# TECHNICAL SPECIFICATION

The performance as stated in this specification is applicable to the wideband condition. If the optional RF tuning unit is fitted a nominal 20dB of protection is given at ±12½% off-tune.

**Frequency Range:**

15kHz - 30MHz.

**Modes of Reception:**

A1, A2, A2H, A2J, A3, A3A, A3J, A3H with the following options:

(i) Choice of filter bandwidth.
(ii) Provision for ISB reception.
(iii) Provision for AFC
(iv) Provision for FSK.

**Tuning:**

RA.1771
Fully synthesized in 10Hz steps. 30-way switch for MHz selection, five rotary decadic switches for kHz and Hz selection.

RA.1772
Switched selection of 1MHz steps and a continuously tunable synthesizer in 10Hz or 100Hz steps over each 1MHz band. Electronic readout of each 1MHz band to increments of 10Hz.

**Overspill:**

RA.1772
20kHz at either end of each 1MHz band.
Overrun indication is provided.

**Tuning Accuracy:**

±5Hz relative to the frequency of the wanted signal.

**Frequency Stability:**

(1) The following optional alternative frequency standards may be fitted:

(a) Temperature Compensated Crystal Oscillator (TCXO).

(i) Temperature: Better than $\pm 1.5:10^6$ from -10°C to 55°C.

(ii) Long Term: $\pm 2:10^7$ over a 30 day period.

(b) Frequency Standard Type 9400

(i) Temperature: $\pm 1:10^8/°C$.

(ii) Long Term: $\pm 1.5:10^7$ over a 30 day period or $\pm 5:10^9$ per day.

(c) Frequency Standard Type 9420

(i) Temperature: $\pm 6:10^{10}/°C$.

(ii) Long Term: $\pm 1.5:10^{8}$ over a 30 day period or $\pm 5:10^{10}$ per day.

(2) Provision is made for the use of an external frequency standard.

**Antenna Input:**

(a) Wideband. 50 ohms to 75 ohms nominal. Coaxial BNC connector.

(b) RF tuning is available as an optional fitting within the receiver. This is provided by five automatically selected bandpass filters covering the frequency range 1MHz to 30MHz. Manual RF peak tuning is provided over each pre-selected band of frequencies. Each tuned range provides a nominal attenuation of 20dB at $12\frac{1}{2}$% off-tune. A low pass filter is used below 1MHz.

(c) Receiver muting is provided to protect the receiver from local emissions on the tuned frequency. The operation of the muting circuits permits 'break-in' or 'listen through' operation when keying at a rate of up to 20 bauds.

(d) The receiver will withstand without damage RF input signals of 30V (emf) continuously. A fuse and spark gap is provided for protection against higher voltages.

(e) Re-radiation with the antenna input terminated in 50 ohms is less than 10microvolts.

**Sensitivity:**

(a) CW and SSB (A1, A2H, A3A, A3H, A3J)
In a 3kHz bandwidth the signal-to-noise ratio is better than:

500kHz - 30MHz, 15dB with 1μV (emf) input.
50kHz - 500kHz, 15dB with 3μV (emf) input.
15kHz - 50kHz, 15dB with 10μV (emf) input.

(b) DSB (A2, A3)
In a 3kHz bandwidth the signal-to-noise ratio is better than:

500kHz - 30MHz, 15dB with 1.5μV (emf) input 70% modulated.
50kHz - 500kHz, 15dB with 5μV (emf) input 70% modulated.
15kHz - 50kHz, 15dB with 15μV (emf) input 70% modulated.

**IF Selectivity:**

(a) SSB (A3A, A3J)

Passband at -6dB: 250Hz to 3000Hz.
Passband at -60dB: -650 and +4100Hz

(b) ISB (A3B)

Passband at -6dB: 250Hz to 3000Hz.
Passband at -60dB: -400 and +4100Hz.

ALTERNATIVELY - SSB and ISB

Passband at -6dB: 250 to 6000Hz.
Passband at -60dB: -300 and +8000Hz.

(c) CW/MCW/AM/FSK (A1, A2, A3, A2H, A3H, F1)

Standard Receivers: In addition to the mode-selected SSB or ISB filters, up to four optional IF filters may be fitted although certain combinations of facilities will permit only three filters to be fitted. IF filters of the following nominal passbands are available:

0.3kHz, 1kHz, 3kHz, 6kHz, 8kHz, 13kHz.

**Cross Modulation:**

With a wanted signal greater than 300 μV emf, in a 3kHz bandwidth, an unwanted signal, 30% modulated, removed not less than 20kHz, will be greater than 300mV emf, to produce an output 20dB below the output produced by the wanted signal.

**Reciprocal Mixing:**

With a wanted signal of less than 100 μV emf, in a 3kHz bandwidth, an unwanted signal more than 20kHz removed will be greater than 70dB above the wanted signal level to give a noise level 20dB below the output produced by the wanted signal.

**Blocking:**

With a wanted signal of 1mV emf, an unwanted signal more than 20kHz removed must be greater than 500mV to reduce the output by 3dB.

**Intermodulation Products:**

(a) Out of Band

With two 30mV emf signals separated and removed from the wanted signal by not less than 20kHz the third order intermodulation products are not less than -85dB below either of the interfering signals and typically better than -90dB.

(b) In Band

Two in band signals of 30mV emf will produce third-order intermodulation products of not greater than -40dB.

**Spurious Responses:**

(a) External:

External signals, 20kHz removed from the wanted signal, must be at least 80dB above the level of the wanted signal to produce an equivalent output.

(b) Internal:

The specified sensitivity for CW and SSB is not reduced by more than 3dB as a result of any internally generated spurious signals.

**AGC:**

(a) Range:

An increase in input of 100dB above 2 microvolts emf will produce an output change of less than 6dB.

(b) Switches selection of AGC 'off' 'short' and 'long' time constants.

**AFC: (A3A, A3B)**

(a) AFC is available as an optional internal facility and is provided with a front panel switch for selecting AFC off, pilot carrier or full carrier.

(b) Capture range ± 50Hz.
Follow range ± 500Hz or beyond.
Stability: Over a temperature range of ± 10°C relative to 25°C the incoming signal is held to within ± 2Hz of its tuned frequency setting.

**IF OUTPUT: (AGC ON)**

1.4MHz, nominally 100mV e.m.f. into 50 ohms.

**BFO Range:**

±3kHz variable by a slow motion control.

**Audio Characteristics:**

(a) Output Levels:

(i) Line outputs, 1mW nominal into 600 ohms balanced, adjustable by preset level control on front panel to +6dBm.

(ii) Phone outputs balanced, 10mW nominal into 600 ohms.

(iii) 50mW into an internal loudspeaker which is capable of being switched in or out of operation.

(iv) Connection for external speaker 1 watt into 8 ohms.

(b) AF Response:

(i) Line outputs. Within 1dB from 100Hz to 6000Hz relative to the level of a standard 1000Hz tone.

(ii) The overall AF response will be dependent upon the IF bandwidth selected.

(c) AF Distortion:

(i) Line outputs: Not greater than 2% at specified output of 1mW nominal.

(ii) Loudspeaker outputs: Not greater than 5% at 50mW output to internal loudspeaker, and 1W output to external speaker.

(iii) Phone outputs: Not greater than 5% at specified output of 10mW nominal.

Cross Talk: (A3B)

With a wanted signal at a level of 1mV and the AF output adjusted to 1mW, the cross talk from an equal signal in the opposite sideband, at greater than 400Hz from the carrier, is not greater than -50dB relative to 1mW.

Frequency Shift Demodulation: (optional)

(a) Frequency shift range, 85Hz to 850Hz.

(b) Maximum keying speed 200 bauds.

(c) Telegraph distortion not greater than 5% up to 100 bauds.

(d) Telegraph output. Polar (double current) DC output approximately 100mA with choice of 6-0-6V or 80-0-80V. Normally positive on 'Mark'. Provision is made, by a rear panel switch, for neutral (single current) operation.

(e) Mark/space reversal is available to the operator and a 'tune' switch position is provided to permit tuning of the receiver without operating the teleprinter.

Metering:

A meter is provided on the front panel to indicate RF level, AF level to line, FSK tune, and suitable performance or supply test levels.

Front Panel Controls and Fittings:

RA.1772

MHz Frequency Control by rotary switch.
kHz Frequency Selection by rotary VFO type control.
Tuning Rate switch (Fast, Slow, Lock).
RF Tuning Control (Optional).
AGC Time Constants switch.
AFC Full Carrier/Off/Pilot Carrier (Optional)
AFC Lock Lamp (Optional)
Mode Switch
Meter Facility Switch.
Meter.
Loudspeaker.

Loudspeaker switch.
Two Headphone sockets.
IF Gain Control.
AF Gain Control.
BFO Slow Motion Control
Line Level Preset Adjusters.
Filter Switch.
Power On/Off Switch.

RA.1771
As for RA.1772 except that the kHz rotary control is replaced by five decadic switches for kHz and Hz settings.

**Rear Panel Connections and Facilities:**

RA.1771 and RA.1772
Antenna Input Socket.
Antenna Fuse
Power Input Socket.
Mains Voltage Adjuster Panel.
Power Input Fuse.
Standby +12V Fuse
Teleprinter Supply Fuse.
Teleprinter Supply Voltage Selector Switch.
Teleprinter Supply Polar/Neutral Switch.
Ground Terminal.
34MHz Input/Output Socket.
34MHz Internal/External Switch.
1MHz Frequency Standard Input/Output Socket.
Frequency Standard Internal/External Switch.
Local Oscillator Input/Output Socket.
Local Oscillator Internal/External Switch.
AGC Output (for diversity operation). )
Line Output(s) (2 outputs for ISB version only) )
Loudspeaker Output. ) Terminal
Mute Line. ) Strip
FSK Input and Output )
Standby +12V Input )
+12V Output )
1.4MHz IF Output Socket (2 outputs for ISB version).

**Power Supply:** 100V-125V or 200V-250V, ± 10%, 45- 65 Hz

**Power Consumption:** Approx. 60VA (Basic receiver)
Approx. 90VA (Fully equippped)

**Environmental Conditions:** The equipment is designed to meet certain of the requirements of the British Defence Specification DEF.133, L2, for ambient temperature range of:

| | |
|---|---|
| Operating Temperature | -10°C to +55°C |
| Storage Temperature | -40°C to +70°C. |
| Relative Humidity | 95% at 40°C. |

| | | | |
|---|---|---|---|
| Dimensions: | Rack Mounted: | Height: | 178mm (7 in) |
| | | Width: | 483mm (19 in) |
| | | Depth: | 410mm (16.14 in) |
| | In Bench Cabinet: | Height: | 220mm (8.66 in) |
| | | Width: | 495mm (19.49 in) |
| | | Depth: | 445mm (17.52 in) |
| Weight: | Rack Mounted: | 22kg (48.4lb) approximately | |
| | In Bench Cabinet: | 28kg (61.6lb) approximately | |

## ACCESSORIES

| | |
|---|---|
| AA.660/A | Headset, 600 ohms, with ventilated ear cushions, lead and plug. |
| BA.45520 | Bench Mounting Cabinet. |
| DA.47020 | Ruggerdised Bench Mounting Cabinet for marine applications. |
| DA.46531 | Ruggerdised Bench Mounting Cabinet fitted with shock mounts for mobile/ transportable applications. |

## OPTIONAL EXTERNAL MODULES

| | |
|---|---|
| MM532 | Audio Switching Unit. |
| MS540 | 12V Battery Module. |
| MS530 | Bandpass Filter, 2-30MHz, for use in antenna systems. |
| MS561 | IF Conversion Module, 1.4MHz to 100kHz. |

## NATO NUMBERS

| | |
|---|---|
| RA.1771 | 5820-99-626-3415 |
| RA.1772 | 5820-99-624-5397 |