

R E S T R I C T E D

ELECTRICAL AND MECHANICAL
ENGINEERING REGULATIONS
(By Command of the Army Council)

TELECOMMUNICATIONS
L 302/1

AERIAL TUNING UNIT NO 6 AND NO 8

TECHNICAL HANDBOOK - TECHNICAL DESCRIPTION

Errata

Note: This page 0 will be filed immediately in front of Page 1, Issue 1, dated 29 Mar 56

1. The following amendments will be made to this Regulation:-

Top of page 1: delete 'AERIAL TUNING UNITS'

Bottom of page 2: delete 'END OF PART ONE'

Page 1003, line 1 in paragraph: amend Tels L 304 to L 304/1

H.Q. MTDE

Issue 1, 22 May 56

Distribution - Class 860. Code No 3

Page 0

~~AERIAL TUNING UNITS~~
AERIAL TUNING UNIT NO. 6 AND NO. 8
TECHNICAL HANDBOOK - TECHNICAL DESCRIPTION

INTRODUCTION

1. Aerial Tuning Units No. 6 and No. 8 are used with Wireless Sets C.42 and B.47 respectively. They enable the equipments to be used over the frequency band 36-60 Mc/s with a standard 8 ft rod aerial.
2. The tuning units form part of the vehicle installation and will normally be mounted near the aerial base. Provision is made for fixing a remote tuning control and using a remote indicating meter where necessary.
3. The only difference between Aerial Tuning Units No. 6 and No. 8 is that, since the B.47 has a lower power output, one resistor in the metering circuit is changed in value in Aerial Tuning Unit No. 8.

BRIEF TECHNICAL DESCRIPTION

Principles of operation

4. The Aerial Tuning Unit No. 6 or No. 8 (ATU) is designed to match the output cable impedance of 70Ω to the effective impedance of the 8 ft aerial on the vehicle at the frequency used. A Collins type coupler is used but, by using a link mechanism matching and tuning are obtained with a single front panel control, which should be adjusted to give maximum reading on the built in meter.

Construction

5. The ATU is contained in a cast desiccated sealed box the overall dimensions of the unit being $7\frac{1}{8}$ in wide 5 in high and $6\frac{1}{8}$ in deep (including the tuning knob). Mounting lugs are provided on the top and rear of the case as alternative fixings to brackets on the vehicle. Four tapped pillars on the front panel are provided for fixing a remote tuning control, if required.
6. Components are mounted above and below a tray which is fixed to the front panel by two triangular brackets. The two gang capacitor (C9a C9b) is driven through anti-backlash gears from the tuning knob on the front panel and its rotor is pinned to the gearing so that maximum capacity and 0 on the tuning indicator coincide. Drive for the single variable (C8) is taken from C9, through a link mechanism consisting of a crank arm, held by Allen screws on C9 rotor spindle, and a similar but shorter crank on C8 rotor spindle. The extremities of the cranks are joined by a straight bar on swivel pins so that, by rotating the tuning knob, C8 will move according to a pre-determined law in relation to C9.

Controls (Fig. 1001)

7. The controls and connections on the front panel are:-

Tuning control

Tuned for maximum output. A plate calibrated 0-10 gives an indication of approximate frequency setting.

LOCK

Locks the drive mechanism when unit is adjusted.

L 302 //

PL-A	Input	A Pattern 4 RF coaxial plug for connecting via 70Ω cable to the wireless set
	AE	A porcelain insulated threaded aerial terminal.
	EARTH	A threaded earth terminal.

DETAILED TECHNICAL DESCRIPTION (Fig 1002)

8. The input of the ATU is connected via a coaxial cable to the output of the wireless sender which consists of a tank circuit with the coil tapped at 70Ω to match the impedance of the uniradio cable. The output of the ATU is connected to a standard 8 ft rod aerial which will present a varying impedance dependent mainly upon the frequency used but also on the method of its mounting on the vehicle. A set of average impedances, experimentally obtained, is given in Table 1. Figures at 60Mc/s are given for two mountings.

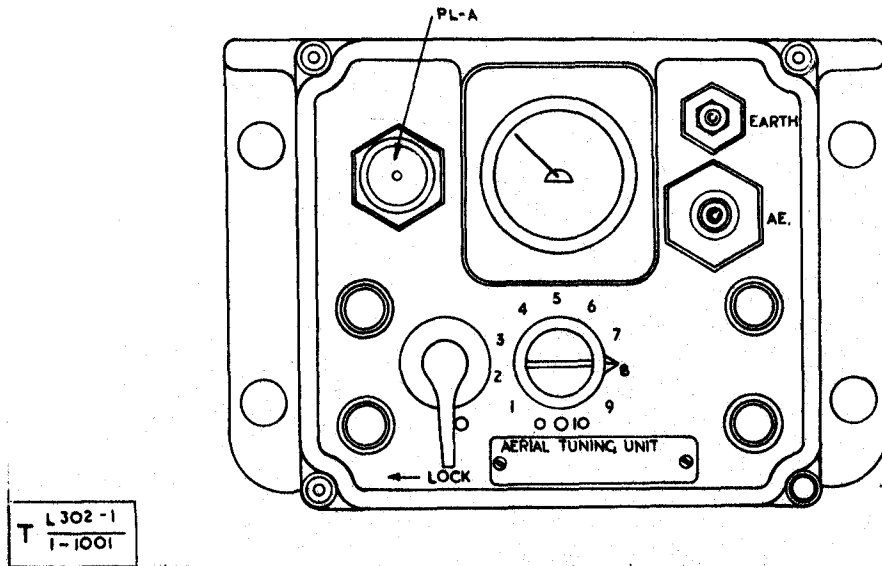
Frequency Mc/s	Equivalent load of aerial	
	Conductance G (MHOS)	Susceptance $\frac{B}{W}$ (pF)
36	3.3	-5.3
40	3.0	+3.1
42	2.6	+9.0
46	2.3	+9.3
50	2.0	+14.6
54	2.1	+23.3
60	6.1	+26.6
60	7.5	+27.6

TABLE 1

9. To match the cable impedance (70Ω) to the aerial impedance (Table 1) and to achieve optimum power transfer, a tuned auto transformer is used. The input is fed via C1 to a tap on L1 while the whole of L1 is tuned by variable capacitor C9. (C9a C9b in parallel). The effective transformer ratio of L1 is altered by a variable condenser (C8) across the input of the ATU. This capacitor is driven from C9 by the linkage described in para 6 and is adjusted, together with the trimming capacitor (C7), so that when L1 C9 and the aerial are resonant, the effective transformer ratio of L1 is such that approximately correct matching is achieved. By careful adjustment this condition is met over the frequency band.

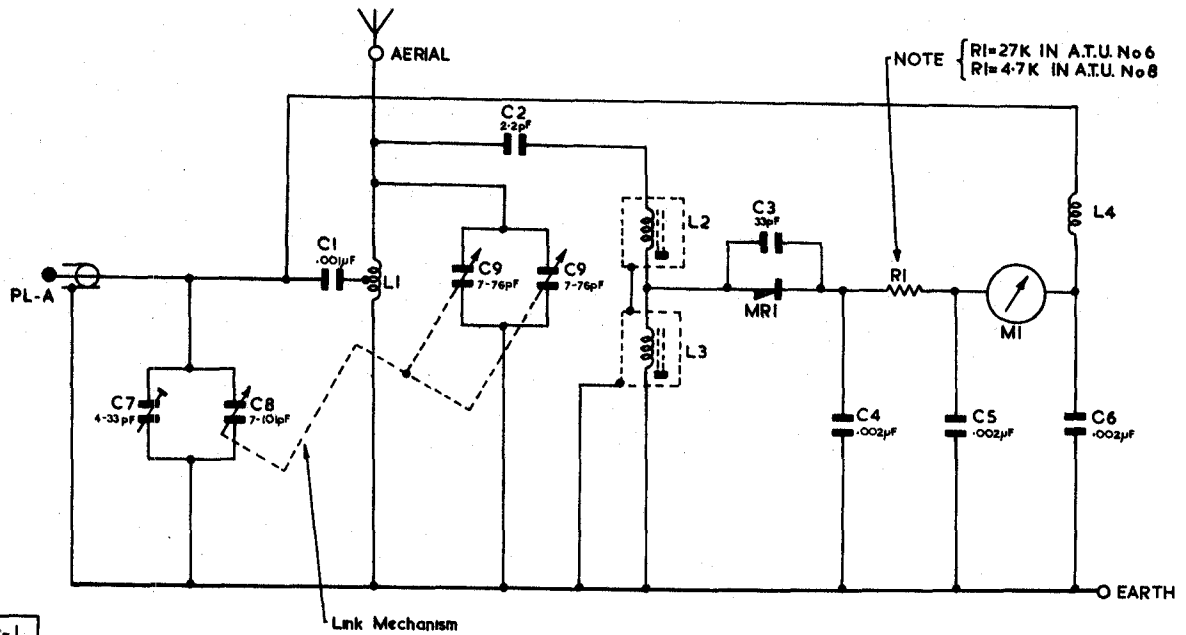
10. A metering circuit is included so that the unit may be tuned to give maximum output. A portion of the voltage developed across tuned circuit (L1 C9) is fed through a small capacitor (C2) to two variable inductors (L2 L3). These are broadly tuned and are adjusted so that across L3 the rectified reading on the meter will be substantially constant over the band. MR1 is a germanium diode and indication is given by measuring the current through a resistor (R1 27K in ATU No. 6, 4.7K in ATU No. 8), since the power output of the B.47 is lower. C4 and C5 by-pass any RF. The negative terminal of M1 is connected to earth via L4, the coaxial cable and part of the wireless set tank coil so completing the detector circuit. This is done so that, on remote tuning, another meter may be connected to give an indication at the control point. An RF choke (L4) and decoupling capacitor (C6) are fitted to isolate the RF tuned circuit from the metering circuit.

~~END OF PART ONE~~



T L 302-1
I-1001

Fig 1001 Front Panel Controls



T L 302-1
I-1002

Fig 1002 Circuit Diagram

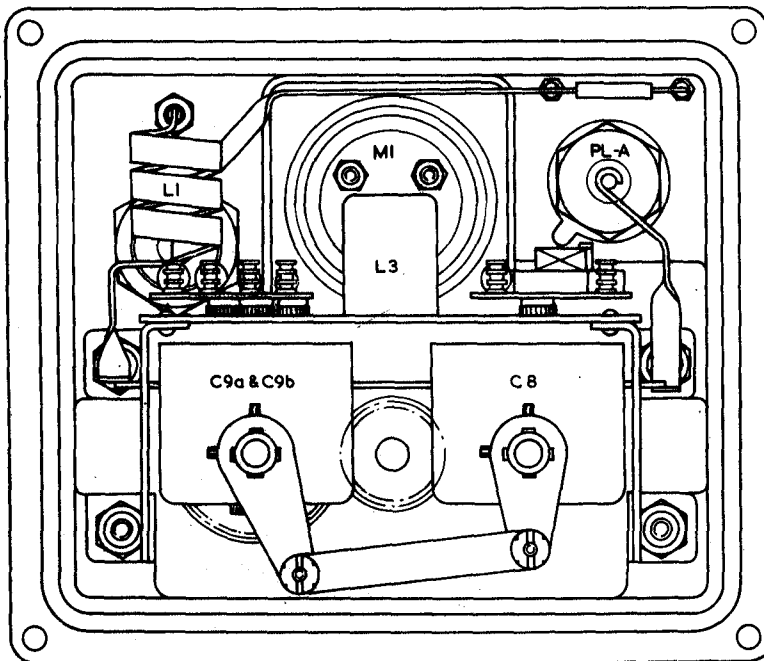
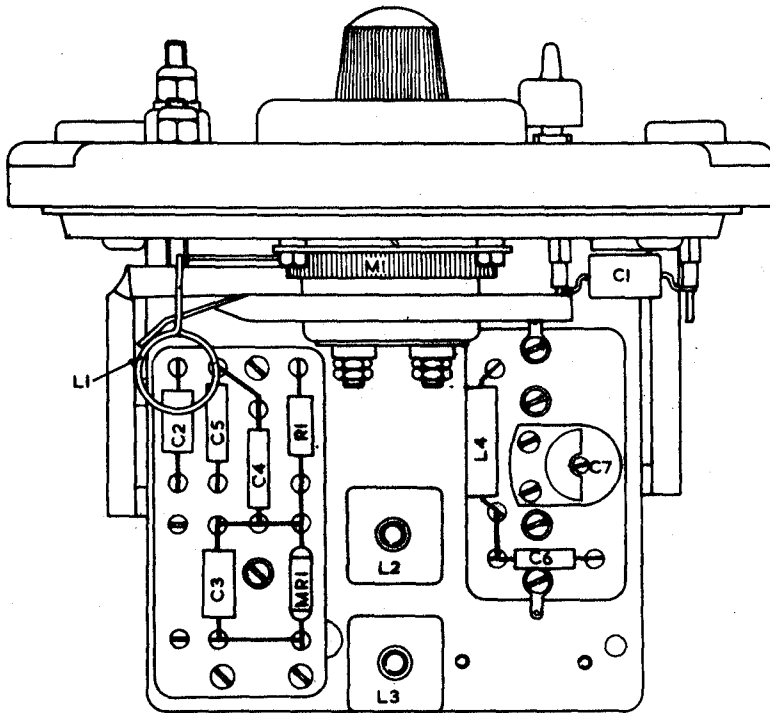


Fig 1003 Component Layout

T L302-1
I-1003

Circuit reference	Location of components		Value	Rating	Type and limit
	Circuit diagram	Component layout			
R1 ATU No.6	Fig 1002	Fig 1003	27kΩ	$\frac{1}{2}$ W	Composition grade 2 $+10\%$
R1 ATU No.8			4.7kΩ	$\frac{1}{2}$ W	Composition grade 2 $+10\%$
C1			.001μF	350V	Moulded mica $+20\%$
C2			2.2pF	500V	Tubular ceramic $+0.25$ pF
C3			33pF	500V	Tubular ceramic $+10\%$
C4			.002μF	150V	Met paper tubular -20%
C5			.002μF	150V	Met paper tubular $+20\%$
C6			.002μF	150V	Met paper tubular $+20\%$
C7			4-33pF		Variable trimmer
C8			7-101pF		Variable
C9a C9b			7-76pF		Two gang variable
L1					Fixed tuning inductor
L2					Ferrocarte tuned inductor
L3					Ferrocarte tuned inductor
L4					RF choke
MR1					Germanium diode CV 425
M1					0-500μA moving coil meter

SPECIFICATION TESTS

Not yet issued.

WARNING

NO REPAIRS should be attempted on this unit until Tels L-304 is published giving full instructions for repair and adjustments. Failure to comply with this will result in the misalignment of the unit and possible damage to the PA stage of the wireless set with which it is used.

L 304/1

END

