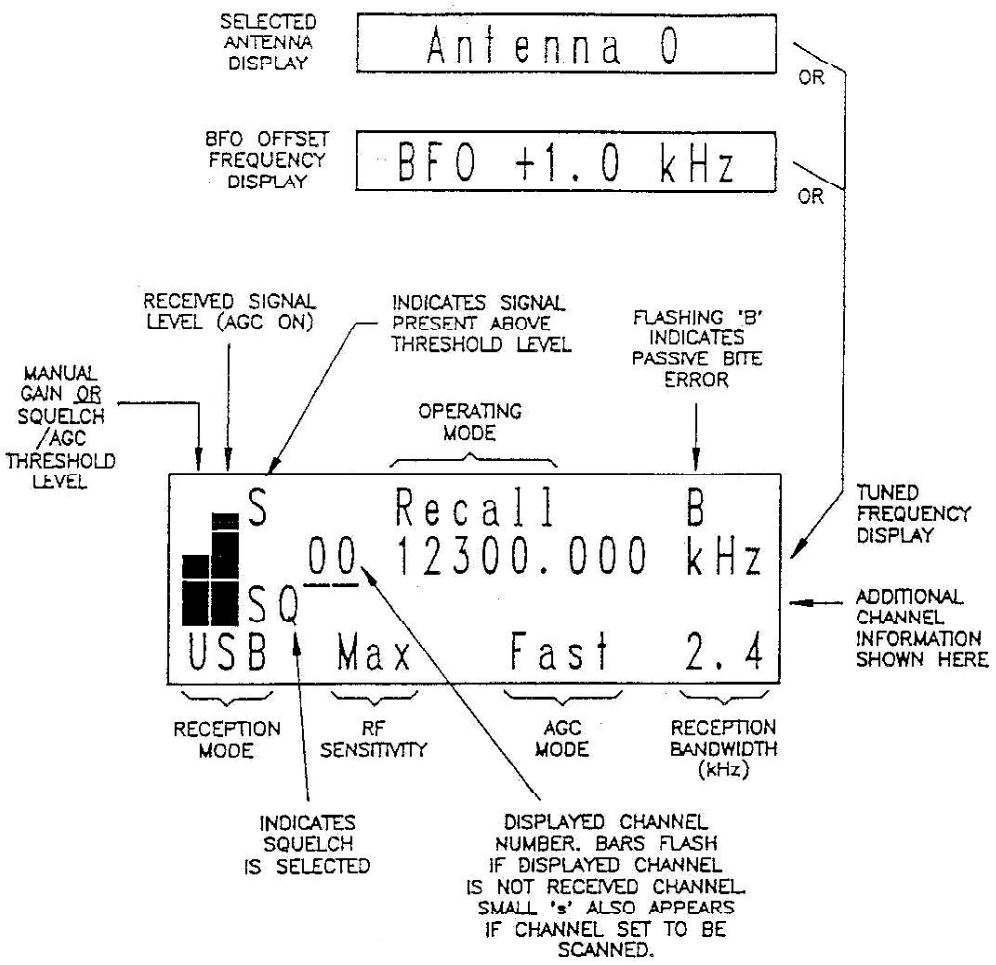


Figure 3.2
BITE Mode Display

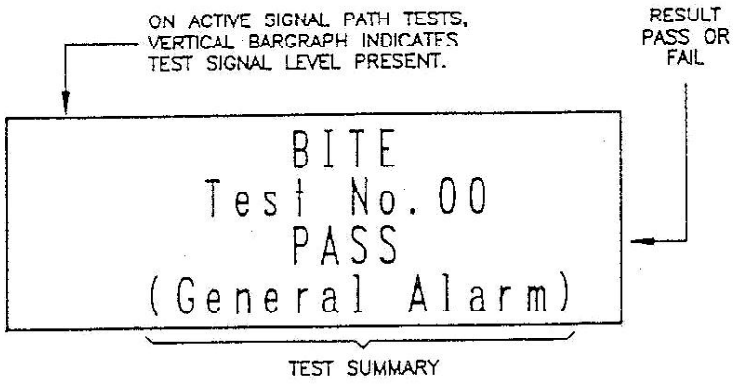


Figure 3.3
DWELL Mode Display

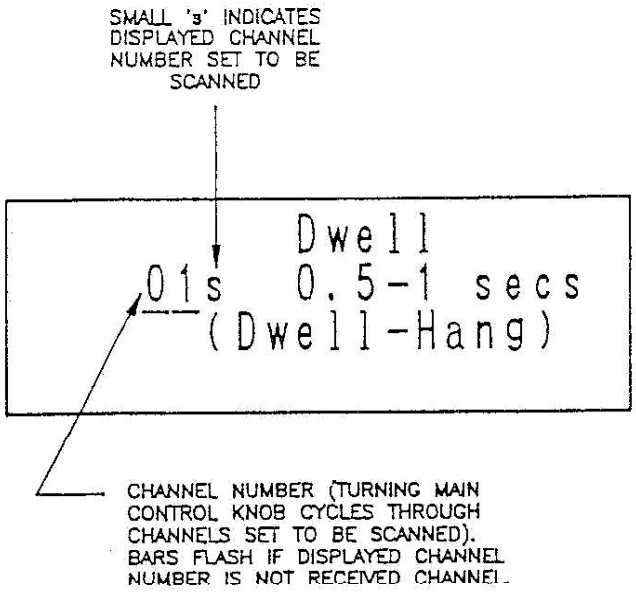
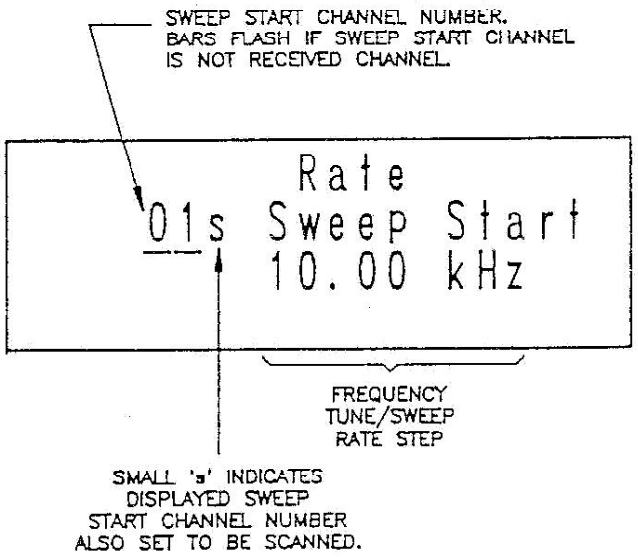


Figure 3.4
RATE Mode Display



3.2 SIGNAL RECEPTION

3.2.1 Switching On

Ensure that the rear panel voltage selector is set for the local mains power supply, apply mains power (or a suitable dc supply) and press the **[SUPPLY]** switch so that the green indicator shows on the switch.

Three power on reset tones will sound in sequence whilst all the display pixels show as black. The display will then show **Power on Reset Memory/Channel Check** as the internal program memories are checked and initialised. At least one of the red **FSK TUNE** LEDs will also illuminated.

The display will then go to one of the four main formats shown in Figures 3.1 to 3.4. The top line will indicate the current operating mode. If this line shows **Remote** and local operation is required, press **[RECEIVER REMOTE]** to enable the front panel keyboard and main control knob.

If the conventional receiver display format is shown and the **B** indicator at the top right hand side of the display is flashing, it may indicate a potential fault at the current receiver settings. However, at switch-on, at certain tuned frequencies when the /X option is fitted, this indicator may flash for a few minutes as the internal standard warms up to its operating temperature. The **B** indicator will also flash, when the /S option is fitted, if the external standard frequency is not present at the correct level or frequency. In this case, press **[BITE] [0] [8]** in sequence to determine if the 436MHz loop oscillator has locked to the external standard input (should display **PASS**). In all cases the flashing **B** BITE warning should be investigated using the BITE procedure, see section 3.3, since the receiver will automatically go through the power on reset procedure every few seconds in this circumstance.

If use of the equipment as a conventional free-tuning receiver is required, and the top line of the display does not show **Recall**, press **[RECALL]**. Use involving the stored channels is described in sections 3.4, 3.5, 3.6 and 3.7.

3.2.2 Setting the Tuned Frequency

This can only be done directly from the front panel into the free-tuning channel 00, with RECALL or TUNE mode selected.

If the display shows **SQ** on the bottom right hand side of the vertical bargraphs, this indicates that audio squelch is on. In this case, if required, press **[SQUELCH]** to prevent loss of audio during frequency tuning.

If the display shows **BFO** frequency or **Antenna** setting, press **[FUNCTION]** repeatedly until the tuned frequency is displayed. If **Clear** is displayed, this indicates that a valid frequency is not loaded.

Use of the numeric keys then enters the frequency, always starting with the most significant digit, 10MHz. For frequencies lower than 10MHz, all the leading zeros must be entered into the display, digits remaining to be entered being shown as bars, except for the 1Hz digit which is always 0. The bars are gradually replaced by the digits entered.

A longer tone is sounded as the last (10Hz) digit is entered. Turning the main control knob fills in trailing zeros and thus also helps to restart quickly an incorrect entry. The 10MHz digit is limited to a maximum of 2 (allowing entries of frequencies up to 29999.990kHz). The lowest frequency which can be entered is 10.000kHz. Entry of frequencies below 10kHz, for example all 0s, clears the channel (displaying **Clear**). Note that, except on /A and /F option receivers, the receiver sensitivity is much reduced for frequencies entered below 1600.000kHz.

Example 3.1
To Tune to 143.780kHz

Press **[0] [0] [1] [4] [3] [7] [8]** in sequence.

The last, 1Hz, digit is automatically entered as zero when the first, 10MHz, digit is entered.

Example 3.2
To Tune to 21000.560kHz

Press **[2] [1] [0] [0] [0] [5] [6]** in sequence.

Example 3.3
To Tune to 25000.000kHz

Press **[2] [5]** and turn the main control knob slightly.

This enables rapid entry of any frequency with a large number of trailing zeros.

When a frequency is displayed in RECALL or TUNE modes, it can be adjusted using the main control knob, The rate of tuning is set as follows.

Press **[RATE]**. The frequency display is replaced by the tuning step which is in the range 0.00kHz to 99.99kHz. This step can be entered using the numeric keys or commonly used steps can be selected using the main control knob. When using the numeric keys it is generally best to enter all four digits, including any leading and trailing zeros.

Example 3.4
To Select 1.00kHz Steps

Starting in RECALL mode.

Press **[RATE]** and turn the main control knob until **1.00kHz** is displayed.

Example 3.5
To Select 1.50kHz Steps

Starting in RECALL mode.

Press **[RATE] [0] [1] [5] [0]** in sequence.

The rate gives the tuning step starting from the initial frequency shown or entered. Many bands are split up into specific channels (e.g. 9kHz on some broadcast bands) and are thus best searched using the appropriate step. Note that the starting frequency need not be a whole multiple of the selected step, thus allowing stepping through frequency channels which are offset from a multiple of the channel spacing.

The smaller steps allow fine tuning as required. However, for general use, a step of 0.00kHz can be selected which provides automatic variable rate tuning with the step then increasing from 10Hz upwards as the speed, at which the main control knob is turned, is increased.

To exit RATE, mode press **[RATE]** again or select the new mode required.

3.2.3 Signal Mode Settings

To step through the reception mode options of AM, CW, FSK, USB, LSB and when fitted, ISB, press **[MODE]** repeatedly. To step through the reception bandwidths, press **[BW kHz]** repeatedly. When CW or FSK is selected, the BFO can be used to determine the detected audio output frequencies. An additional audio peaking filter, centred on about 1kHz, is provided on CW mode only. On USB, LSB and ISB modes, the reception bandwidths are limited to just those which are suitable. On standard receivers this is only 2.4kHz, which is automatically set on those modes. Returning to AM, CW or FSK modes also returns the bandwidth to that previously selected.

On USB, LSB and ISB, where the BFO is not used, clarification of the signal is performed using the main control knob. Automatic variable rate tuning (0.00kHz step) or a small step (0.01 to 0.05kHz) should have been set in RATE mode. This also applies when fine-tuning FSK signals to drive the inbuilt FSK demodulator (on /K option receivers) or external FSK demodulators (such as the Eddystone 1529/20).

On ISB variants an additional front panel switch is provided to select the source for the front panel PHONES socket and monitor loudspeaker and the rear panel high level audio output. For monitoring all but the lower sideband when ISB mode is selected, switch **[AF MONITOR]** to **NORMAL**. For monitoring the lower sideband on ISB, switch it to **LSB ON ISB**. Note that separate independent rear panel audio line outputs are provided for both sidebands on ISB mode.

Example 3.6
AM Reception

Press **[MODE]** repeatedly to select **AM**.

Press **[BW kHz]** repeatedly to select usually **2.4** for amplitude modulated CW/radiotelephony or **6.0** for broadcast AM.

Tune to the desired signal as described in section 3.2.2.

Example 3.7
CW Reception

Press **[MODE]** repeatedly to select **CW**.

Press **[BW kHz]** repeatedly to select usually the narrowest bandwidth available.

Press **[FUNCTION]** repeatedly to display the BFO frequency offset. Set the offset in the range 0.8 to 1.2kHz (+ or -) using the main control knob. This setting equals the desired output tone in the range of the CW audio filter.

Press **[FUNCTION]** repeatedly again to return to the tuned frequency display and tune to the desired signal as described in section 3.2.2.

Example 3.8
FSK Reception

Press **[MODE]** repeatedly to select FSK. Press **[BW kHz]** repeatedly to select a bandwidth suitable for the shift and Baud rate of the received signal.

For FSK demodulators driven from the audio output, press **[FUNCTION]** repeatedly to display the BFO frequency offset. Use the main control knob to set this to the centre input frequency of the demodulator. When driving the standard Eddystone 1529/20 FSK Demodulator, this would be 1.7kHz.

Press **[FUNCTION]** again to return to the tuned frequency display. Then, with a small or automatic variable rate tuning step, tune the receiver to obtain centre zero deflection (or equivalent) on the demodulator's tuning indicator. The signal must be carrying traffic whilst tuning in this manner. The sign of the BFO offset (+ or -) determines the effective 'polarity' of the FSK signal. The polarity may be reversed or corrected, if necessary, by setting the same BFO offset but with the other sign.

When the internal FSK demodulator is fitted (/K option receivers) the same procedure is followed with the BFO set at +1.7kHz or -1.7kHz, as required. The receiver is now tuned so that both **FSK TUNE** LEDs are equally illuminated whilst the signal is carrying traffic.

Example 3.9
USB or LSB Reception

Press [MODE] repeatedly to select USB or LSB as required.

On standard receivers, the bandwidth will be automatically set to 2.4 (kHz).

Tune to the desired signal as described in section 3.2.2.

Example 3.10
ISB Reception (ISB Variants only)

Press [MODE] repeatedly to select ISB.

On standard receivers, the bandwidth will be automatically set to 2.4 (kHz).

Switch [AF MONITOR] to NORMAL to monitor the upper sideband of the ISB signal on the front panel loudspeaker etc. Switch it to LSB ON ISB to monitor the lower sideband. Note that separate audio line outputs for both upper and lower sidebands are provided on the rear panel.

Tune to the desired signal as described in section 3.2.2.

3.2.4 Gain Control

To step through the gain control options, press [AGC] repeatedly. Three AGC on decay times (Slow , Med and Fast) are available as well as AGC Off (manual gain). When Off is selected, to set the gain, press the [IF GAIN/SQUELCH] up or down key as required. The gain set is displayed as a vertical bargraph adjacent to the up and down keys. Gain is maximum with the bargraph at maximum height.

An internal option setting (see section 2.3.3) enables conventional or variable threshold AGC to be selected. When conventional AGC is selected and on, the IF GAIN/SQUELCH up and down keys only control the squelch and signal present detector functions (see section 3.2.5). When variable threshold AGC is selected and on, they also simultaneously control the AGC threshold. In this case, when AGC is in use, the AGC/squelch threshold is displayed on the vertical bargraph adjacent to the

up and down keys. Threshold is at maximum, equivalent to an approximately +100dBuV emf input signal, when the bargraph is at maximum height. Minimum height is equivalent to an approximately -3dBuV emf input signal. Both of these figures with maximum RF sensitivity set.

Note that the manual gain setting and the threshold setting are stored separately. This reduces the amount of re-adjustment required when going between AGC on and off.

AGC decay time is normally selected to suit the signal being received. Slow is normally used for AM broadcast reception. Slow or medium for CW, USB, LSB and ISB reception. Fast is normally used for FSK signals. Generally, AGC decay times should be faster for low level, noisy signals where impulsive noise may tend to 'block' the signal if the decay time is too slow

To step through the RF sensitivity settings of Max, Med or Min, press **[RF SENS]** repeatedly. Maximum sensitivity is normally used. Medium introduces approximately 10dB signal input attenuation and can be used to reduce interference from adjacent signals. Minimum introduces at least 30dB signal input attenuation and can be used to improve performance if the tuned signal level is very high.

3.2.5 Squelch and Signal Present Detector Operation

Signal level derived squelch (audio output muting) and signal present detection is available on all reception modes. Note that the signal present detector is also used in scan and sweep modes (see sections 3.5, 3.6 and 3.7).

AGC must be on (Slow, Med or Fast) for these functions to operate correctly. An internal option setting (see section 2.3.3) enables conventional or variable threshold AGC to be selected. When conventional AGC is selected and on, the IF GAIN/SQUELCH up and down keys set the squelch/signal present detector threshold level. When variable threshold AGC is selected and on, they also simultaneously control the AGC threshold level. In this case, the squelch/signal present detector threshold will be the same as the AGC threshold. The threshold is displayed on the vertical bargraph adjacent to the up and down keys. Threshold is at maximum, equivalent to an approximately +100dBuV emf input signal, when the bargraph is at maximum height. Minimum height is equivalent to an approximately -3dBuV emf input signal. Both of these figures with maximum RF sensitivity set.

The second vertical **SIGNAL** bargraph, on the right hand side of the squelch level bargraph, shows the received signal level. Both bargraphs are equally calibrated. Therefore, when the signal bargraph level rises above the squelch bargraph level, the audio will be demuted and the signal detector will indicate that a signal is present (by showing **S** on the display and via a rear panel open collector transistor output). Otherwise no signal present will be registered and if squelch is on, the audio will be muted by about 20dB. Note, on ISB variants, when ISB mode is selected, independent audio muting of each sideband is provided.

The rear panel signal present indicator output can be used to drive external signal monitoring equipment (such as tape recorders). Specialised modulation detecting equipment (tone detectors etc.) can also be activated during scanning and sweeping processes (see sections 3.5, 3.6 and 3.7).

Example 3.11
Selecting Squelch/Signal Present Detection

Press **[AGC]** repeatedly to obtain **Slow**, **Med** or **Fast** as required.

If audio muting is required, and **SQ** is not shown on the display, press **[SQUELCH]**.

Press the **[IF GAIN/SQUELCH]** up or down key so that the adjacent bargraph level is just below the level, on the **SIGNAL** bargraph, which corresponds to the signal level at which the squelch/signal present detector is required to operate.

When the **SIGNAL** bargraph reading exceeds the adjacent threshold level reading, the signal detector will indicate that a signal is present by the display showing S. The rear panel signal indicator, open collector transistor output, will also go open circuit. The audio output will not be muted.

When the **SIGNAL** bargraph reading is below the adjacent threshold level reading, the rear panel signal indicator will go short circuit. The audio output will be muted by 20dB if squelch has been selected.

3.2.6 Antenna Selection (/B option receivers)

One of up to four remotely sited antennas (or other devices) can be selected from the receiver front panel. The control activates one of four open collector output control lines. To change or check the setting press **[FUNCTION]** repeatedly so that the display shows the antenna number. This number can be altered, if required, by using the main control knob. Finally press **[FUNCTION]** repeatedly again to return to the tuned frequency display.

3.3 BITE (Built-in-Test-Equipment)

3.3.1 Passive BITE

When the receiver is not in BITE mode, BITE continues to monitor certain receiver conditions and flashes the B indicator, at the top right hand side of the display, if a potential fault is found. This is described as 'Passive BITE'. When convenient, the source of the fault can be found by pressing [BITE] and stepping through the tests using the main control knob. If the result of a particular test is required, its number can be directly entered using the numeric keys.

It should be noted, when the /X option is fitted, that the B indicator may flash for a few minutes when the receiver is first switched on, as the internal frequency standard warms up to its operating temperature.

The tests performed in passive BITE are those which do not interfere with the reception of signals (tests 0-9 inclusive - see Table 3.2). They mainly indicate whether power is applied to modules and if the frequency synthesiser is in lock at the frequency to which the receiver is tuned. All passive tests will show the test being performed with **PASS** or **FAIL** as appropriate. Test 03 will indicate **SPARE** on non-ISB variants. Table 3.2 gives a full description of all tests.

3.3.2 Active BITE

Comprehensive tests of the synthesiser and of signal paths through the receiver can also be performed. This involves switching the synthesiser over its whole range and injecting test signals from the inbuilt broadband noise generator. Therefore these tests cannot be performed whilst the receiver is being used for signal reception. This is described as 'Active BITE'. For this, BITE mode has to be selected. The display then indicates BITE test number, the test being performed and **PASS** or **FAIL** as appropriate. The tests can be stepped through using the main control knob (ensuring each test has time to settle) or directly entered using the numeric keys.

Tests 98 and 99 are special tests which are used to display certain receiver status conditions. Test 98 shows the receiver's externally set number (1 to 15) if it is being used in certain types of remote control system (see section 2.2.4). Test 99 indicates the receiver's Operating System software issue number, in the form **O.S. X.X**, and the Eddystone part number of the program EPROM fitted, as **XXXXXPX**. The information given in both of these tests should be quoted if questions about operation arise.

Tests 96 and 97 are used, on /T option receivers only, to start, set and calibrate the inbuilt real time clock.

Table 3.2
BITE Tests

BITE Number	Test	Notes
	Tests 00-09 inclusive are the passive BITE tests which are made at the current receiver settings. Test 00 will appear as FAIL if any of the tests 01-09 fail. Test 03 will appear as SPARE on non-ISB variants.	
00	General Alarm	(As 01-09)
01	Preselector (Input) Power Supply	
02	Main Board Power Supply	
03	ISB Board Power Supply	(ISB variants only)
04	Synthesiser Main Power Supply	
05	Synthesiser Varicap Power Supply	
06	Main Synthesiser Loop Lock	
07	Reference Loop Lock	
08	436MHz Loop Lock	
09	BFO Loop Lock	(Always PASS on AM mode)
	Tests 10-15 inclusive are active BITE tests at the extreme ends of each synthesiser loop sub-range. The main loop is tested at the extreme ends of its two ranges (LF and HF). The reference loop is also tested at the extreme ends of its range. Thus the tests will analyse if any loop has failed in total or just at one end. Note that due to the restricted range of the reference loop, the main loop will not necessarily fail when the reference loop fails.	
10	Main Loop Lock	(LF, minimum freq.)
11	Main Loop Lock	(LF, maximum freq.)
12	Main Loop Lock	(HF, minimum freq.)
13	Main Loop Lock	(HF, maximum freq.)
14	Reference Loop Lock	(low frequency)
15	Reference Loop Lock	(high frequency)
	Tests 16 and 17 are active BITE tests at each end of the BFO synthesiser range.	
16	BFO Loop -2.4kHz Lock	(Always PASS on AM mode)
17	BFO Loop +2.4kHz Lock	(Always PASS on AM mode)

Table 3.2 (continued)

BITE Number	Test	Notes

Tests 18 to 52 inclusive are overall signal path tests using the inbuilt noise generator to check the receiver over the frequency range.

Tests 18 to 22 are used to test each IF bandwidth separately. Tests 23 to 52 are performed using two different IF bandwidths at each RF setting. An RF fault would produce **FAIL** at both bandwidth settings. A single IF bandwidth fault would produce **FAIL** on just one setting.

Faults only occurring at certain frequencies generally indicate a fault on the preselector/input board or synthesiser board. Note that a low synthesiser drive level will not necessarily indicate fail since it tends to increase the noise level generated. If all tests fail, a serious fault in the signal path or synthesiser is most likely. A fault producing 15-30dB or more of gain loss, will be needed to produce **FAIL**. Thus, **PASS** is not necessarily an indication of full receiver performance. Note tests 20 to 22 show **Spare** if the filter for that bandwidth or mode is not fitted.

BITE	Gain	Filter	Range	Option
18	IF	2.4kHz	N/A	All
19	IF	6.0kHz	N/A	All
20	IF	Option No.1	N/A	/C
21	IF	Option No.2	N/A	/C
22	IF	ISB	N/A	ISB variants
23	1600kHz	2.4kHz	LPF	/A
24	1600kHz	6.0kHz	LPF	/A
25	1610kHz	2.4kHz	10	/A
26	2150kHz	6.0kHz	10	/A
27	2160kHz	2.4kHz	10	/A
28	2880kHz	6.0kHz	9	/A
29	2890kHz	2.4kHz	8	/A
30	3860kHz	6.0kHz	8	/A
31	3870kHz	2.4kHz	7	/A
32	5180kHz	6.0kHz	7	/A
33	5190kHz	2.4kHz	6	/A
34	6940kHz	6.0kHz	6	/A
35	6950kHz	2.4kHz	5	/A
36	9300kHz	6.0kHz	5	/A
37	9310kHz	2.4kHz	4	/A
38	12460kHz	6.0kHz	4	/A

Table 3.2 (continued)

BITE Number	Test	Notes

BITE	Gain	Filter	Range	Option
39	12470kHz	2.4kHz	3	/A
40	16700kHz	6.0kHz	3	/A
41	16710kHz	2.4kHz	2	/A
42	22380kHz	6.0kHz	2	/A
43	22400kHz	2.4kHz	1	/A
44	29990kHz	6.0kHz	1	/A

Tests 45 to 95 inclusive are spare.

Tests 96 and 97 are used, on /T option receivers only, to start, set and calibrate the inbuilt real time clock (otherwise they are spare). When in test 96, the clock can be 'kick started' by pressing **[FUNCTION]**. All controls are then locked out for about 2 seconds whilst the real time clock is initialised. Note that this is normally only required during initial testing procedures or if a new real time clock/RAM integrated circuit is fitted. When in test 97, the display shows the time of day (24 hour clock), day of week (as a number **1-7**) and the clock speed calibration setting (as a number **0-31 Slow** or **Fast**). To set the time or speed, press **[FUNCTION]**. The display will indicate **Set** on the left hand side. Enter the new time using the numeric keys or adjust the speed using the main control knob (see section 3.7). Press **[FUNCTION]** again to return to normal BITE mode. Note that the time must always be reset if the clock has been restarted using test 96.

Test 98 indicates the externally set receiver number in certain remote control systems (see 2.2.4).

Test 99 gives the receiver's Operating System software issue number as **O.S. X.X** and program EPROM Eddystone part number as **XXXXXPX**.

3.4 CHANNELISED OPERATION

Ninety-nine non-volatile memories are provided for channel storage. In each memory, tuned frequency, BFO offset, reception mode, RF sensitivity, AGC setting, bandwidth and antenna setting can be stored. Memories can be interrogated (viewed), loaded, modified, shifted or cleared without disturbing the signal being

received. These operations often mean that the displayed channel is not that to which the receiver is tuned. This state is indicated by alternately flashing the two bars beneath the channel number in the display. During modification of channel data, the free-tuning channel 00 is used as an intermediate temporary store for the data being altered or shifted. Therefore channel 00 must not be used as the receiving channel if reception is not to be disturbed. Similarly, the channel chosen for reception should not be used during channel modifications etc.

Channel memories can be interrogated by pressing **[CHANNEL]** and entering the channel number using the numeric keys. The number can also be altered, in this mode, using the main control knob. Channel mode has to be selected before operations which involve modification of channel memories. The contents of the selected channel memory are thus displayed for checking before being altered.

The channels stored can be received as required and can also be scanned (section 3.5). The frequencies stored can be used as limits for frequency sweeping (section 3.6). On /T option receivers, channels can also be time scanned (section 3.7). The following examples detail most of the commonly required channel operations concerning direct reception and contents alteration.

Example 3.12
Storing a Received Signal Setting

To store the settings of the receiver when tuned to the desired signal in RECALL mode (clear channels are known to be in the vicinity of say, channel 9).

Press **[CHANNEL]** **[0]** **[9]** in sequence. The present contents of that channel are displayed, with the bars beneath the channel number alternately flashing, to indicate that this is not the channel being received. If the display shows **Clear** or contains settings no longer required, it may be used to store the new settings. Otherwise turn the main control knob to select a more suitable channel.

When the channel to be used is displayed, press **[STORE]** to load the channel memory. Press **[RECALL]** to return to the normal tuning mode.

Note that channel 00 is the free-tuning channel and pressing **[STORE]** copies all data from this to the channel displayed in CHANNEL mode, overwriting its previous contents. To ensure that channels are not accidently overwritten, STORE only operates if CHANNEL mode is selected, allowing the original contents to be checked before being modified. Note also, on /T option receivers, the start/stop times stored in channel memories are not copied

from one channel to another.

Example 3.13
Receiving on a Stored Channel
(with tuning controls enabled)

To initially receive on channel 91's settings but with the ability to adjust the settings if required (for example to allow for changes in the received signal's frequency).

Press **[CHANNEL] [9] [1] [RECEIVE] [RECALL]** in sequence.

The initial commands ensure that the receiver is first tuned to channel 91. The settings are then copied into, and the receiver tuned to, the free-tuning channel 00. Note that a channel showing **Clear** cannot be received.

Example 3.14
Receiving on a Stored Channel
(with tuning controls locked out)

To receive on channel 29 with the tuning controls locked out to prevent any alteration of the received signal settings.

Press **[CHANNEL] [2] [9] [RECEIVE]** in sequence.

RECEIVE mode is initially used in this way if the receiver is to remain tuned to a specific frequency for a long time. This is particularly important if loading or modification of other channel memories is being performed whilst a signal is being received (see Example 3.15).

Example 3.15
Modifying Channel Settings
(without disturbing the received signal)

Starting with channel 29 being received (as in Example 3.14), to modify channel 12's settings for later use, without breaking into the signal being received.

Press **[CHANNEL]** [1] [2] **[TUNE]** in sequence.

Channel 12's settings are copied into the free-tuning channel 00, with the bars beneath the channel number alternately flashing, to indicate that 00 is not the channel being received.

Modify the settings using the controls as described is sections 3.2.2, 3.2.3, 3.2.4 (AGC mode and RF sensitivity only) and 3.2.6. Note that these modifications have no effect on the received signal, unless the IF GAIN/SQUELCH up or down key is pressed.

Press **[CHANNEL]** again and the display shows channel 12 and its original contents.

Press **[STORE]** to copy the new settings into channel 12, overwriting the original settings. Note that the new settings can be stored in a different channel (apart from channel 29 in this case) by using the numeric keys or the main control knob to select a channel, other than 00, 12 or 29, before STORE is pressed.

Note that pressing **[TUNE]** always copies the settings from the displayed channel into the free-tuning channel 00. Compare this with pressing **[RECALL]** which always copies the actual received settings into 00. Pressing **[CHANNEL]** directly after these, initially displays the channel number which was originally displayed or received respectively. Again note, on /T option receivers, the start/stop times stored in channel memories are not copied from one channel to another.

During more complicated memory modifications whilst receiving on a fixed channel, the received signal may require the receiver to be retuned slightly or the number of the received channel may simply be forgotten. To enable rapid readjustment, press **[RECALL]**. To determine the resulting received channel number, then press **[CHANNEL]**. To return to fixed reception on that channel, press **[RECEIVE]**.

Example 3.16
Shifting Memory Contents

To copy the settings in memory 67, without alteration, into channel 88. This may be necessary in order to modify the order in which frequencies are scanned or to alter the limit of a sweep sequence with new settings already in memory 67.

Press **[CHANNEL] [6] [7] [TUNE]** in sequence to copy channel 67's settings into the free-tuning channel 00.

Press **[CHANNEL] [8] [8] [STORE]** in sequence to copy these settings into channel 88.

The settings in channel 67 are thus copied into 88. Note that, if required, they be modified whilst they are in channel 00. Note also that the contents of the originating channel 67 are not altered.

Example 3.17
Clearing a Channel Memory

To clear channel memory 78 of its present contents since, for example, it is no longer required and its frequency setting must not be retained for security reasons. Note that a clear channel is also more obviously useable for storing new settings.

Starting in RECALL or TUNE modes with the display showing tuned frequency.

Press **[0]** and turn the main control knob slightly to enter zero frequency. The display will show **Clear** to indicate that channel 00 contains no valid frequency.

Press **[CHANNEL] [7] [8] [STORE]** in sequence to copy the clear channel setting into channel 78.

Note that a clear channel effectively contains a frequency below 10kHz, usually zero, the original frequency being totally lost. The channel cannot then be received or scanned. It can however, remain a sweep start or stop channel even though actual sweeping would not be possible.

3.5 SCANNING OPERATION

Any number of the stored channels (except the free-tuning channel 00 and any clear channels) can be scanned. This is done in channel number order, with adjustable dwell and hang times. The dwell time is the period for which the receiver stays on each channel. This can be set in the range 0.0 to 9.9 seconds, in 0.1 second increments. Note, on /T option receivers only, 0.0 seconds is reserved to initiate scanning by time (see section 3.7).

If SQUELCH on is selected and a signal above the squelch threshold is present on the channel being received, the receiver will halt on that channel and remain there for the hang period after the signal goes below the threshold level. This period can be set in the range 0 to 9 seconds in one second increments. However, for the scan halt to operate correctly, AGC must be on in the scanned channel. The decay time (Slow, Medium or Fast) will also add to the hang period selected. If zero or a short hang period is required, AGC Fast should be selected, which only adds a few hundred milliseconds to the displayed hang period.

The threshold level, for scan halt, is set by the IF GAIN/SQUELCH up and down keys and displayed on the adjacent vertical bargraph, when AGC is on in the received channel. The calibration of this bargraph is the same as that for the adjacent **SIGNAL** level bargraph, with maximum height representing approximately +100dBuV emf input signals and minimum height representing approximately -3dBuV emf signals. Therefore, the threshold level should be set so that the threshold bargraph reading is just below the **SIGNAL** bargraph reading at which scan halt is required.

The scan sequence can also be stepped on or back by the main control knob. Except on /T option receivers, if a dwell of 0.0 seconds is set, the knob has sole control of the sequence and thus provides 'tuning by channel'. If this is required on /T option receivers, a dwell of 9.9 seconds should be set and then RECEIVE mode selected if it is required to stay on a manually scanned channel.

The rear panel REMOTE connector has a SCAN/SWEEP HOLD input line. Connecting this line to ground holds the receiver at the channel being scanned at that moment. Removing the connection to ground causes the receiver to step on to the next channel. This input line can therefore be used, in conjunction with external signal detecting equipment, to halt the scan when a specific type of signal is received. It can also be used, in conjunction with an external switch, to scan channels at a rate determined by that switch.

The scanning facility is most suitable for monitoring randomly spaced frequencies where the mode settings on each channel are not necessarily the same or the frequencies in order. For large numbers of equally spaced frequencies which have the same mode settings and which are in order of frequency, the sweep function is more suitable (section 3.6). On /T option receivers, scanning by time of day or week is also possible (section 3.7).

The following examples show commonly used scanning operations. Scanning can be started from any mode by pressing **[SCAN]**. Note however, that at least two channels must be set to be scanned, each containing a valid frequency. If this is not the case, pressing **[SCAN]** will just sound the invalid tone. Note also, that if squelch is on and a signal above the set threshold is present before pressing **[SCAN]**, scanning will not start until the signal goes below the threshold level or the scan is forced on by turning the main control knob.

Example 3.18
Displaying Scan Parameters and Channel Numbers

Press **[DWELL]**. The display will show the dwell and hang times. For example **1.2-8 secs** indicates a dwell of 1.2 seconds and a hang of 8 seconds.

Turn the main control knob either way and this will step through the numbers of the channels set to be scanned. A small letter s will also be shown, adjacent to the channel number. If none are found, this indicates that no channels are set to be scanned. In this case the invalid tone will sound as the main control knob is turned.

Example 3.19
Removing Channels from the Scan Sequence

Proceed as in Example 3.18 using the main control knob.

Press **[SCAN CHAN]** whilst displaying the number of the channel to be removed from the scan sequence. When it is removed, the s adjacent to the channel number will also be removed from the display.

This is the easiest way of removing channels from the scan sequence (it can also be done in the same way in CHANNEL mode) since it only displays scanned channel numbers. If required, all channels can be rapidly removed with the invalid tone sounding as soon as none are left.

If a channel is removed in error, it can be reset by pressing **[SCAN CHAN]** again before turning the main control knob to select another number (as the removed channel will not be displayed again in this mode).

Example 3.20
Setting Dwell and Hang Periods

To set, for example, a dwell period of 3.5 seconds and a hang period of one second.

Press **[DWELL] [3] [5] [1]** in sequence. The numbers enter right to left. Note that the dwell and hang periods cannot be entered separately.

Example 3.21
Setting Channels to be in the Scan Sequence

To enter channels into the scan sequence (23 and 45 for example) which are not already set to be scanned.

Press **[CHANNEL] [2] [3] [SCAN CHAN]** in sequence.

Then press **[4] [5] [SCAN CHAN]** in sequence.

In each case a small s will appear adjacent to the channel number as it is set to be scanned. Note that channels already in the sequence can be removed in the same way (see also Example 3.20).

Example 3.22
Typical Scanning Usage

A typical use would be to monitor a split frequency simplex (half duplex) conversation using frequencies stored in say, channels 23 and 45. Both channels should have AGC fast selected.

Proceed as in Examples 3.20 and 3.21 to ensure that channels 23 and 45 are the only channels in the scan sequence.

Press **[SQUELCH]** if **SQ** is not shown in the display (i.e. put squelch on).

Press the **[IF GAIN/SQUELCH]** up and down keys, as required, to set the adjacent threshold bargraph reading so that it is just below the **SIGNAL** bargraph reading from the weaker of the two signals to be monitored. This will ensure that the scan will halt when either signal is present.

Press **[DWELL] [0] [5] [0] [SCAN]** in sequence to monitor.

Example 3.22 sets the receiver scanning just the two channels which contain the frequencies used in the two way conversation. A short (0.5 seconds) dwell time ensures that the start of the transmission is not missed, no matter which frequency is used first. The short (zero) hang time ensures that the receiver quickly tunes to the other half of the conversation when the first half ceases.

In general the dwell period is kept as short as possible, just being long enough to allow reliable detection or recognition of desired signals by the chosen means (i.e. by the scan/sweep halt circuitry, by the operator's 'ear' or by ancillary equipment). The hang period is selected to suite the type of communication being monitored and is usually kept very short for split frequency simplex. Several seconds are required for single frequency simplex to ensure that the receiver stays on the same channel to monitor both sides of the conversation. CW, USB, LSB or ISB signals may require Slow or Medium AGC to be selected. Note that these decay times add a few seconds to the hang period and this has to be taken into account when monitoring SSB split frequency simplex transmissions. This lengthening of the hang period is desirable because SSB signals naturally fall below the threshold level during the normal one to two second pauses in speech. A very short hang period in this circumstance would therefore cause erratic channel switching.

Example 3.23
Tuning by Channel
(except on /T option receivers)

Proceed as in the previous examples to set the channels which are to be scanned.

Press **[DWELL] [0] [0] [0]** in sequence to enter a dwell period of 0.0 seconds (the hang period is not significant).

Press **[SCAN]**. Turning the main control knob now just tunes the receiver to the channels in the scan sequence.

Manual tuning by channel is useful in circumstances where rapid selection of a small number of frequencies is required, especially if each also requires a different mode, bandwidth, antenna setting etc. If this is required on /T option receivers (where 0.0 seconds dwell initiates time scanning) a dwell of 9.9 seconds should be set. If it is then required to stay for longer than 9.9 seconds on a selected channel, press **[RECEIVE]**. To restart the scan, press **[SCAN]**.

3.6 SWEEPING OPERATION

The receiver can automatically sweep tune between the frequencies stored in any two adjacent channel memories (except the free-tuning channel 00). The rest of the receiver settings are as stored in the lower numbered of the two adjacent memories. This is called the 'Sweep Start Channel' and can be set from the front panel in the range 01 to 98. The sweep can be in ascending or descending frequency and automatically repeats.

Tuning proceeds in the steps set as the rate (see Example 3.4). The receiver remaining on each frequency step for the selected dwell period (see Example 3.20).

For steps of 5kHz or greater, if SQUELCH on is selected and a signal above the squelch threshold is present on the frequency being received, the receiver will halt on that frequency and remain there for the hang period after the signal goes below the threshold level. This period can be set in the range 0 to 9 seconds in one second increments. However, for the sweep halt to operate correctly, AGC must be on in the sweep start channel. The decay time (Slow, Medium or Fast) will also add to the hang period selected. If zero or a short hang period is required, AGC Fast should be selected, which only adds a few hundred milliseconds to the displayed hang period.

The threshold level, for sweep halt, is set by the IF GAIN/SQUELCH up and down keys and displayed on the adjacent vertical bargraph, when AGC is on in the sweep start channel. The calibration of this bargraph is the same as that for the adjacent **SIGNAL** level bargraph, with maximum height representing approximately +100dBuV emf input signals and minimum height representing approximately -3dBuV emf signals. Therefore, the threshold level should be set so that the threshold bargraph reading is just below the **SIGNAL** bargraph reading at which sweep halt is required.

The sweep sequence can also be stepped on or back by the main control knob. If a dwell of 0.0 seconds is set, the knob has sole control of the sequence and thus provides tuning over a predetermined range only.

The rear panel REMOTE connector has a SCAN/SWEEP HOLD input line. Connecting this line to ground holds the receiver at the frequency being received at that moment. Removing the connection to ground causes the receiver to step on to the next frequency. This input line can therefore be used, in conjunction with external signal detecting equipment, to halt the sweep when a specific type of signal is received. It can also be used, in conjunction with an external switch, to step at a rate determined by that switch.

The sweeping facility is most suitable for monitoring large numbers of equally spaced frequencies which have the same mode settings and which are in order of frequency. For randomly spaced frequencies where the mode settings on each channel are not

necessarily the same or the frequencies in order, the scan function is more suitable (see section 3.5).

The following examples show commonly used sweeping operations. Sweeping can be started from any mode by pressing [SWEEP]. Note however, that both the sweep start and stop channels must contain valid frequencies and the rate set must be greater than 0.00kHz. If this is not the case, pressing [SWEEP] will just sound the invalid tone.

Example 3.24
Displaying Sweep Parameters and Sweep Start Channel

Press **[DWELL]**. The display will show the dwell and hang times. For example **1.2-8 secs** indicates a dwell of 1.2 seconds and a hang of 8 seconds.

Press **[RATE]**. The display will show the number of the present sweep start channel and the step size. Note that this is the same step size as for manual tuning (0.00 to 99.99kHz) except that 0.00 is invalid for sweep tuning.

To alter the dwell and hang periods, proceed as in Example 3.20. To alter the step size, proceed as in Example 3.4.

Example 3.25
Setting the Sweep Start Channel

To select, for example, channel 27 as the sweep start channel.

Press **[CHANNEL] [2] [7] [SWEEP CHAN]** in sequence.

The display will now show **Sweep Start Channel**. The number of the original sweep start channel is lost.

Whilst still in CHANNEL mode, check the contents of the start and the next highest numbered (stop) channel, contain frequencies separated by greater than the step size.

Example 3.26
Typical Sweeping Usage

A typical use would be to check for activity between just 26965 to 27405kHz, in 10kHz steps, with the receiver set in AM mode. The step is greater than 4.99kHz and therefore the sweep can be halted if a signal is found.

Press **[RATE]** and turn the main control knob until the display shows **10kHz**.

Press **[RECALL]** and tune the receiver to 26965kHz, AM mode, 6.0kHz bandwidth, Max. RF sensitivity and Fast AGC.

Press **[CHANNEL] [2] [7] [STORE]** in sequence.

Press **[RECALL]** again and tune the receiver to 27405kHz.

Press **[CHANNEL] [2] [8] [STORE]** in sequence.

Proceed as in Example 3.25 to set 27 as the start channel.

Press **[SQUELCH]** if the display does not show SQ.

Press the **[IF GAIN/SQUELCH]** up and down keys, as required, to set the adjacent threshold bargraph reading so that it is just below the **SIGNAL** bargraph reading from the weakest of the signals to be monitored. This will ensure that the sweep will halt when a signal is present.

Press **[DWELL] [0] [1] [5] [SWEEP]** in sequence.

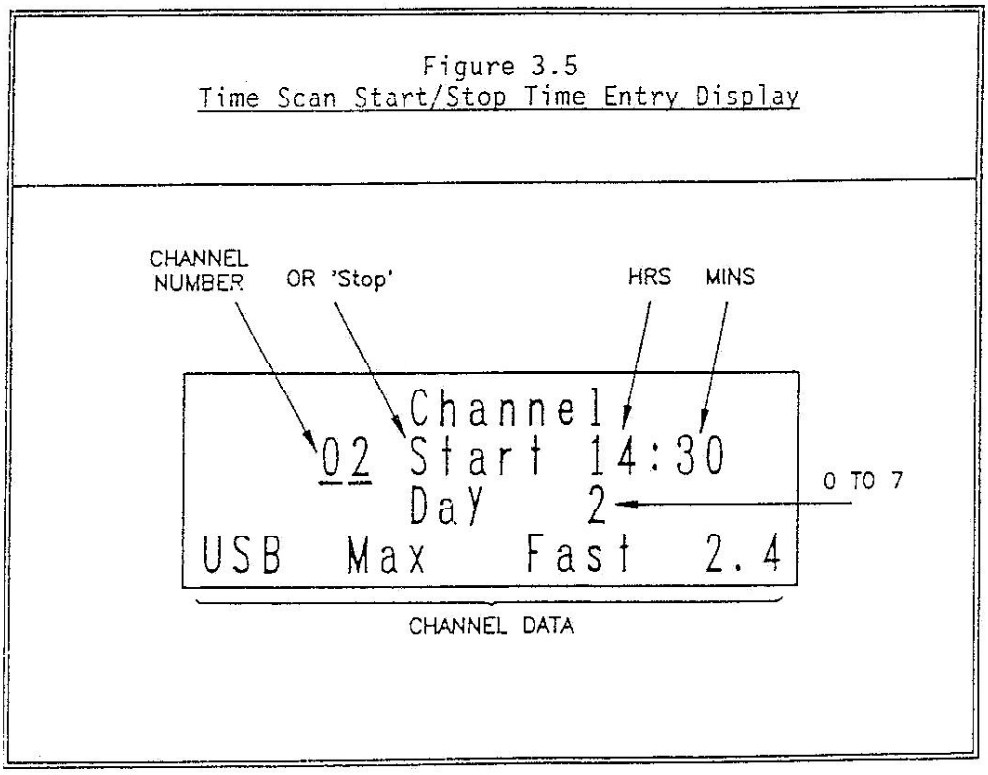
Example 3.26 sets the receiver constantly sweeping between the two frequencies in 10kHz steps. The very short, 0.1 seconds, dwell time minimises the total time required to monitor all the channels (approximately 5 seconds). The moderately long, 5 second, hang time ensures that the receiver does not rapidly tune away from a signal which may have only temporarily gone below the threshold level. For further information about dwell and hang times, see the end of section 3.5.

3.7 SCANNING BY TIME OPERATION (/T Option Receivers Only)

Each of the stored channels, 1 to 99, can be loaded with a start and stop time. These times define the period, during the day or week, for which a channel is to be selected. To enable this form of 'time scanning', the DWELL period must be set to 0.0 seconds and SCAN mode selected. Any other DWELL period will enable conventional channel scanning as described in section 3.5. Note that the HANG period is not significant when time scanning. Procedures for adding or removing channels etc., from the time scan sequence, are as for conventional scanning (see Examples 3.18 to 3.21).

The start and stop times for each channel are entered as hours, minutes and day of week in the channel memories. This is done by selecting CHANNEL mode and the channel to be set, then using the numeric keys after pressing **[FUNCTION]** repeatedly to obtain the **Start** or **Stop** display (see Figure 3.5). Valid entry times are in the range 00:00 ('midnight') to 23:59. The final (day) entry can be '0' or any number '1' to '7'. The special day number '0' is used to produce daily reception (i.e. the day of the week is not significant). Numbers '1' to '7' refer to specific days in a weekly cycle and thus produce weekly reception. It is important to note that '1', for example, does not necessarily refer to Monday, but does relate to the day setting of the receiver's real time clock. Note that start and stop times are loaded directly into the channels and not via channel 00 as is frequency etc. Each channel therefore, has times connected specifically with it, which are not transferred or altered by the RECALL, TUNE and STORE operations.

Figure 3.5
Time Scan Start/Stop Time Entry Display

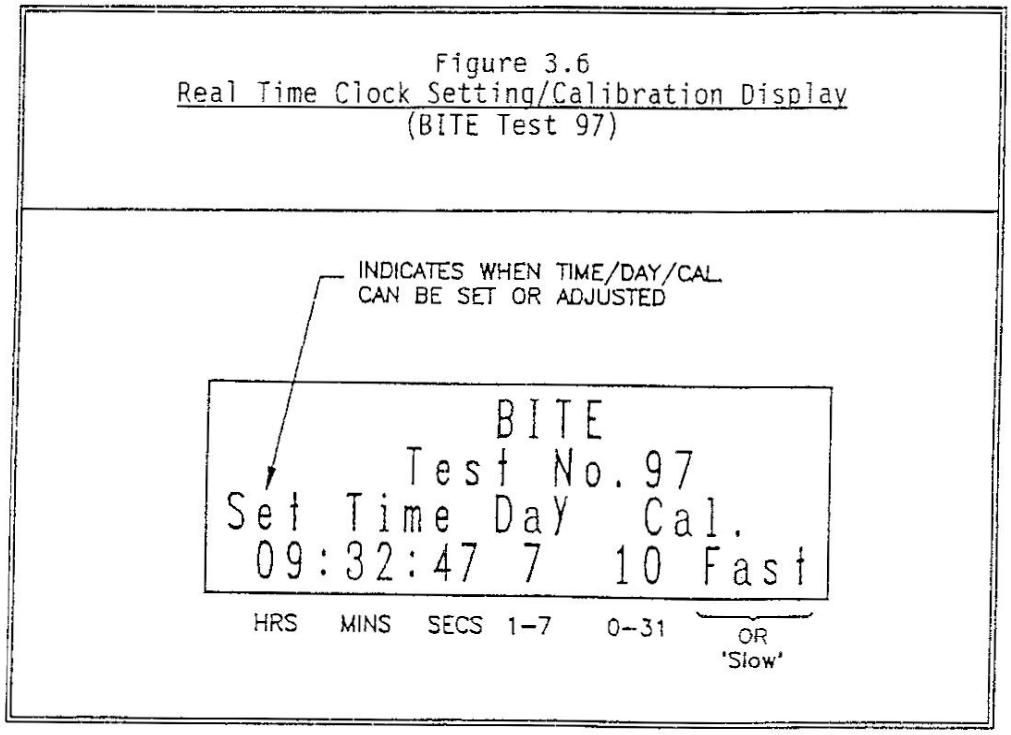


The channel start/stop times relate to the receiver's real time clock, which must be set to the local time. This is done by selecting BITE mode, test 97, then using the numeric keys after pressing [FUNCTION] to obtain the Set Time display (see Figure 3.6). The time is entered as for the channel start and stop times. Whilst a new time is being entered, the clock is stopped and is only restarted when the day ('1' to '7' only) is finally entered. The day number chosen then relates the day on which the clock has been set, to the days of the week on which weekly scanned channels will be selected. To indicate that the clock has been properly set, the colons in the clock time display will flash. To exit the time setting mode, press {FUNCTION] again. The clock has a standby battery and therefore does not need to be reset each time power is applied to the receiver.

It is important to note that whilst displaying Set Time in BITE test 97, the main control knob sets the clock speed (Cal.). This is displayed as being between 0 and 31, Slow or Fast. This is a relative indication only, with each unit representing about 5 seconds per month. Care should be taken that this setting is only altered from the set value, if the clock is found to be running too slow or too fast.

After certain maintenance procedures or if the inbuilt real time clock/RAM integrated circuit is replaced, it may be necessary to re-initialise the clock ('kick-start'). This is done by selecting BITE mode, test 96, then pressing [FUNCTION]. All controls are locked out for about 2 seconds whilst the clock is initialised. It is important to note that the clock time setting should be checked, and corrected if necessary, after each time it is re-initialised in the manner just described.

Figure 3.6
Real Time Clock Setting/Calibration Display
(BITE Test 97)



If the receiver has the 8 bit parallel data output, /B option fitted, then two additional open collector status outputs are provided (see section 2.2.5). One of these indicates when a time scanned channel is selected. The other indicates when a time scanned channel, with a signal input level above the set threshold level, is selected. For this second indicator to operate correctly, AGC must be on in the selected channel. As normal, the threshold level is set by the IF GAIN/SQUELCH up and down keys and displayed on the adjacent vertical bargraph, when AGC is on in the selected channel. The calibration of this bargraph is the same as that for the adjacent **SIGNAL** level bargraph, with maximum height representing approximately +100dBuV emf input signals and minimum height representing approximately -3dBuV emf signals. Therefore, the threshold level should be set so that the threshold bargraph reading is just below the **SIGNAL** bargraph reading at which output indication is required. The output indicators can be used to control external monitoring equipment such as tape recorders.

The following examples show commonly used time scanning operations. Time scanning can be started from any mode by pressing **[SCAN]**, the display then showing **Time Scan** with **Waiting** if a channel is not presently selected. Note that a DWELL of 0.0 seconds must have been set and the real time clock must be running. Also, at least one channel with valid frequency and start/stop times must have been set to be scanned (i.e. have s adjacent to channel number). If this is not the case, pressing **[SCAN]** will either sound the invalid tone or start conventional scanning (just displaying **Scan**).

Note that time scanning does not depend on signal level even if SQUELCH on is selected. However, audio squelch will operate as normal. Also, if the rear panel SCAN/SWEEP HOLD line is pulled low, time scanning will halt on the channel presently selected.

Example 3.27
Setting the Real time Clock

Starting in RECALL mode.

Press **[BITE]** [9] [7] **[FUNCTION]** in sequence. The display should indicate **Set Time.**

Use the numeric keys to enter the local time in hours then minutes (24 hour clock). Bars will appear to indicate the entry point. The last minute entered should be the next minute in local time, for example, if local time is 1401 and 15 seconds, press [1] [4] [0] [2] in sequence and wait.

Prepare to enter the day number, which should be pressed at the moment when local time just equals the time entered (1402 in this example). Note that the displayed colons will flash after the day is entered, to indicate that the clock is running.

The day number must be in the range 1 to 7. This number then relates the day of the week, on which the clock has been set, with the day numbers stored in the channel memories. For example, if the clock is set on a Friday using day number 5, any channel with day number 4 stored will be selected on Thursdays.

Finally press **[FUNCTION]** again to return to normal BITE mode.

Note, when in the set time mode, the clock speed can also be adjusted, using the main control knob. Care should be taken that it is not accidently adjusted whilst setting the time using the numeric keys. It is recommended that a record is kept of the clock speed setting (**0** to **31 Slow** or **Fast**) required to maintain correct time.

Each channel can be set to be scanned on a daily or weekly basis. If a channel start or stop day is set to 0, then daily reception of that channel is provided during the specified hours. If the channel start and stop days are not 0, then reception of the channel will provided during the specified part of a weekly cycle.

Example 3.28
Setting Channel Start/Stop Times (Daily Scan)

To set Channel 23 to be selected every day between 1800 and 1900 hours. Note that channel must contain valid frequency.

Press **[CHANNEL]** **[2]** **[3]** in sequence.

Press **[FUNCTION]** repeatedly until **Start** is displayed.

If a valid time is already entered (i.e. no bars present in time/day part of display) press **[1]** **[8]** **[0]** **[0]** **[0]** in sequence. If the time/day had already been partly entered, finish the entry and restart with the new specified time. Note that the final 0 will enable a daily scan.

Press **[FUNCTION]** again so that **Stop** is displayed. Repeat as for the start time, but now press **[1]** **[9]** **[0]** **[0]** **[0]** in sequence.

Press **[FUNCTION]** again to return to the frequency display.

Example 3.29
Setting Channel Start/Stop Times (Weekly Scan)

To set Channel 45 to be selected every week between 2000 on Thursday and 0100 hours on Friday. The following assumes the clock has been set on a Friday, using day number 5. Note channel must contain valid frequency.

Press **[CHANNEL]** **[4]** **[5]** in sequence.

Press **[FUNCTION]** repeatedly until **Start** is displayed.

If a valid time is already entered (i.e. no bars present in time/day part of display) press **[2]** **[0]** **[0]** **[0]** **[4]** in sequence. If the time/day had already been partly entered, finish the entry and restart with the new specified time. Note that the final 4 represents Thursday.

Press **[FUNCTION]** again so that **Stop** is displayed. Repeat as for the start time, but now press **[0]** **[1]** **[0]** **[0]** **[5]** in sequence. Note that the final 5 represents Friday.

Press **[FUNCTION]** again to return to the frequency display.

If a time scan is started with just the two channels set as in Examples 3.28 and 3.29, the receiver will remain muted except every day between 18:00 and 19:00, when it will select channel 23, and between 20:00 each Thursday and 01:00 the following Friday, when it will select channel 45.

Note that the start time can be greater or less than the stop time. For example, if the start time is 12:00 day 0 and the stop time is 13:00 day 0, then the channel will be selected from 12:00 to 13:00 each day (i.e. for one hour). However, if the start time is 13:00 day 0 and the stop time is 12:00 day 0, then the channel will be selected from 13:00 each day until 12:00 on the next day (i.e. for 23 hours). The same arrangement applies to weekly scans when days are not entered as '0'.

Note also that channels are time scanned in order of priority 01 to 99. At any time, the first 'in-time' channel found in that order, is the one that is selected. Care must therefore be taken in ordering the channel times. For example, if channel 01 has start time 12:00 day 0 and stop time 15:00 day 0, and channel 02 has start time 13:00 day 0 and stop time 14:00 day 0, then channel 02 would never be selected. However if the channel times were exchanged, channel 01 would then be selected between 13:00 and 14:00 and channel 02 between 12:00 and 13:00 then 14:00 and 15:00. Since several channels may have valid frequencies and times set, it is therefore important that only the required channels are set to be scanned (i.e. have s adjacent to the channel number, see Example 3.21).

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