



# RDF Receiver GPO (Tester WL 53400)

Country of origin: England

About 10 years after the publication of WftW Volume 4, I received a large envelope from Marc and Paul of the Crypto Museum, containing photocopies of the description, operation and drawings of the RDF Receiver GPO, officially known as TESTER WL 53400. This was of course a very pleasant surprise as nobody ever thought of finding any written data on this DF receiver, let alone a good quality circuit diagram. On this and the next pages are published the circuit diagram, technical description, operation, wiring diagram and assembly drawing with part list. These are cleaned copies from the original which had folds and was slightly stained. More details of the TESTER WL 53400 with colour illustrations can be found at <http://www.cryptomuseum.com/df/gpo/>

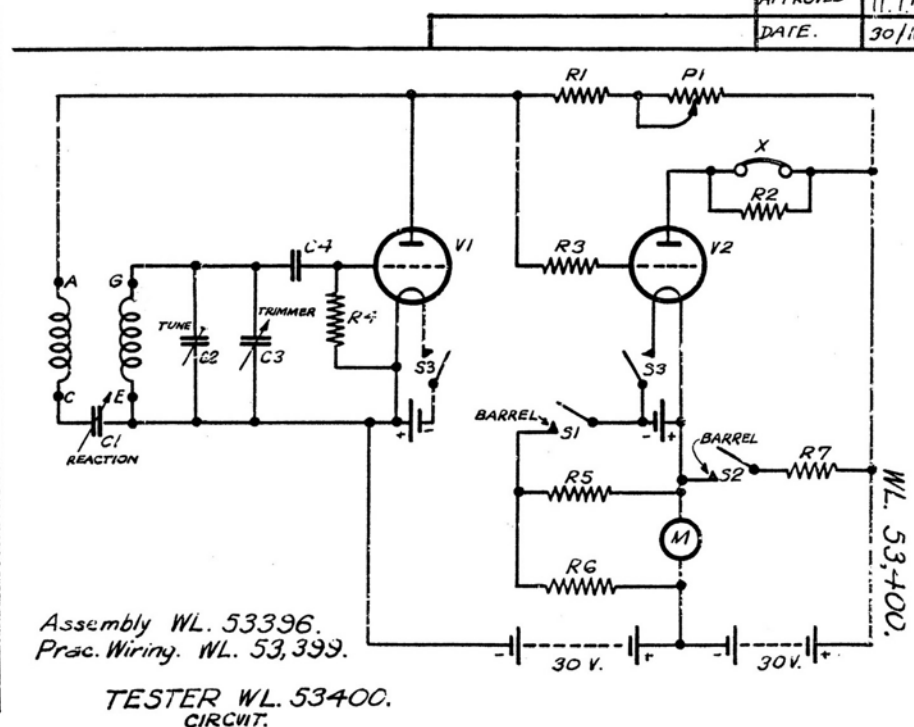
It should be noted that the instrument which was investigated in the Royal Signals Museum at Blandford Forum, UK, long before I

started compiling Volume 4, had only 9 tuning coils (with range 10 16-28MHz missing) and two Hivac XP 1.5V valves, the latter probably with a wrong replacement valve as the RF valve was noted as an Hivac XL 1.5V in the parts list. As far as can be traced, there are at least four surviving instruments: the Royal Signals Museum (s/n 81), Museum Jan Corver s/n 203, Crypto Museum s/n 93, and in a private collection with s/n 100.

This Supplement chapter is a follow up and should be read in conjunction with the 'RDF Receiver GPO' section in the 'RDF Equipment and Intercept Sets' chapter of WftW Volume 4.

| Code | Component.                                 |
|------|--|
| R1   | 50,000 $\Omega$                            |
| R2   | 5,000 $\Omega$                             |
| R3   | 100,000 $\Omega$                           |
| R4   | 10 $\Omega$                                |
| R5   | 20 $\Omega$                                |
| R6   | 1450 $\Omega$ $\pm$ 2%                     |
| R7   | 30,000 $\Omega$ , $\pm$ 2%                 |
| M1   | 1/2 Meter 0-1mA. (50 $\Omega$ , $\pm$ 10%) |
| C1   | 50 $\mu$ F                                 |
| C2   | 100 $\mu$ F                                |
| C3   | 25 $\mu$ F                                 |
| C4   | 0.0001 $\mu$ F                             |
| X    | 2000 $\Omega$ . Single Earpiece.           |
| P1   | 50,000 $\Omega$                            |
| V1   | Hivac. XL. 1.5V.                           |
| V2   | Hivac. XR. 1.5V.                           |
| S1-2 | Button Switch                              |
| S3   | Toggle Switch.                             |

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| CHECKED  | <i>P.B.K.</i> |
| APPROVED | <i>H.T.M.</i> |
| DATE.    | 30/11/39.     |



Circuit diagram and list of components TESTER WL 53400.

## Acknowledgements:

Many thanks to Paul Reuvers and Marc Simons of the Crypto Museum, Eindhoven, Holland, for their permission to reproduce the documentation for the TESTER WL 53400 as a Supplement chapter to Volume 4. This document was originally kindly supplied in 2013 by Ray Henville, UK.

## References:

- TESTER, WL 53400, Description, Operation and Circuit Diagram. 30-11- 1939.
- GPO Receiver, RDF Receiver WL-53400: [www.cryptomuseum.com/df/gpo/files/Tester\\_WL53400.pdf](http://www.cryptomuseum.com/df/gpo/files/Tester_WL53400.pdf)

TESTER WL 53400

This instrument is a small portable D.F. receiver suitable for use in the immediate vicinity of a transmitter. The receiver covers the waverange 12-2000 metres in a series of ten coil ranges. The set is in the form of a box and the coils are mounted in a series of ten interchangeable clip-on lids. The coils are about four inches in diameter and lie in the plane of the lids.

| Coil No. | RANGE            |                    |
|----------|------------------|--------------------|
|          | Frequency        | Wavelength         |
| 1        | 0.15 - 0.23 Mc/s | 2000 - 1305 Metres |
| 2        | 0.25 - 0.36 Mc/s | 1305 - 833 Metres  |
| 3        | 0.36 - 0.6 Mc/s  | 833 - 500 Metres   |
| 4        | 0.6 - 1.0 Mc/s   | 500 - 300 Metres   |
| 5        | 1.0 - 1.6 Mc/s   | 300 - 187 Metres   |
| 6        | 1.6 - 2.7 Mc/s   | 187 - 111 Metres   |
| 7        | 2.7 - 4.6 Mc/s   | 111 - 65.3 Metres  |
| 8        | 4.6 - 9.0 Mc/s   | 65.3 - 33.3 Metres |
| 9        | 9.0 - 16 Mc/s    | 33.3 - 18.7 Metres |
| 10       | 16 - 28 Mc/s     | 18.7 - 10.7 Metres |

The circuit of the tester consists of a tuned reacting detector followed by a D.C. amplifying stage. The tuning is by two condensers; one marked "Tune" is divided into five ranges by a "click" action on its control and each of these ranges is more than covered by 180° rotation of the second condenser marked "Trimmer". The reaction control is a small variable condenser and by its use the set can be brought smoothly into oscillation on any frequency throughout the complete range of coils. The "Reaction" knob when rotated clockwise is divided into 24 sections over 180° by a "click".

action and enables the control to be pre-set on any fixed frequency. When rotated anti-clockwise the click spring acts as a friction drive and enables the degree of reaction to be set with greater precision. A 0-1 mA meter with luminous scale and a single earpiece headphone are provided in the output circuit to give visual and aural results. The headphone plugs in and its disconnection does not interfere with the operation of the set. The meter is also arranged to monitor the H.T. and L.T. supplies. The H.T. gives full scale for 30 Volts and the L.T. full deflection for 1 ½ Volts. The supplies are checked with the set off, by operation of the appropriate push button switch. The loading of the batteries in the monitor condition is equivalent to normal loading with the set in use. The L.T. batteries should be changed when the voltage falls below 1.3 Volts and the H.T. battery should be changed when the voltage falls below 24 Volts. The life of the battery on continuous load is of the order of 14 hours for L.T. and 200 hours for H.T. Intermittent use should give considerable improvement to the L.T. battery life.

With the set in operation in a non-oscillating condition the standing current should in absence of any signals lie between 0.25 and 0.4 milliampere. The actual value between these limits is not critical and is adjustable by operation of the pre-set screwdriver control potentiometer P.1.

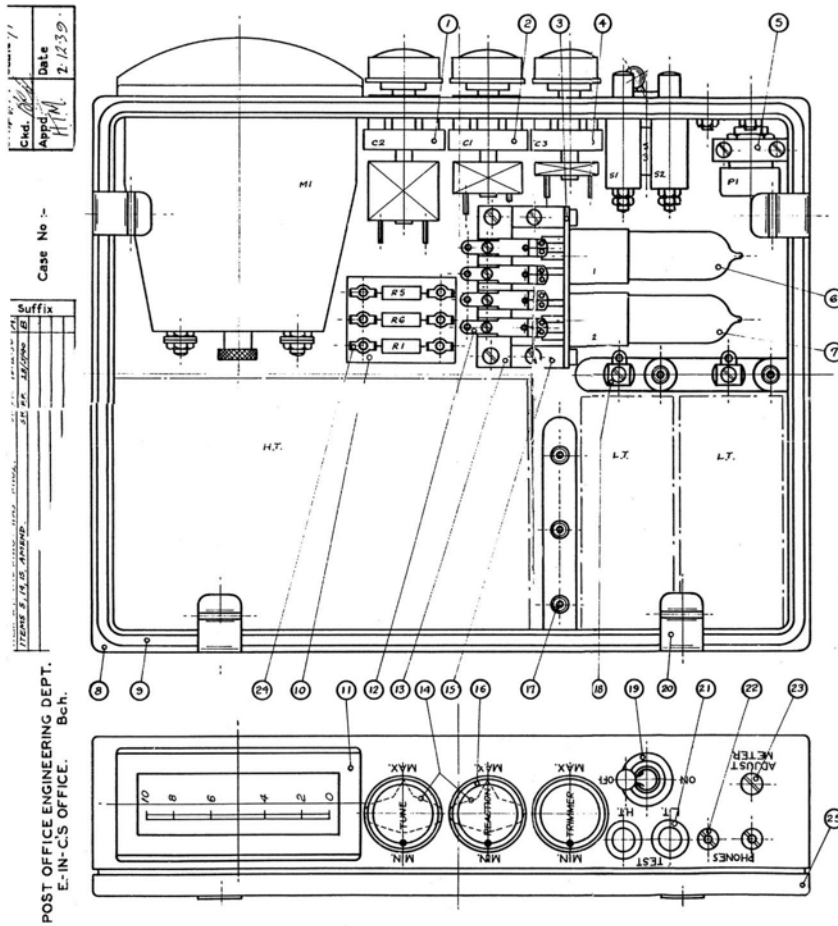
Diagrams W.L. 53,396, 53,399 and 53,400 show the layout, wiring and circuit of the tester.

### Operation

Check the L.T. and H.T. Voltages. Select the coil lid covering the required frequency and clip it onto the set. Plug in the headphone and switch on. Make sure the set is not oscillating and check that the standing current falls within the required limits. Tuning in the desired signal is best done with the set oscillating. Keeping the reaction control adjusted so that the meter deflection is approximately 0.6 – 0.8 mA. Search through the tuning ranges using the "Tune" and "Trimmer" controls until the heterodyne note is heard. It is useful to note the location of the required frequency in the particular coil range in use. If the signal is of sufficient strength the set can be used in a non oscillatory condition when tuning will produce a visible deflection on the meter.

Should the set have to be used in the oscillating condition, aural results only will be obtainable, in this case it is preferable to work with minima in the usual D.F. manner. The transmitter will then lie in a plane of the coils. When working on maxima using a visual signal the transmitter will lie in the plane of the coils. To reduce sensitivity the reaction control should be turned towards the "MIN" position, should this prove inadequate further reduction can be obtained by reducing the standing current by means of P.1. Should this still be not enough the only alternative remaining is to work with minima instead of maxima.

*NOTE: Because the original scanned pages were not very eligible, the text was retyped in MSW, and reproduced here using a different font.*



| ITEM | CCT REF. | DESCRIPTION.                              | AMOUNT | WL. N. |
|------|----------|---|--------|--------|
| 1    | C2       | Cond. 100µF Polar. Air-Spaced Type C802.  | 1      |        |
| 2    | C1       | " 50µF " " "                              | 1      |        |
| 3    |          | Valve Mounting. Clix. Type X114. Mod.     | 1      | 53399. |
| 4    | C3       | Cond. 25 µF. Polar. Air-Spaced Type C802. | 1      |        |
| 5    |          | Pol. Mounting.                            | 1      | 53399. |
| 6    | V1       | Valve. Hiraac. XL. 15V.                   | 1      |        |
| 7    | V2       | " " XP " "                                | 1      |        |
| 8    |          | Case                                      | 1      | 31122  |
| 9    |          | Gasket. 1/8" dia. About 2 9/16" Lg.       | 1      |        |
| 10   |          | Resistor Mounting.                        | 1      | 53399. |
| 11   | M1       | Meter. Edgewise. 0-1 mA. (50µ. ±10%)      | 1      |        |
| 12   |          | Spring. Relay. STAC. LP. S9508 Mod.       | 4      | 53399. |
| 13   |          | Spring Mounting.                          | 1      | 53399. |
| 14   |          | Knob Click Spring.                        | 2      | 53398  |
| 15   |          | Spring & Valve Mounting Block.            | 2      | 53399. |
| 16   |          | Knob. Black. Bulgin. Type K94M Mod.       | 3      | 53399. |
| 17   |          | Terminal. C. B. A.                        | 5      |        |
| 18   |          | Spring Clip. Bulgin Part 704 Ph. Box      | 2      |        |
| 19   | S3       | Switch. Bulgin. Type S126. (D.P.)         | 1      |        |
| 20   |          | Lid Clip.                                 | 4      | 31122  |
| 21   | S1-2     | Switch. Bulgin. 1 off Type MP1. 1 off MP2 | 2      |        |
| 22   | X        | Plug P. 175 & Socket P178 (1/4") Bulgin   | 1      | 53399. |
| 23   | P1       | Pot. 50,000 Ω. Bulgin. VC. 95.            | 1      |        |
| 24   |          | Tag M. 110. Bifurcated & Tubular Rivets   | 6      |        |
| 25   |          | Interchangeable. Coil Unit.               | 1      | 31122  |
| R1   |          | Resistor. 50,000 Ω. 1/4 W. Erie. Type 4N. | 1      |        |
| R2   |          | " 5,000 Ω. " " " " "                      | 1      |        |
| R3   |          | " 100,000 Ω. " " " " "                    | 1      |        |
| R4   |          | " 10 M Ω. " " " " "                       | 1      |        |
| R5   |          | " 20 Ω. " " " " "                         | 1      |        |
| R6   |          | " 145 Ω. " " " " "                        | 1      |        |
| R7   |          | " 30,000 Ω. " " " " "                     | 1      |        |
| C4   |          | Condenser. .0001 µ F. T.C.C. Type MW.     | 1      |        |
| X    |          | Phones. 2000 Ω. Single Earpiece.          | 1      |        |
| H.T. |          | Battery. H.T. Special. 0-30-60 V.         | 1      |        |
| L.T. |          | " L.T.                                    | 2      |        |

TESTER WL 53400.  
ASSEMBLY.  
Practical Wiring WL. 53399.  
Circuit. WL. 53400. WL. 53396.

Assembly drawing and part lists (above), and wiring diagram (below) of TESTER WL 53400.

The set to be form wired throughout, except wires marked \* which should be as direct as possible. All wire 1 wire 6 1/4.

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| APPROVED | H.T.M.   |
| DATE     | 20/11/39 |

