The STC RV9A Communications Receiver

by David M. Pratt, G4DMP

A search around Monty Passingham's, the local government surplus emporium in Bradford in 1959, uncovered a pair of receivers manufactured by Standard Telephones and Cables Limited. The receivers were marked 'Receiver A' and 'Receiver B'. Inspecting the labelling on the front panel and the sockets at the rear showed that the receivers were intended for diversity reception, perhaps at a land-based government monitoring station. One of the receivers was bought for £7.10s., a large sum at the time for an underpaid apprentice! The identification plate quoted the model number as 3-LE-19N, but an enquiry to the radio division of STC brought a circuit diagram and a helpful letter from the late E. J. Allen, G5ZD, identifying the receiver as being better known as the RV9A.

With a quarter-inch aluminium front panel just over 19 inches wide, the receiver is sturdily built on a welded aluminium chassis giving good screening and stability for a receiver built in 1949.

Circuit Description

The receiver is of a fairly traditional design for the time, using valves from the pre-miniature era. The RF amplifier uses the well known EF50. The letter from G5ZD in June 1961 suggested the EF50 and its holder were "extracted and hurled into the night – forthwith!" and replaced by an EF91. This in fact was done as suggested, but the RF stage has since been restored to its original state.

A Mullard ECH35 is used for the mixer/oscillator providing an intermediate frequency of 580kHz. In hindsight, a separate local oscillator valve would have been preferable for a communications receiver. But the present arrangement is stable without excessive drift after an appropriate warming-up period. A small value variable capacitor is connected across the local oscillator tuning gang for fine frequency adjustment.

Three IF amplifier stages are provided, the last stage including diodes for AGC and demodulation. Between the first and second IF stages (6K7G) there are two pairs of IF transformers, switched to give a choice of bandwidth settings. A crystal filter is switched in to provide a third bandwidth position. Slow, medium and fast time constants for the AGC are selected by a front panel switch, another position of the switch being used to enable the receiver gain to be controlled externally for diversity reception.

The BFO uses a 6J7G enclosed in a screening box together with the third IF valve (6B8G). The screening box was missing when the receiver was

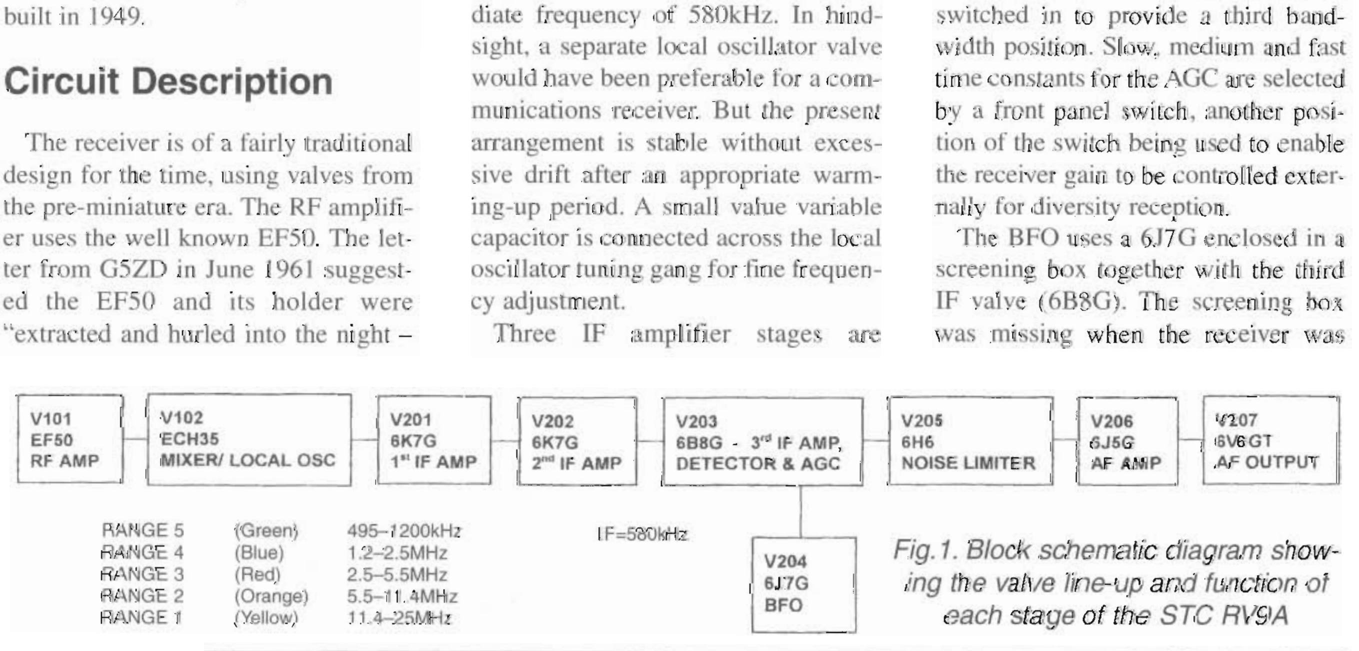
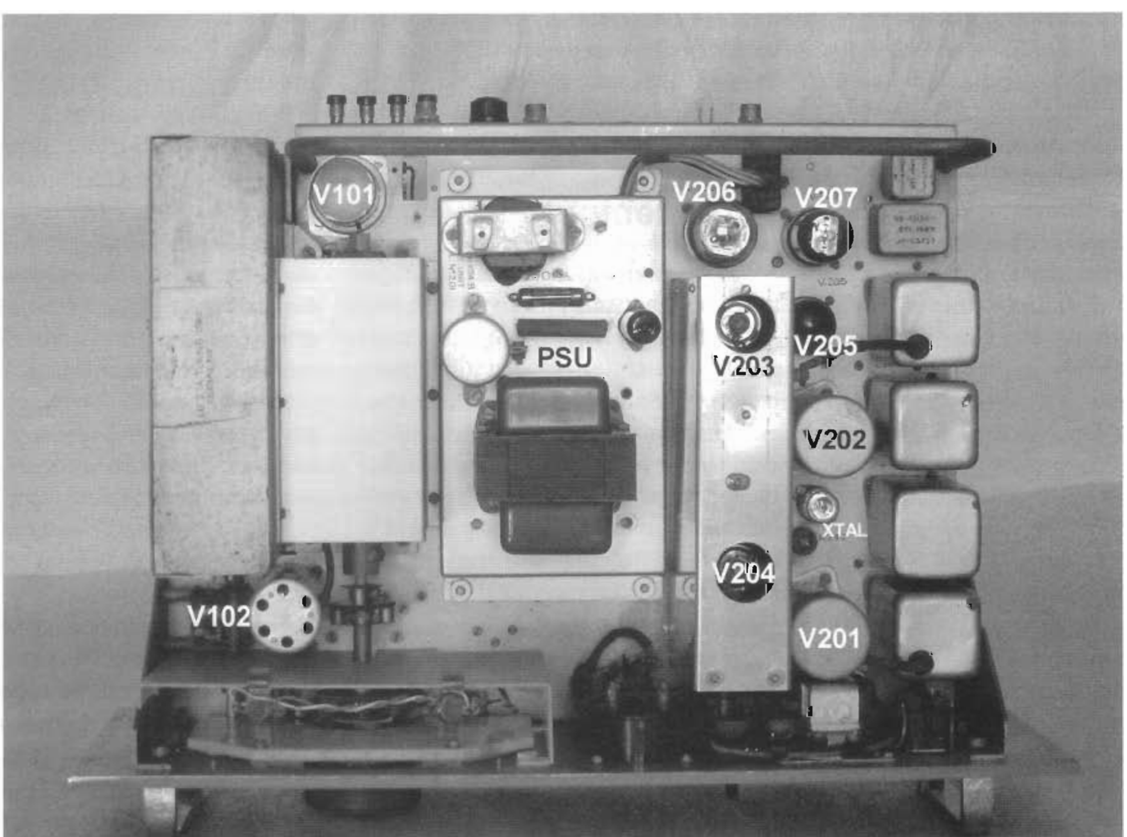
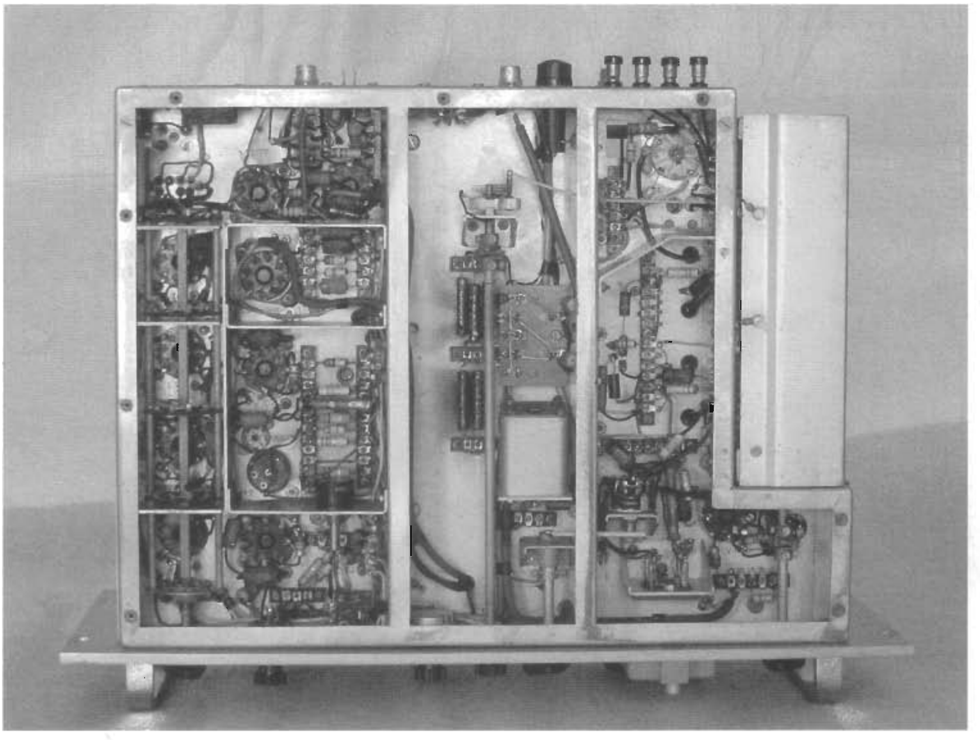


Fig. 1. Block schematic diagram showing the valve line-up and function of each stage of the STC RV9A

Rear view of the RV9A. The power supply unit is fitted in the centre of the chassis

Top view of the RV9A with the valves labelled – see the block schematic for valve line-up





The neat underside chassis layout and wiring of the STC RV9A

bought, so one had to be made from 16swg aluminium. In addition to an internal preset trimmer, a variable control is available on the front panel for fine adjustment and for selecting the upper and lower sideband settings for SSB reception.

The output of the detector is fed to the 6J5G audio preamplifier via a metal 6H6 double diode that serves as a variable noise limiter and is adjusted by a front panel control. Between the 6J5G and the 6V6GT output stage, there is an audio filter, selected by another position of the bandwidth switch and giving a fourth bandwidth option: 'Very Narrow'. Audio output is by a small internal monitor speaker and/or a pair of high impedance headphones. A jack socket also provides output for an external 600Ω line.

As purchased, the receiver had a 6.3V heater transformer mounted on a sub-chassis; HT was supplied from an external source. This has since been replaced by a power unit giving both heater and HT supplies and also 150V stabilised for the local oscillator and BFO.

Tuning

The receiver covers from 495kHz to 25MHz in five bands, a small overlap being provided between the bands. The main tuning uses a 56:1 drive with anti-backlash gears covering from one end of the tuning range to the other in 28 revolutions of the tuning control. A logging scale is available giving 100 division per revolution of the tuning knob. The tuning knob and its assembly are made from solid brass weighing some 500 grams and doubles as a flywheel enabling the pointer to be spun from one end of the band to the other!

Optionally, the local oscillator can be controlled by two crystals inserted through the front panel behind a hinged cover. The crystals are selected by a switch. Another position of the switch enables an external local oscillator to be used, for example, from another receiver when using diversity reception.

Alignment

The receiver was found easy to align using old and well proven techniques. All the IF transformers are tuned with good quality air-spaced trimmers rather than with dust iron cores that can seize up with age. Air-spaced trimmers are used in the RF, local oscillator and mixer stages together with dust iron cores, which fortunately had not seized up! Padding and tracking by adjusting the trimmers at the HF end and the cores at the LF end of each range was done without difficulty and provided a high degree of frequency accuracy over all five ranges.

Performance

Understandably, the performance of a receiver designed over 50 years ago cannot be expected to match the receivers designed today. An IF of 580kHz is far from ideal as regards second channel image rejection, particularly on the highest frequency range. However, image rejection was measured to be 54dB at 2MHz and 35dB at 14MHz, comparing favourably with receivers with a similar line-up. RF sensitivity varied over the ranges and was naturally better on the lower bands. Signals of less than 1μV were perceptible on all ranges.

While three settings of selectivity (plus the audio filter position) are available to provide suitable bandwidths for broadcast, telephony and CW reception, the steepness of the response skirts leaves much to be desired where adjacent channel rejection is important for modern day communication requirements.

Overall the RV9A was found to perform well for a receiver designed and manufactured in the 1940s, outperforming most of the wartime equivalents. It is still very useful as a general coverage receiver up to 25MHz.

The accompanying photographs show the neat layout and construction. A circuit diagram has not been reproduced in this article as it is a full-size dyeline print some six feet long! The author, however, would be pleased to make it available to any other RV9A owner requiring it. ***RB***