Eddystone

1995

OPERATORS HANDBOOK

Eddystone Radio

A MARCONI COMMUNICATION SYSTEMS COMPANY
Eddystone Radio Limited,
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NOTE : : AC MAINS CONNECTOR

The following information is issued in compliance with British Standard BS415:-

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 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 13 amp (BS1363) FUSED PLUG is used to facilitate connection to the supply outlet, the plug MUST be protected by a 3 AMP FUSE unless expressly declared otherwise (see para. 5 below). 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.

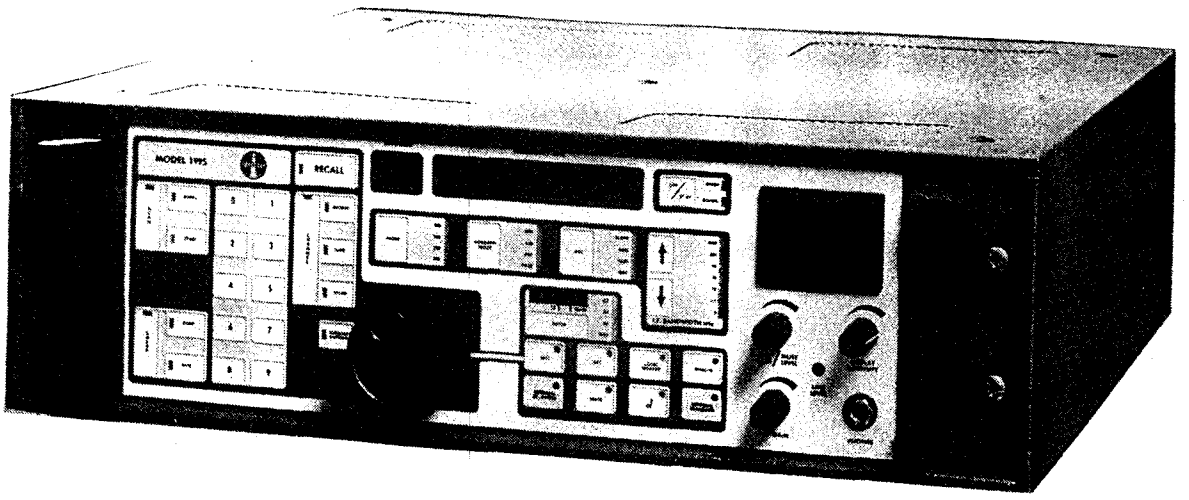
5. NOTE:

   A 3 AMP fuse rating is sufficient for most equipments, but in some instances, to allow for switching surges, it may be necessary to use a 5 AMP FUSE RATING. In all instances where the higher rating is applicable, specific notice will be given in the INSTALLATION SECTION of the handbook at the POWER SUPPLIES subsection.

Eddystone

Model 1995

HIGH STABILITY VHF/UHF RECEIVER



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AMENDMENT RECORD

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The Manufacturer reserves the right to modify the content of this publication as necessary to accommodate modifications, design improvements etc. Relevant Amendment Sheets will be incorporated at date of issue.

VHF-UHF RECEIVER INSTALLATION

Accessories Kit

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

Rack-Mounting Receivers.

The rack mounting versions can be installed directly in 483mm (19inch) racks, 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 standard with centre spacing of 57mm (2.25 inches). Dimensions of the receiver are shown in Figure 2.1c and 2.1d.

Bench Mounting Receivers.

Four mounting feet are included with the accessories kit. These should be fixed to the bottom corners of the cabinet using the four M4 x 10mm screws provided. Dimensions of the receiver are shown in Figure 2.1b.

Conversion Of Mounting Style.

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

Anti-Vibration Mountings.

These are available to order for bench mounting receivers for use under arduous conditions. The dimensions of the receiver and cabinet fitted with anti-vibration mountings are shown in Figure 2.1a

To fit anti-vibration mountings Catalogue Number 1547 proceed as follows:-

1) Remove the cabinet feet (if fitted).

2) If access to the underside of the mounting surface (i.e. the bench or shelf is available, drill sixteen clearance holes on the centres shown in Figure 2.2. to enable the anti-vibration mountings to be bolted to the surface. If access to the underside is not available these holes must be drilled and tapped to take suitable hexagon-headed screws.

3) Fix the four anti-vibration mountings to the base of the cabinet using M6 x 20mm screws, ensure the bases are correctly aligned.

4) Secure the bases to the mounting surface.

Figure 2.1

Dimensions of the receiver in all mounting styles.

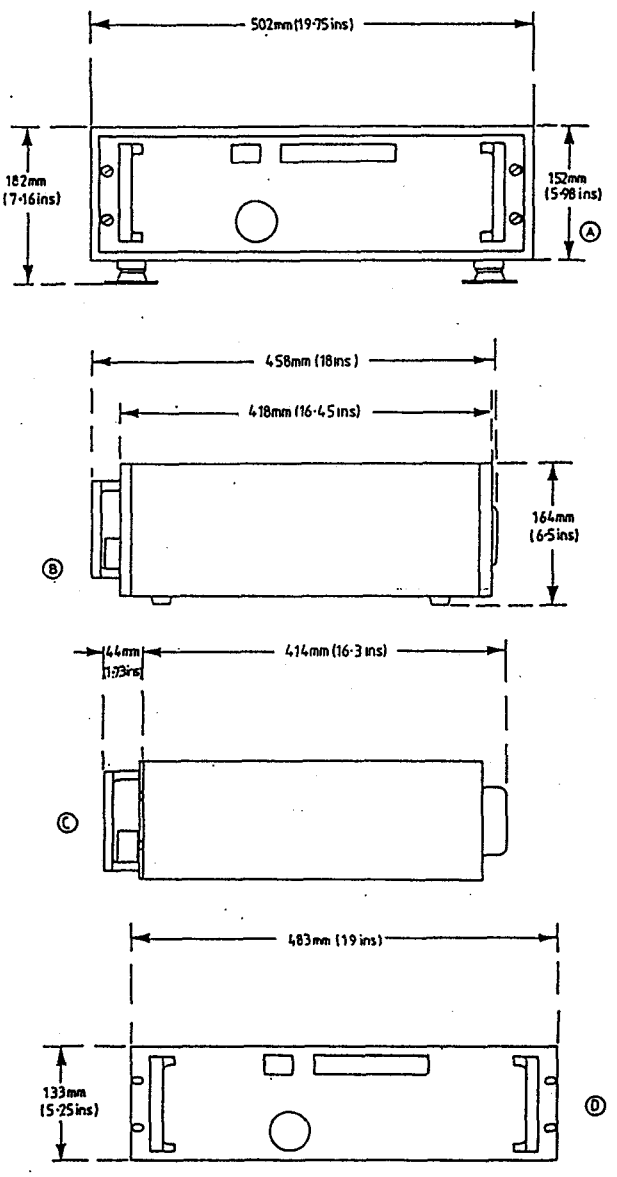
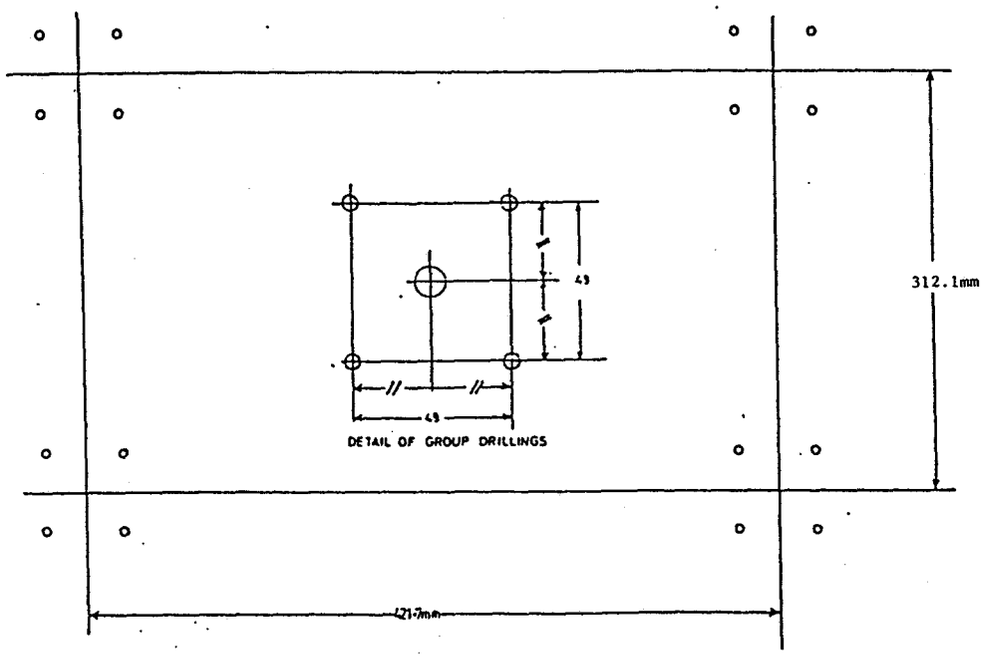


Figure 2.2

Drilling details for fixing Anti-Vibration Mountings, Catalogue Number 1547



Power Supplies.

Before connecting to the local mains supply ensure that the mains voltage selector switch is set to the correct position to suit the available mains supply. (Do Not operate the mains voltage selector with the supplies connected).

Fuse Ratings

AC Fuses - The fuse ratings are 1 amp anti-surge. (T).

DC Fuses - The two DC supplies in the receiver supply are each protected with a 3.15 amp fuse.

All fuses are accessible on the rear plate of the receiver.

External Connections.

With the exception of the headphone socket all external connections are made at the rear of the receiver. (See Figure 2.3).

AC Mains Socket.

This socket accepts a 40 Hz - 60 Hz mains supply within the ranges specified using a standard IEC connector. If the plug and lead supplied in the accessories kit 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

Aerial Input

This socket accepts a 50 Ohm N-type co-axial connector.

IF Output High Level.

This socket accepts 50 Ohm BNC Bayonet-Lock co-axial connector. The output is approximately 20 mVRMS into 50 Ohm at 10.7 MHz with nominal 50 Ohm output impedance.

IF Output Low Level.

This socket accepts 50 Ohm BNC Bayonet-Lock co-axial connector. The output is approximately 6dB above the input level, centred at 10.7MHz, with nominal 50 Ohm output impedance.

External Standard Connector.

This socket accepts a 50 Ohm BNC Bayonet-Lock co-axial connector. (Input level as specified separately).

External Standard Switch.

Selects OFF (for internal standard), 1 MHz or 5 MHz as required.

Video Output

Separate positive and negative video outputs are provided by BNC Bayonet-Lock co-axial connectors.

MPX Output

A demodulated output, filterd to suit multiplex stereo transmission, is provided by a 50 Ohm BNC Bayonet-lock connector.

Earth Terminal.

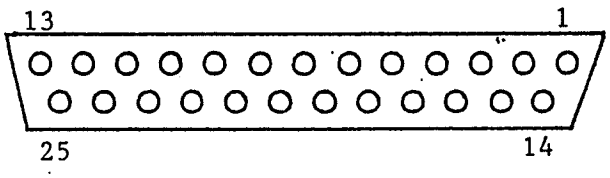
An earth terminal is provided to enable direct earthing of the receiver.

Remote Connector.

A 9 way 'D' connector is provided for remote control inputs.

Figure 2.3

1995 Rear Panel Ancillaries Connector (View into Connector)



Ancillaries Connector.

The pin connections and their fundamental characteristics are given in Table 2.3.

1995 Antenna Switch Connector.

A 15 way 'D' type connector is provided for connections to an external antenna switch. The pin connections are shown in Table 2.4.

NOTE A 'TTL HIGH' is used to select the appropriate antenna. Reverse polarity can be provided to special order.

Table 2.1

Accessories Kit

1 Mains Connector And Lead	D4815P
1 25 Way Plug	11153P
1 9 Way Socket	11973P
1 Cover for 25 Way Plug	10977P
1 Cover for 9 Way Socket	11974P
2 1 Amp Anti-surge Fuse	9816P
2 3.15 Amp Fuse	11967P
4* Cabinet Mounting Feet (with Screws)	9817P

*Not supplied for rack mounting receivers.

Table 2.2

List of Accessories Available To Order

Description	Part Number
Cabinet	LP4487
Anti-Vibration Mounting Kit	Catalogue Number 1547
Cabinet Loudspeaker Unit	Catalogue Number 1615
Headphones	Catalogue Number 1588

Table 2.3

1995 Ancillary Connections.

25 way 'D' female connector mounted on receiver rear panel.

Pin 1 AF output from amplifier (LS) - 1 watt maximum into 4/8 Ohm. (see Pins 14 and 15).

Pin 2 External reset input.

Pin3 Sidetone input - 2 VRMS input to give 200 mW AF output(>10K input resistance).

Pin 4 Diversity out)
) Screened cable must be used for external
Pin 5 Diversity in) connections.

Pin 6 600 Ohm Output)
)
Pin 7 600 Ohm Centre-tap) -10 mW pre-set into 600 ohms (floating).
)
Pin 8 600 Ohm Output)

Pin 9 RF Mute (ground to mute). Pulled down 'R' to mute from +15V through 10K.

Pin 10 RF Mute)
) +12V to +30V maximum to mute or desense.
Pin 11 IF Desense)

Pin 12 AF Mute (ground to mute internal speaker). Pulled down 'R' to mute from +15V through 10K.

Pin 13 Mute indicator. (Open collector transistor output, 50mA maximum current, 30V maximum voltage, transistor 'ON' when signal not present.)

Pin 14 Earth for 1 (unmuted ground))
) Audio LS output. (See Pin 1)
Pin 15 Muted ground)

Pin 16 Earth for 3

Pin 17 Earth for 4

Pin 18 Earth for 5

Pin 19 Earth for 6

Pin 20 Earth for 7

Pin 21 Earth for 8

Pin 22 Earth for 9 or 10

Pin 23 Carrier operated relay pole

Pin 24 Carrier operated relay contact

Pin 25 Carrier operated relay contact.

Notes

Use Pin 15 for external speaker ground return if muting of this speaker is required when the 'PHONE' jack is inserted.

Table 2.4

1995 Antenna Switch Connections

15 way 'D' type male connector mounted on receiver rear panel.

Pin 1 Select Antenna 0
Pin 2 Select Antenna 2
Pin 3 Select Antenna 4
Pin 4 Select Antenna 6
Pin 5 Select Antenna 8
Pin 6 Earth for 5 Volt Supply
Pin 7 Earth for 5 Volt Supply
Pin 8 15 Volt Supply
Pin 9 Select Antenna 1

Pin 10	Select Antenna 3
Pin 11	Select Antenna 5
Pin 12	Select Antenna 7
Pin 13	Select Antenna 9
Pin 14	5 Volt Supply
Pin 15	Earth For 15 Volt Supply

1995 VHF-UHF RECEIVER OPERATION

Operation is described in five sections. These are 'Signal Reception', 'Channelised Operation', 'Scanning', 'Sweeping' and BITE (Built-in test equipment. Each section should be read and understood before proceeding to the next, though it should be noted that basic use of the receiver does not require all sections to be studied. A number of examples are given to show typical usage.

Certain controls have different operations depending on the current operating mode of the receiver front panel. If a control has no function in the current mode then a distinctive warble tone is sounded if the keyboard sounder is enabled.

SECTION ONE : Signal Reception

Ensure that the rear panel voltage selector is set for the local mains power supply and apply mains power.

Ensure that the rear panel external standard selector switch is set to OFF if no external standard is being used (**EXTERNAL STANDARD** LED OFF) or is set to 1MHz or 5MHz to suit an external standard being used (**EXTERNAL STANDARD** LED ON).

Turn **<DISPLAY INTENSITY - POWER OFF>** control fully clockwise for power on and full display intensity.

All display LEDS (except meter) will illuminate briefly and then **rS 123456** will be displayed in the Channel and Frequency sections. rS indicates power on reset and is accompanied by three tones. Note that not all the numbers 2 to 6 will necessarily be displayed as they indicate the settings of an internally fitted switch which is set to give the required remote control parameters. If the number 1 is displayed, this indicates that the keyboard sounder is enabled. Finally the display will clear to one of the operational formats.

If only the **OVEN** LED is on, the receiver is in standby. Press **<ON/STANDBY>** to use the receiver. In standby the receiver display (apart from the **OVEN** LED) is turned off and the main outputs are muted. However, the oven controlling the internal frequency standard temperature is left on. When the receiver is initially on, standby can be selected by pressing the **<ON/STANDBY>** key.

If the **REMOTE** LED is on, and the receiver is not in a remote control system, press **<REMOTE>** to obtain local control. If this or any other operation is not possible, the receiver may be internally set for remote control priority. This will be shown by the number 4 being off during the power on reset period.

If use of the internally fitted loudspeaker is required, ensure that the **<LOUDSPEAKER>** LED is on. If it is not on, press the **<LOUDSPEAKER>** key. If headphones are being used or an external loudspeaker is being used, the internal loudspeaker should normally be switched off.

If the meter is required, press the **<METER>** key repeatedly to select **CZ** (centre zero for tuning FM signals), **AF** (rear panel line audio output, calibrated at 10 mW into 600 Ohms) or **RF** (relative signal strength). The **TEST** position is only used during receiver test and alignment.

If the **RECALL** LED is not on, press **<RECALL>** to obtain conventional signal reception and tuning.

If the **AFC** LED is on, press **<AFC>** to prevent **AFC** action.

If the **MUTE** LED is on, press **<MUTE>** to prevent mute action.

If the **BFO** LED is on, press **<BFO>** to obtain a frequency display.

If the **AUXILIARY ANTENNA** LED is on, press **<AUXILIARY ANTENNA>** to obtain a frequency display.

The channel number shown will be **00** which is the direct entry channel.

The frequency display may contain the tuned frequency or may be blank (i.e. a clear channel). Tuning may commence from the frequency shown or from a new frequency entered via the numeric keypad.

If the **BITE** LED flashes this indicates a possible receiver fault (see Section 5 'BITE'). Intermittent flashing during tuning, however, is normal and does not necessarily indicate a fault.

Direct frequency entry.

Use of the numeric keypad when a tuned frequency display is present (i.e. **BFO** and **AUXILIARY ANTENNA** LEDS both off) enters the frequency, starting with the most significant digit, 100 MHz. For frequencies less than 100 MHz, this digit must be entered as zero. The rest of the display, except the 10 Hz digit, is shown as bars which are gradually replaced by the numbers entered via the keypad.

If the keyboard sounder is enabled, a longer tone sounds as the last (100 Hz) digit is entered. Turning the tuning knob fills in trailing zeros or helps to restart an entry if a mistake has been made. On the 1995/1, the 100/10 MHz digits are automatically limited at '46' (maximum frequency of 469.99999 MHz). On the 1995/2 frequencies above 999.99999 MHz have to be set from the tuning knob and are shown as A00.00000 to A99.99999 MHz (the latter equivalent to 1099.99999 MHz).

Example 1 : To tune to 23.76540 MHz.

Press**<0>, <2>, <3>, <7>, <6>, <5>, <4>.**

The Last, 10 Hz, digit is automatically entered as zero when the first, 100 MHz, digit is entered.

Example 2 : To tune to 456.68330 MHz.

Press**<4>, <5>, <6>, <6>, <8>, <3>, <3>.**

Example 3 : To tune to 154.00000 MHz.

Press **<1>, <5>, <4>**. Turn tuning knob slightly.

This enables speedy entry of any frequency with any number of trailing zeros.

Example 4 : To tune to 1034.67840 MHz (1995/2 only).

Press **<9>, <9>,<9>, <9>, <9>, <9>, <9>.** Turn the tuning knob clockwise to the required frequency which will be displayed as A34.67840 MHz.

Manual frequency tuning.

When a frequency is displayed it can be adjusted using the tuning knob. The rate of tuning can be set as follows.

Press **<RATE>**. The frequency display is replaced by the tuning step which is in the range 00.00 to 99.99 KHz. This step can be altered via the numeric keypad, with the digits entering the display from the left.

Example 5 : To select 12.50 KHz steps.

Press **<RATE>, <1>, <2>, <5>, <0>.**

The rate gives the tuning steps starting from the initial frequency shown or entered. Many VHF/UHF bands are split into 6.25, 12.5, 25, or 50 KHz channels and are thus best searched using the appropriate step. Note that the starting frequency entered need not be a whole multiple of the selected rate, thus allowing stepping through frequency channels which are offset from a multiple of the channel spacing. SSB or CW signals require finer tuning and thus 10 to 100 Hz steps may need to be selected.

If a rate 00.00 KHz is selected it provides variable rate tuning where the step size increases in proportion to the speed with which the tuning knob is turned. Thus very fine tuning to fast tuning is possible without altering the RATE setting.

After setting the rate, press **<RECALL>** to enable manual tuning to be used in the conventional manner.

Signal Mode settings.

The **<MODE>** and **<SIDEBAND MODE>** keys are used to step through the reception mode options of **AM, USB, LSB, FSK, TELEX, CW** and **FM.** The reception bandwidth is set by the **<I.F. BANDWIDTH KHz>** key. This setting also selects wide or narrowband AM or FM when those modes are in use (6000 or 250 KHz selectivity being 'wide', 60, 30, 15, 7.5 and 3 KHz being 'narrow'). When **FSK** or **CW** are selected the BFO can be used to determine the detected audio output frequency. A narrow audio filter, centred at 1 KHz, is also switched in on **CW** only.

On **USB** or **LSB** clarification of the signal is performed with the tuning knob after using **<RATE>** to set small steps (10 to 100 Hz) or variable rate ('00.00 KHZ'). On **TELEX** all tuning is also performed using the tuning knob, the BFO being automatically set to give audio tone centred on 1.7 KHz.

Example 6 : AM reception.

Press **<MODE>** repeatedly to select **AM.**

Press **<I.F. BANDWIDTH KHz>** keys repeatedly to select usually 3 KHz for amplitude modulated CW or 7.5 KHz for radiotelephone. Tune to the desired signal as described in Direct Frequency Entry or Manual Frequency Tuning.

Example 7 : USB or LSB reception.

Press **<MODE>** repeatedly to select **SSB.**

Press **<SIDEBAND MODE>** repeatedly to select **USB** or **LSB** as required.
Press **<I.F. BANDWIDTH KHz>** keys repeatedly to select usually 3 KHz.
Tune to the desired signal as described in Direct Frequency Entry or Manual Frequency Tuning.

Example 8 : FSK reception.

Proceed as for example 7 but select FSK with the **<SIDEBAND MODE>** key and select usually 7.5 or 3 KHz with the **<I.F. BANDWIDTH KHz>** keys. Tune for maximum signal strength or to the centre of the transmitted tones as described in Direct Frequency Entry or Manual Frequency Tuning. Press **<BFO>** and set the BFO frequency (now displayed in the range + to - 9.9 KHz) by using the tuning knob, thereby obtaining the required audio output tones.
Press **<BFO>** again to return to normal tuning.

Example 9 : TELEX reception.

Proceed as for example 7 but select **TELEX** with the **<SIDEBAND MODE>** key and select 3 KHz with the **<I.F. BANDWIDTH KHz>** keys.

Tune to the centre of the transmitted tones as described in Direct Frequency Entry or Manual Frequency Tuning. The frequency display will show the effective carrier frequency 1.7 KHz below the tones centre. The audio output tones will now also be centred at 1.7 KHz. Note that TELEX can also be received on **FSK** mode.

Example 10 : CW Reception.

Press **<MODE>** repeatedly to select **CW.**
Press **<I.F. BANDWIDTH KHz>** keys repeatedly to select 3 KHz.
Press <BFO> and set the BFO frequency in the range 0.8 to 1.2 KHz (+ or -) using the tuning knob. This setting equals the desired audio output tone within the range of the CW audio filter.
Press **<BFO>** again and tune to the desired signal as described in Direct Frequency Entry or Manual Frequency Tuning.

Example 11 : FM reception.

Press **<MODE>** repeatedly to select **FM.**
Press **<I.F. BANDWIDTH KHz>** keys to select usually 15 or 7.5 KHz for NBFM or 250 KHz for broadcast WBFM. Tune to the desired signal as described in Direct Frequency Entry or Manual Frequency Tuning. If the meter has been set to **CZ** as previously described, the signal should be tuned so that one of the central LEDs is on.

Gain Control.

Manual gain and three speeds of automatic gain control are available by pressing the **<AGC>** key repeatedly until the desired setting is obtained. When off is selected, gain is set by use of the **<I.F./R.F. GAIN / MUTE LEVEL>** knob. When **AGC SLOW, MEDIUM** or **FAST** is selected, this control then sets the threshold level for the carrier operated relay on all modes and for the audio output mute on all modes except **FM.**

The **AGC** speed is normally selected to suit the signal being received. **SLOW** is generally used for USB, LSB or broadcast AM. **MEDIUM** or **FAST** is selected on other modes to obtain a smooth output signal without losing the start of a required but weaker signal when a stronger signal ceases.

Mute Operation.

Audio muting, carrier operated relay and transistor operation is available on all modes. When mute is selected and a signal above the threshold level is present, full audio output will be obtained and the **SIGNAL** LED will be on, otherwise the audio output will be muted by 20 dB and the **SIGNAL** LED will be off.

The audio muting threshold level is set internally on **FM** and is noise (NBFM) or noise/deviation (WBFM) operated. On all other modes it is signal level operated, the threshold being set by the **<I.F./R.F. GAIN/MUTE LEVEL>** knob. As the knob is turned clockwise, the threshold level is decreased. On all but FM mode **SLOW, MEDIUM** or **FAST AGC** must also be selected for audio muting to operate.

The carrier operated relay and transistor threshold level is set by the **<I.F./R.F. GAIN/MUTE LEVEL>** control on all modes including FM.

Note that the signal level muting circuit operates from the AGC voltage and thus there is a delay period between the signal ceasing and the mute circuit switching to mute the audio output. This period depends on the AGC speed selected and thus may be between about 250 to 500 mS **(FAST)** 3 to 5 seconds **(SLOW)**. During this period, background noise is still however maintained at a low level by the AGC voltage. It is also recommended that only 3, 7.5 or 15 KHz I.F. bandwidths are used to prevent background noise from operating the signal level muting circuit when the threshold setting is at its maximum sensitivity. This limitation does not of course apply to FM mode audio muting.

Example 12 : FM reception with audio muting.

If the **MUTE** LED is off, press **<MUTE>** to obtain muting when no signal is present.

Proceed as in Example 11 'FM reception'. Muting is especially useful when on FM to reduce the high level of noise produced when no signal above the receiver limiting level is present.

Example 13 : Reception of modes other than FM with audio muting.

If the **MUTE** LED is off, press **<MUTE>** to obtain audio muting when no signal is present.
Press the **<I.F. BANDWIDTH KHz>** keys repeatedly to select usually 3, 7.5 or 15 KHz.
Press the **<AGC>** key repeatedly to select **SLOW, MEDIUM** or **FAST** as required.
Turn the **<R.F./I.F. GAIN / MUTE LEVEL>** knob fully clockwise for minimum threshold level.
Proceed as in Examples 6 to 10 to obtain the desired signal level. The **SIGNAL** LED should be on unless the signal is of very low level (in which case the audio will remain muted).
Turn the **<R.F./I.F. Gain / MUTE LEVEL>** knob slowly anti-clockwise until the **SIGNAL** LED is just reliably maintained on by the signal. Any signal or noise lower than the desired signal will have a muted audio output level.

Automatic Frequency Control (AFC).

AFC is available on **FM** only. If the signal is within the discriminator range, selecting **AFC** will automatically tune the receiver to within 10 KHz (WBFM) or 200 Hz (NBFM) of the signal. This is sufficiently accurate for correct signal demodulation. With the meter set to **CZ** as previously described, the discriminator range corresponds to zero to full scale deflection of the meter. AFC will tune the signal so that one of the three to four central LEDS is on. Note that **AFC** should not be selected during normal tuning or if no signal is present, it is simply a tuning aid though it can be used to 'track' non-fading signals with a slowly shifting frequency.

Example 14 : Automatic tuning of FM signal.

If the **AFC** LED is on, press the **<AFC>** key to ensure **AFC** off.
Press **<METER>** repeatedly to obtain **CZ** (centre zero).
Proceed as in Example 11 to tune the desired signal until it produces deflection of the meter.
Press the **<AFC>** key to select **AFC** and the receiver will automatically tune to the signal.
If the signal is of constant frequency press the **<AFC>** key to deselect **AFC**.

Antenna Selection.

One of up to ten remotely sited antennas (or masthead amplifiers, down converters etc.) can be selected from the receiver front panel. The control activates the desired one of ten rear panel TTL output control lines. To change or check the setting, press **<AUXILIARY ANTENNA>**. The frequency display will be replaced by the **ant. number** display. This setting can then be altered, if required, by the tuning knob. Finally press **<AUXILIARY ANTENNA>** again to return to the frequency display.

1995 VHF-UHF RECEIVER OPERATION

SECTION TWO : Channelised Operation.

Ninety-nine non-volatile memories are provided for channel storage. In each memory , tune frequency, BFO offset, reception mode, AGC setting, bandwidth and auxiliary antenna setting can all be stored. Memories can be interrogated, loaded, modified, shifted or cleared without disturbing the signal being received. These operations often mean that the displayed channel (frequency etc.) is not that to which the receiver is tuned. This state is indicated by flashing of the two decimal point LEDS in the channel number display. During modification of channel data, channel 00 (the channel used in **RECALL** mode) is used as an intermediate temporary store for the data being altered. Therefore, channel 00 must not be used as the receiving channel if the receiving is to remain undisturbed.

The channels stored can be received as required and can also be scanned or swept as describedin sections three and four respectively. The following examples detail most of the commonly required channel operations. Channel memories can be interrogated by pressing **<CHANNEL>** and entering the channel number via the numeric keypad or by incrementing or decrementing the channel number using the tuning knob. **CHANNEL** mode has to be selected before operations which involve use or modification of channel memories. The contents of memories are thus displayed for checking before they can be used or modified.

Example 15 : Storing a receiver setting in channel memory 09 found or used during signal reception as described in Section One.

Start in **RECALL** mode.
Press **<CHANNEL>, <0>, <9>.** The present contents are displayed and the channel decimal points flash to indicate that this is not the channel being received.
Press **<STORE>** to load channel memory.
Press **<RECALL>** to return to the normal tuning mode.

Note that channel 00 is the tuning channel and **<STORE>** loads all data from channel 00 into the channel number displayed in **CHANNEL** mode. To ensure that channels are not accidently overwritten, **<STORE>** only operates if **CHANNEL** mode is first selected with the **<CHANNEL>** key. This also allows the original contents to be checked before being modified.

Example 16 : Receiving channel 91 with ability to tune signal if required.

Press **<CHANNEL>, <9>, <1>, <RECEIVE>, <RECALL>.**

Channel 91 data is loaded into channel 00, the tuning channel, and the receiver is set to receive on that channel.

Example 17 : Receiving channel 29 with tuning controls locked out.

Press **<CHANNEL>, <2>, <9>, <RECEIVE>.**

The receiver will be set to receive using the data stored in channel memory 29. Note that the receiver signal cannot be tuned or adjusted i.e. the stored channel data cannot be directly modified thus safely preserving the stored data.

Example 18 : Modifying data in channel memory 12 without disturbing a signal being received on channel 63.

Press **<CHANNEL>, <6>, <3>, <RECEIVE>** to receive using settings stored in channel memory 63. Note that the tuning controls have no effect in **RECEIVE** mode.

Press **<CHANNEL>, <1>, <2>, <TUNE>** to load channel 12 data into the tuning channel 00. Modify the data using the controls as described in Section One. Note that the controls have no effect on the received signal. The channel decimal points will also flash to indicate that the channel displayed is not that being received.

Press **<CHANNEL>**. The display will show channel 12 and its original data.

Press **<STORE>** to load the modified data.

Note that **<TUNE>** loads data from the displayed channel memory into channel 00, the tuning channel.

During more complicated memory modifications whilst receiving a fixed channel, the received channel may need adjustment or its number may simply be forgotten. To enable rapid adjustment (for example to retune slightly) press **<RECALL>**. This loads the received channel data into channel 00 and thus complements **<TUNE>**. If the received channel is also the displayed channel (channel number decimal point LEDs not flashing) then **<TUNE>** and **<RECALL>** have the same effect.

To determine the received channel number, press **<CHANNEL>**.

To return to fixed reception on that channel press **<RECEIVE>**

Example 19 : Shifting data from channel memory 67 to memory 88 without disturbing a signal being received on channel 35.

Press **<CHANNEL>, <3>, <5>, <RECEIVE>** to receive wanted signal.
Press **<CHANNEL>, <6>, <7>, <TUNE>** to move channel 67 data to tuning channel 00. The data may be modified at this stage if required.
Press **<CHANNEL>, <8>, <8>, <STORE>** to transfer data into channel 88.

Example 20 : Clearing data in channel 78.

Start in **RECALL** or **TUNE** mode.
Ensure receiver has a frequency display (**BFO** and **AUXILIARY ANTENNA** LEDS off).
Press **<0>** key and turn tuning knob slightly to enter zero frequency.
The channel stored data display will go blank.
Press **<CHANNEL>, <7>, <8>, <STORE>** to clear channel 78.

A channel is cleared by loading zero frequency. The original stored frequency is lost entirely although the rest of the original data (i.e. bandwidth etc.) is retained and is displayed if a valid frequency is entered into the channel. A clear channel provides a blank channel data display and a muted output if selected as the receive channel.

Example 21 : Rapid interrogation of all or several channel memories.

Press **<CHANNEL>** and turn tuning knob to step rapidly through channel stores. Note that this does not affect or alter the channel being received.

SECTION THREE : Scanning Operation.

Any number of the stored channels (except the tuning channel 00) can be scanned with adjustable dwell and hang times. The dwell time is the period for which the receiver stays on each channel. This period can be set in the range 0.1 to 9.9 seconds (0.1 second increments). If **MUTE** on is selected and a signal above the threshold is present on the scanned channel being received, the receiver will remain tuned to that channel. On **FM** mode channels, if **AFC** on is selected, the signal must also be within the centre of the discriminator range to halt the scan. When the signal ceases, the receiver will still remain on that channel for the hang period before it resumes scanning. This period can be set in the range 0 to 9 seconds (1 second increments). Note that channels which are not in **FM** mode must also have **AGC SLOW, MEDIUM** or **FAST** selected to enable the scan halt facility on that channel. In this case, the **AGC** time constant will add, to the hang period selected, about 250 to 500 mS **(FAST)** and 3 to 5 seconds **(SLOW).** The hang period and AGC speed are thus selected independently to suit the actual signals being scanned. However, if short hang periods are required (less than 0.5 to 1 second), **AGC FAST** must be selected.

The scanning facility is most suitable for monitoring small numbers of equally spacedchannels or any number (up to 99) of random frequencies. For large numbers of equally spaced frequencies, the sweep facility is more suitable (see Section Four).

The scanned channel number can also be incremented or decremented using the tuning knob. If a dwell period of 0.0 seconds is entered, the tuning knob has sole control of the scanning process thus allowing manual tuning through the receiver's channel memories.

The rear panel **REMOTE** connector has a **HOLD SCAN/SWEEP** input line. Connecting this line to ground holds the receiver on the channel being scanned. Removing the connection to ground causes the receiver to immediately move on to the next scanned channel. This input line can therefore be used, in conjunction with ancillary 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 manually scan channels at a rate determined by the use of the switch.

Example 22 : Determining which channels are set to be scanned and the present hang and dwell periods.

Press **<DWELL>.** The frequency display will be replaced by the hang and dwell times display. For example **1.2 - 8 SEC** indicates a dwell of 1.2 seconds and a hang of 8 seconds.
Turn the tuning knob either way. The channel number display will cycle through any channels which already are set to be scanned. The **START SCAN** LED will also flash. If it does not, then it indicates that no channels are set to be scanned. In this case, if the keyboard sounder is enabled, the invalid tone will also sound as the tuning knob is turned.

Example 23: Removing channels from the scan procedure.

Proceed as in example 22.
Press the **START SCAN** key whilst displaying the number of the channel to be removed from the scan process. When it is removed, The **START SCAN** LED will stay off.

If a channel is removed in error, it can be reset by pressing the **START SCAN** key again before turning the tuning knob to display another channel number (as the removed channel will not be displayed again in this mode).

Note that none of these operations alter the frequency settings etc. stored in the channel memory.

Example 24 : Setting a dwell period of 3.5 seconds and a hang of 1 second.

Press **<DWELL>, <3>, <5>, <1>.** The numbers enter right to left.
Note that dwell and hang cannot be entered separately.

Example 25 : Setting channels 23 and 45 to be scanned.

Proceed as in Example 23 to remove all channels from the scan process.

Press **<CHANNEL>**, **<2>**, **<3>**, **<START SCAN>**.
Press **<4>**, **<5>**, **<START SCAN>**.

When interrogating channels in the channel mode, the **START SCAN** LED will flash if the displayed channel is set to be scanned. Inthis mode the displayedchannel can be removed from or set in the scan process by pressing the **<START SCAN>** key (as in example 23).

Example 26 : Monitoring a split frequency simplex communication using frequencies stored in channels 23 and 45.

Proceed as for Example 25 to set channels 23 and 45 to be scanned.
Press **<MUTE>** if **MUTE** LED off and set threshold level if not set to **FM**.
Press**<AGC>** repeatedly to select **FAST** or **MEDIUM** to retain a short hang period.
Press **<DWELL>**, **<0>**, **<5>**, **<0>**, **<SCAN>**.

This sets the receiver scanning the desired channels with a dwell period of 0.5 seconds and a very short hang period. The short dwell time ensures that the start of the two way communication is not missed. The very short time ensures that the receiver immediately tunes to the other half of the communication when the first half ceases. In general the dwell period is kept as short as possble, just being long enough to allow reliable detection or recognition of desired signals by the chosen means (i.e. by the mute circuitry, by the operators 'ear' or by anciliary equipment). The hang period is selected to suit the type of communication being monitored and is usually very short for split frequency operation or several seconds for single frequency simplex (to ensure the receiver remains on same frequency to monitor both sides of the communication).

Note that if, in error, no more than one channel has been set to be scanned, pressing the **<SCAN>** key will have no effect and the invalid tone will sound if the keyboard sounder is enabled.

Example 28 : Manual only scanning of channels.

Proceed as in previous examples to set the channels which are to be scanned.
Press **<DWELL>, <0>, <0>,<0>** to enter a dwell period of zero seconds (the hang period is not significant).
Press **<SCAN>**. Turning the tuning knob now just tunes the receiver to the various channels selected for scanning.

Manual channel scanning is useful in circumstances where rapid selection is required of a limited number of frequencies, possible each with different modes, bandwidths etc.

Section Four : Sweeping Operation.

The receiver can automatically sweep tune between the frequencies stored in any two adjacent channel memories (except the tuning channel 00). The rest of the receiver settings are as stored in the lower numbered of the two adjacent memories. The tuning is in the frequency steps stored as the rate (see example 5), the receiver remaining on each step for the stored dwell period (see example 24). If the rate is set as 5 KHz or above, all the mute, hang and scan/sweep hold facilities available in scanning operation (see Section 3) are also available in sweeping operation. This allows all automatic monitoring facilities to be available when sweeping a frequency band containing equally spaced channels, the sweep rate being set equal to the channel spacing which is normally 5 KHz or greater.

The receiver tunes repeatedly between the frequency in the lower numbered channel to that in the next highest numbered. The sweep can be in ascending or descending frequency.

The frequency sweep can also be incremented or decremented using the tuning knob. If a dwell period of 0.0 seconds is entered, the tuning knob has sole control of the sweeping process thus allowing manual tuning restricted to between preset frequencies.

Example 28 : Determining which is the sweep start channel and the present step rate, dwell (on each step) and hang periods.

Press **<RATE>**. The channel number display shows the sweep start channel and the frequency display shows the step size. Note that this is the same step size as for manual tuning except that the variable rate of 00.00 KHz is invalid in sweep mode.
Press **<DWELL>**. The frequency display shows the dwell and hang times which are the same as those set for scanning operation.

Example 29 : Selecting channel 27 as the frequency sweep start channel.

Press **<CHANNEL>, <2>, <7>, <START SWEEP>.**

This enables channel 27 as the channel which contains the sweep start frequency and the rest of the receiver settings for the sweep (i.e. Bandwidth etc.). The repeated sweep will be to the frequency stored in the next highest numbered channel 28. In the **CHANNEL** mode the **START SWEEP** LED will flash when the displayed channel is the sweep start channel. In the **RATE** mode the displayed channel number also shows the sweep start channel.

Example 30 : Automatic sweep monitoring of 154-156 MHz band containing 12.5 KHz NBFM channels.

Start in **RECALL** mode.
Proceed as in Section One to tune to 154 MHz with the required **FM** mode etc.
Press **<CHANNEL>, <2>, <7>, <STORE>** to store the data in channel 27.
Press **<RECALL>** and tune to 156 MHz.
Press **<CHANNEL>, <2>, <8>, <STORE>** to store the end frequency in the next highest channel.
Proceed as in example 29 to set channel 27 as the frequency start channel.
Press **<MUTE>** to enable the sweep to halt on an occupied channel.
Press **<DWELL>, <0>, <5>, <1>** to set a dwell of 0.5 seconds (on each step or channel) and a hang time of one second to ensure the scan does not restart during brief breaks in a 'held' signal.
Press **<SWEEP>** to start the receiver sweeping between 154 and 156 MHz.

The sweep can be totally manually controlled using the tuning knob if the dwell period is altered to 0.0 seconds.

SECTION FIVE : BITE Operation.

The receiver has two levels of BITE (Built-in test equipment). The first level passive BITE is concerned with continuously monitoring various points in the receiver, irrespective of any front panel control settings. In the event of a failure of any of these measurements, the **BITE** LED on the receiver front panel will start to flash.

The second level (active BITE) enables the operator to carry out certain tests for more accurate diagnosis of the receiver's operation. Press **<BITE>** and the display will indicate **00** and either **PASS** or **FAIL.** The tuning knob or numeric keypad can then select the various tests indicated in the following table, with either **PASS** or **FAIL** being indicated. In the event of **FAIL,** refer to the maintenance section for further information. Bite tests numbered 68 to 99 inclusive have no function and when selected display **SPARE.**

Press any of the function switches e.g. **<RECALL>** to return to normal operation.

1995 BITE TESTS

00	General Alarm	
01	Interface Supply	
02	10 Volt Audio Supply	
03	Main IF Supply	
04	RF & IF Supply	
05	Pre-selector Supply	
06	Main Synthesiser Supply	
07	1st Loop and VCO Supply	
08	BFO Level	At frequency of tune.
09	BFO Lock	
10	BFO 40MHz Lock	
11	2nd Synthesiser Loop Lock	
12	504.2 - 504.25MHz Lock	
13	504MHz Lock	
14	External Standard Selected and Lock	
15	Doubler Output Level	
16	1st Synthesiser Loop Lock	
17	BFO Minimum Frequency Lock	
18	BFO Minimum Frequency Level	
19	BFO Maximum Frequency Lock	
20	BFO Maximum Frequency Level	
21	2nd Loop Minimum Frequency Lock	
22	2nd Loop Minimum Frequency Level	
23	2nd Loop Maximum Frequency Lock	
24	2nd Loop Maximum Frequency Level	
25	1st Loop Oscillator 1 Minimum Frequency Lock	
26	1st Loop Oscillator 1 Minimum Frequency Level	
27	1st Loop Oscillator 1 Maximum Frequency Lock	
28	1st Loop Oscillator 1 Maximum Frequency Level	
29	1st Loop Oscillator 2 Minimum Frequency Lock	
30	1st Loop Oscillator 2 Minimum Frequency Level	
31	1st Loop Oscillator 2 Maximum Frequency Lock	
32	1st Loop Oscillator 2 Maximum Frequency Level	
33	1st Loop Oscillator 3 Minimum Frequency Lock	
34	1st Loop Oscillator 3 Minimum Frequency Level	
35	1st Loop Oscillator 3 Maximum Frequency Lock	
36	1st Loop Oscillator 3 Maximum Frequency Level	
37	1st Loop Oscillator 4 Minimum Frequency Lock	
38	1st Loop Oscillator 4 Minimum Frequency Level	
39	1st Loop Oscillator 4 Maximum Frequency Lock	
40	1st Loop Oscillator 4 Maximum Frequency Level	
41	1st Loop Oscillator 5 Minimum Frequency Lock	
42	1st Loop Oscillator 5 Minimum Frequency Level	
43	1st Loop Oscillator 5 Maximum Frequency Lock	
44	1st Loop Oscillator 5 Maximum Frequency Level	
45	1st Loop Oscillator 6 Minimum Frequency Lock	
46	1st Loop Oscillator 6 Minimum Frequency Level	
47	1st Loop Oscillator 6 Maximum Frequency Lock	
48	1st Loop Oscillator 6 Maximum Frequency Level	
49	10.7MHz IF, 6MHz Bandwidth RF Level	
50	10.7MHz IF, 250KHz Bandwidth RF Level	
51	10.7MHz IF, 60KHz Bandwidth RF Level	
52	10.7MHz IF, 30KHz Bandwidth RF Level	

53 10.7MHz IF, 15KHz Bandwidth RF Level
54 10.7MHz IF, 7.5KHz Bandwidth RF Level
55 10.7MHz IF, 3KHz Bandwidth RF Level
56 RF Level for 20MHz RF Input to 1st Mixer
57 RF Level for 44MHz RF Input to 1st Mixer
58 RF Level for 97MHz RF Input to 1st Mixer
59 RF Level for 214MHz RF Input to 1st Mixer
60 RF Level for 470MHz RF Input to 1st Mixer
61 RF Level for 20MHz RF Input to Preselector
62 RF Level for 44MHz RF Input to preselector
63 RF Level for 97MHz RF Input to Preselector
64 RF Level for 219MHz RF Input to Preselector
65 RF Level for 224MHz RF Input to preselector
66 RF Level for 324MHz RF Input to Preselector
67 RF Level for 470MHz RF Input to Preselector

68-69 Not Used On 1995/1.

Tests 01 to 16 are continuously monitored in the first level passive BITE mode, any of these failing also causes test 00 to fail and, unless in BITE mode, flashes the **BITE** LED.

SECTION FIVE : BITE Operation.

The receiver has two levels of BITE (Built-in test equipment). The first level passive BITE is concerned with continuously monitoring various points in the receiver, irrespective of any front panel control settings. In the event of a failure of any of these measurements, the **BITE** LED on the receiver front panel will start to flash.

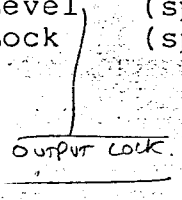
The second level (active BITE) enables the operator to carry out certain tests for more accurate diagnosis of the receiver's operation. Press **<BITE>** and the display will indicate **00** and either **PASS** or **FAIL**. The tuning knob or numeric keypad can then select the various tests indicated in the following table, with either **PASS** or **FAIL** being indicated. In the event of **FAIL**, refer to the maintenance section for further information. ~~Bite tests numbered 68 to~~ 99 ~~inclusive have no function and when selected display SPARE.~~

Press any of the function switches e.g. **<RECALL>** to return to normal operation.

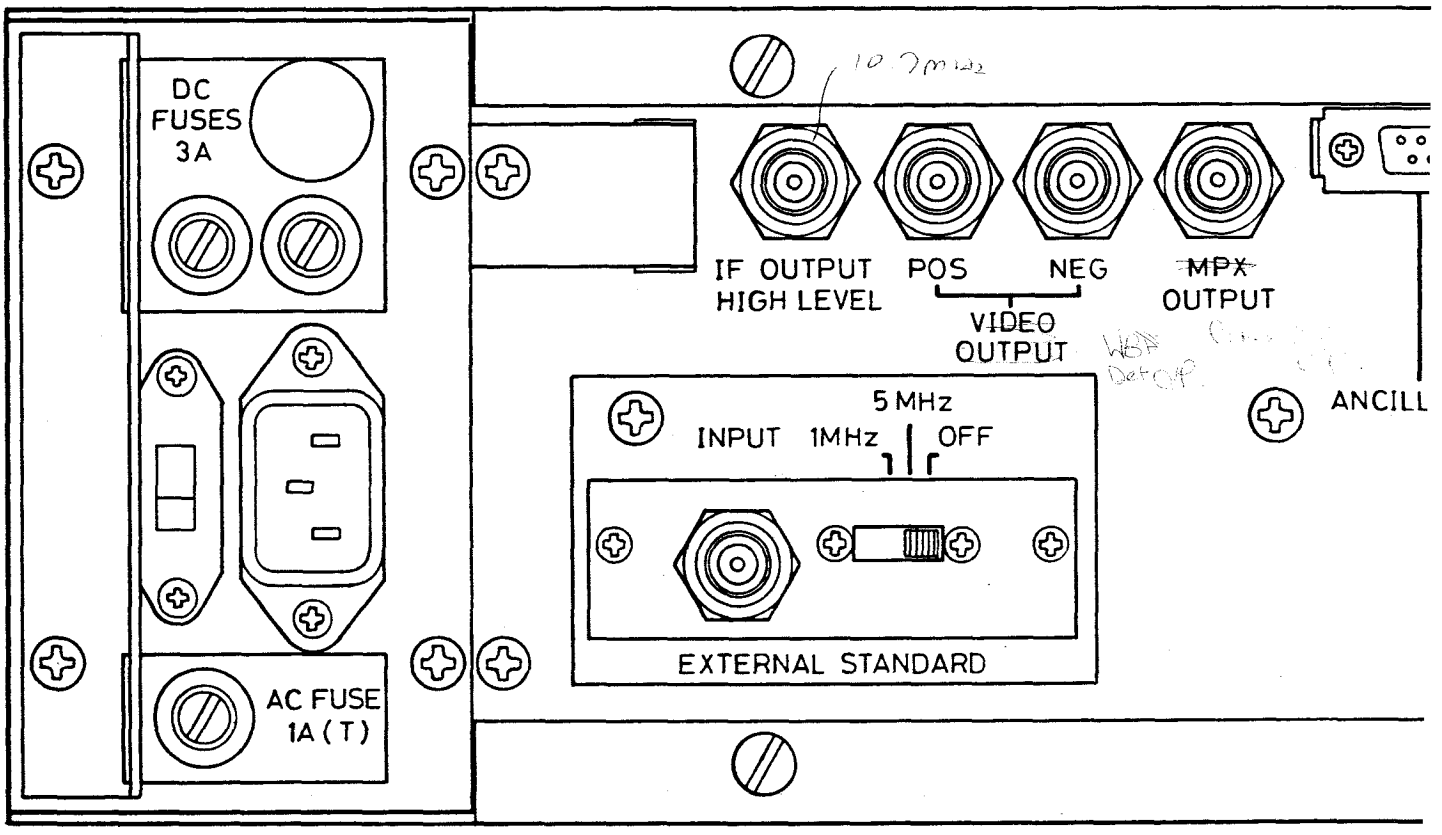
1995 BITE TESTS

00	General Alarm	
01	Interface Supply	
02	10 Volt Audio Supply	
03	Main IF Supply	
04	RF & IF Supply	
05	Preselector Supply	
06	Main Synthesiser Supply	
07	1st Loop and VCO Supply	
08	BFO Level	At frequency of tune.
09	BFO Lock	
10	BFO 40MHz Lock	
11	2nd Synthesiser Loop Level	
12	504.2 - 504.25MHz Lock	
13	504MHz Lock	
14	External Standard Selected and Lock	
15	Doubler Output Level	
16	1st Synthesiser Loop Lock	
17	Preselector Oscillator Output Level (spare on 1995/1)	
18	Preselector Ocsillator Frequency Lock (spare on 1995/1)	
19	BFO Minimum Frequency Lock	
20	BFO Minimum Frequency Level	
21	BFO Maximum Frequency Lock	
22	BFO Maximum Frequency Level	
23	2nd Loop Minimum Frequency Lock	
24	2nd Loop Minimum Frequency Level	
25	2nd Loop Maximum Frequency Lock	
26	2nd Loop Maximum Frequency Level	
27	1st Loop Oscillator 1 Minimum Frequency Lock	
28	1st Loop Oscillator 1 Minimum Frequency Level	
29	1st Loop Oscillator 1 Maximum Frequency Lock	
30	1st Loop Oscillator 1 Maximum Frequency Level	
31	1st Loop Oscillator 2 Minimum Frequency Lock	
32	1st Loop Oscillator 2 Minimum Frequency Level	
33	1st Loop Oscillator 2 Maximum Frequency Lock	
34	1st Loop Oscillator 2 Maximum Frequency Level	
35	1st Loop Oscillator 3 Minimum Frequency Lock	
36	1st Loop Oscillator 3 Minimum Frequency Level	
37	1st Loop Oscillator 3 Maximum Frequency Lock	
38	1st Loop Oscillator 3 Maximum Frequency Level	
39	1st Loop Oscillator 4 Minimum Frequency Lock	
40	1st Loop Oscillator 4 Minimum Frequency Level	
41	1st Loop Oscillator 4 Maximum Frequency Lock	
42	1st Loop Oscillator 4 Maximum Frequency Level	
43	1st Loop Oscillator 5 Minimum Frequency Lock	
44	1st Loop Oscillator 5 Minimum Frequency Level	
45	1st Loop Oscillator 5 Maximum Frequency Lock	
46	1st Loop Oscillator 5 Maximum Frequency Level	
47	1st Loop Oscillator 6 Minimum Frequency Lock	
48	1st Loop Oscillator 6 Minimum Frequency Level	
49	1st Loop Oscillator 6 Maximum Frequency Lock	

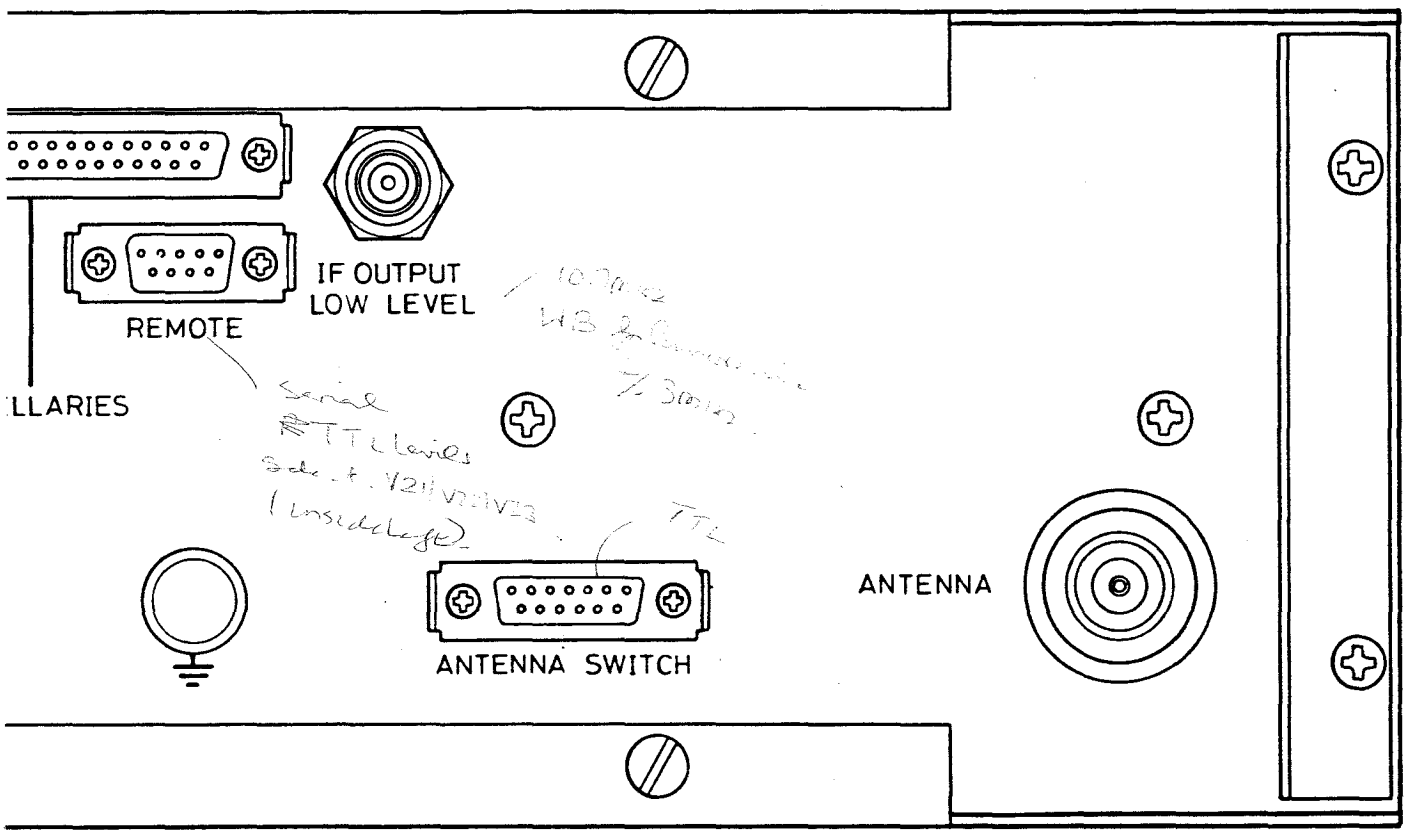
50 1st Loop Oscillator 6 Maximum Frequency Level
51 10.7MHz IF, 6MHz Bandwidth RF Level
52 10.7MHz IF, 250KHz Bandwidth RF Level
53 10.7MHz IF, 60KHz Bandwidth RF Level
54 10.7MHz IF, 30KHz Bandwidth RF Level
55 10.7MHz IF, 15KHz Bandwidth RF Level
56 10.7MHz IF, 7.5KHz Bandwidth RF Level
57 10.7MHz IF, 3KHz Bandwidth RF Level
58 RF Level for 20MHz RF Input to 1st Mixer
59 RF Level for 44MHz RF Input to 1st Mixer
60 RF Level for 97MHz RF Input to 1st Mixer
61 RF Level for 214MHz RF Input to 1st Mixer
62 RF Level for 469MHz RF Input to 1st Mixer
63 RF Level for 20MHz RF Input to Preselector
64 RF Level for 44MHz RF Input to preselector
65 RF Level for 97MHz RF Input to Preselector
66 RF Level for 219MHz RF Input to Preselector
67 RF Level for 224MHz RF Input to preselector
68 RF Level for 324MHz RF Input to Preselector
69 RF Level for 470MHz RF Input to Preselector
70 RF Level for 472MHz RF Input to Preselector (spare on 1995/1)
71 RF Level for 542MHz RF Input to Preselector (spare on 1995/1)
72 RF Level for 613MHz RF Input to Preselector (spare on 1995/1)
73 RF Level for 617MHz RF Input to Preselector (spare on 1995/1)
74 RF Level for 701MHz RF Input to Preselector (spare on 1995/1)
75 RF Level for 786MHz RF Input to Preselector (spare on 1995/1)
76 RF Level for 790MHz RF Input to Preselector (spare on 1995/1)
77 RF Level for 854MHz RF Input to Preselector (spare on 1995/1)
78 RF Level for 918MHz RF Input to Preselector (spare on 1995/1)
79 RF Level for 922MHz RF Input to Preselector (spare on 1995/1)
80 RF Level for 990MHz RF Input to Preselector (spare on 1995/1)
81 RF Level for 1058MHz RF Input to Preselector (spare on 1995/1)
82 RF Level for 1062MHz RF Input to Preselector (spare on 1995/1)
83 RF Level for 1130MHz RF Input to Preselector (spare on 1995/1)
84 RF Level for 1198MHz RF Input to Preselector (spare on 1995/1)
85 Preselector 420MHz Oscillator Output Level (spare on 1995/1)
86 Preselector 420MHz Oscillator Frequency Level (spare on 1995/1)
87 Preselector 504MHz Oscillator Output Level (spare on 1995/1)
88 Preselector 504MHz Oscillator Output Lock (spare on 1995/1)
89-97 Spare
98 Switch Position 1,2,3,4,5,6.
99 Operating System OS__ __



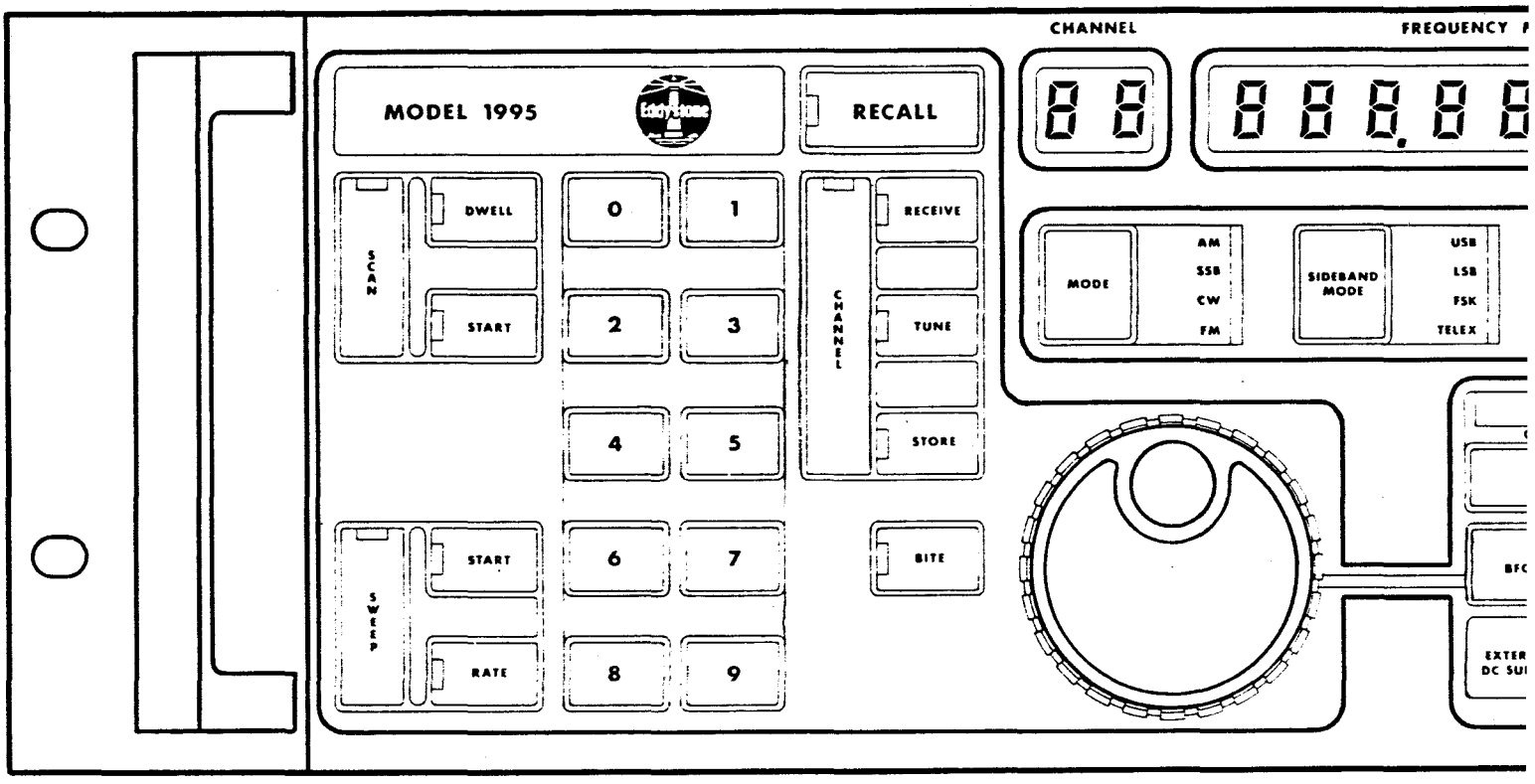
Tests 01 to 18 are continuously monitored in the first level passive BITE mode, any of these failing also causes test 00 to fail and, unless in BITE mode, flashes the BITE LED.



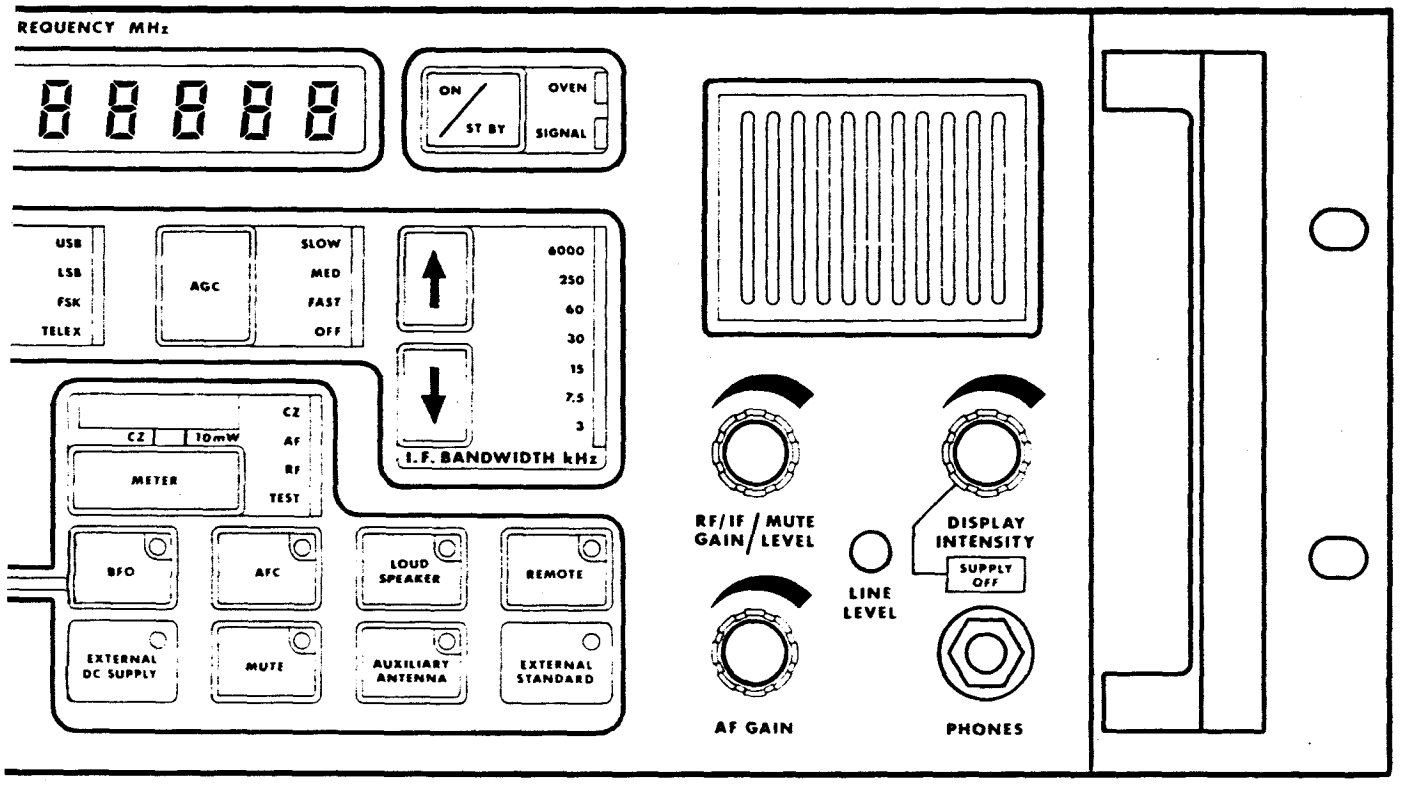
REAR PANEL LAYOUT VHI



HF/UHF RECEIVER 1995



FRONT PANEL LAYOUT VHF/UHF



IF/UHF RECEIVER 1995