

1 INTRODUCTION AND SPECIFICATION

GENERAL

This handbook describes:—

(1) the standard R499A receiver and the remote control system (comprising motor switching unit and RC116A control unit)

(2) the ISB version of the receiver (designated R499/ISB) and remote control system (comprising motor switching unit and RC116/ISB control unit)

The ISB version of the receiver is intended for use with the ARU10A ISB Adaptor which is described in a separate handbook entitled ISB ADAPTOR Type ARU10A.

The R499A is a solid state receiver designed for a variety of applications in point-to-point communications. It is especially adaptable to the requirements of individual systems. The receiver employs single frequency conversion and a nominal IF of 1.4 MHz, with an AM detector and a separate product detector for reception of SSB signals. The basic version is for SSB service, but by appropriate specification of optional filters and BFO as internal sub-units, full CW and DSB modes of reception are possible. When used in conjunction with the type ARU10A ISB Adaptor unit, the receiver can be used for the reception of ISB transmissions.

FREQUENCY COVERAGE

The basic frequency coverage is 1.5 MHz to 30 MHz, but filters can be fitted to give additional coverage of the 255 kHz to 525 kHz band. Pre-aligned HF filter sets are available for fitting after the receiver has been installed, if desired.

RECEPTION MODES

Crystal filters are fitted according to the services required, and are available for CW, SSB, DSB and ISB modes of operation. The CW filter is optional for all versions of the R499, as is also the BFO module. The CW filter and two other filters can be fitted.

By suitable choice of local oscillator crystals, to translate the wanted signal to an IF signal within the 3 kHz passband of the SSB filter, and by selecting the frequency of the re-insertion oscillator (two frequencies are available, selected as required by the Channel switch), the SSB filter may be used for the reception of the modes of transmission detailed in the specification.

For optimum reception of A1 however, use of the CW filter with a 200 Hz bandwidth, is recommended. For A3, optimum performance is achieved by use of the DSB filter which has a 6 kHz bandwidth.

AGC

Comprehensive distributed AGC is employed with different decay and attack times for various modes of operation. The full decay time is dependent upon accumulation of signal for 200 msec or more, which prevents short bursts of noise from paralysing the receiver.

The decay time is automatically selected by a front-panel Service switch, but an additional switch enables the decay time-constant to be divided by three, and is of use during rapid fading. The AGC can be switched off when not required.

Two AGC systems are incorporated. One is operated by the output from the RF amplifier and controls an attenuator at the front end. The other is fed from the last IF stage and is applied in sequence over three IF stages, as well as supplementing the front-end AGC action. Thus the aerial circuit is capable of withstanding an input of 30V e.m.f. from a 50 ohm source.

IF AND AF GAIN

In addition to selecting the bandwidth and AGC constants appropriate to the required service, the Service switch also adjusts IF and AF gain so that:

(1) All services give virtually the same AF output level (provided only that the signal is above AGC threshold).

(2) Any signal which is large enough to provide approximately 14 dB signal-to-noise ratio also provides full AF output e.g. for a given signal-to-noise ratio, a much smaller signal is required in CW mode than in, for example, AM mode; this is because of the narrower bandwidth of CW filters. Thus, the IF gain is increased for CW reception so that a small CW signal can be heard.

SQUELCH

A squelch system is incorporated. To guard against incorrect setting of the squelch control and consequent loss of wanted signals, the squelch does not completely cut off all output, but reduces it by approximately 30 dB so as to keep the audio noise output below annoyance level. This serves as an indication that the receiver is still operative and allows wanted signals to be heard even if the squelch has been set at too high a level.

OPTIMUM CONTROL SETTINGS

To assist operators unfamiliar with the receiver, typical or normal settings of controls are indicated by red spots. Once the controls are set to the indicated positions, relatively few adjustments to the controls need be made. As a built-in check, the Service switch has a TEST setting at which an output from the carrier reinsertion oscillator is injected into the first IF stage. Correct operation of the IF stages at this setting is indicated by a 'test' reading on the front panel S-meter.

ADDITIONAL FACILITIES

For ISB reception, the ARU10A Adaptor is employed. One sideband filter is fitted in the R499A and the other in the ARU10A. Sideband filters for this purpose are available with bandwidths of 2.75kHz or 5.75 kHz. The R499A and the ARU10A have separate AGC systems and line outputs with associated level adjustments. In addition, each unit has its own meter for monitoring of incoming signals and line levels. The internal loud-speaker in the R499A can be switched to monitor the output from either unit.