

ULTRA 6158

Resistors

R1	18kΩ
R2	5.1kΩ
R3	1.5kΩ
R4†	47kΩ
R5	42kΩ
R6†	220kΩ
R7	330Ω
R8	10kΩ
R9	2.7kΩ
R10	330Ω
R11†	150kΩ
R12	4.7kΩ
R13	1kΩ
R14	5kΩ
R15	12kΩ
R16	5.6kΩ
R17	220Ω
R18	3.3kΩ
R19	120kΩ
R20	220Ω
R21	68Ω
R22	1.5kΩ
R23	220Ω
R24	0.5Ω

Capacitors

C1	5.6pF
C2	12pF
C3	300pF
C4	12pF
C5**	15pF
C6	0.02μF
C7	0.022μF
C8**	40pF

Circuit alignment

Equipment required. — An r.f. signal generator amplitude modulated 30 per cent at 400c/s; an audio power output meter of 8Ω impedance, terminated in a miniature jack plug, or alternatively an Avometer model 8, set to the 2.5V a.c. range, a 0.1μF capacitor and an r.f. coupling coil.

Connect the output meter via the earphone socket, thereby disconnecting the loudspeaker. If, however, a model 8 Avometer is to be used the output should be measured across the loudspeaker. During alignment attenuate input signal so that an audio output not greater than 50mW is maintained with the volume control at maximum. This will ensure minimum alignment error due to a.g.c. action.

1. — Switch receiver to m.w., rotate tuning gang to maximum capacitance and feed in a 475kc/s a.m. signal via a 0.1μF capacitor to the junction C3 and common pole S1. Adjust L15/L16, L13/L14 and L11/L12 in that order for maximum output. Repeat these adjustments, in the same order until no further improvement can be obtained.

2. — Transfer signal generator output to r.f. coupling coil and loosely couple coil to the receiver internal aerial. Tune receiver to 500m. and feed in a 600kc/s a.m. signal. Adjust for maximum output, L8/L10, and L1/L2 by sliding along ferrite rod.

Coils and transformers*

L1	6Ω
L2	—
L3	15Ω
L4	—
L5	—
L6	—
L7	4Ω
L8	2Ω
L9	—
L10	—
L11	3.5Ω
L12	—
L13	3.5Ω
L14	—
L15	3.5Ω
L16	—
L17	8Ω

T1	[1-2 40Ω] A2
	[2-3 40Ω] A2
	[4-6 100Ω] A2
T2	[1-2 2Ω] A2
	[2-3 2Ω] A2
	[4-6 —] A2

Miscellaneous

W1	1N6
X1‡	D22A
S1-S6	—
S7	—
S8§	—
TmS††	—

* Approximate d.c. resistance in ohms.
 † Not fitted in some receivers.
 ** Subject to variation in value.
 ‡ Thermistor.
 § Automatic wind switch, located in clock unit.
 †† Time switch in clock unit.

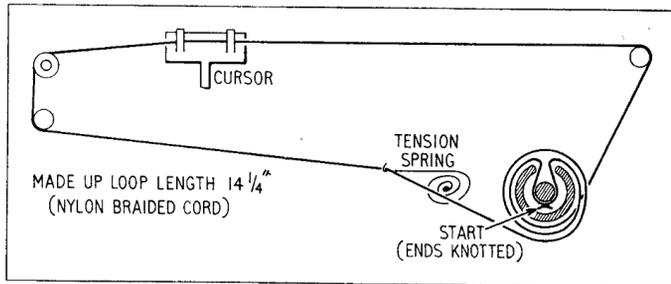
Transistor table

Transistor	Emitter (V)	Base (V)	Collector (V)
TR1	2SA466*	0.5	0.525
TR2	2SA466†	0.2	0.325
TR3	2SA466§	0.35	0.5
TR4	2SB54	0.12	0.22
TR5	2SB54	0.7	0.85
TR6	2SB56	—	0.2
TR7	2SB56	—	0.2

* May be type 2SA470.
 † May be type 2SA49.
 § May be type 2SA53.
 Quiescent current 16.5mA.

Transistor analysis

Transistor voltages quoted in the table overleaf were obtained from information supplied by the manufacturers. They are negative with respect to positive line, and were measured with a 20,000Ω/V meter under quiescent conditions.



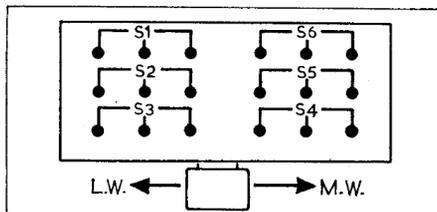
3. — Tune receiver to 200m. and feed in a 1,500kc/s a.m. signal. Adjust C13 and C2 for maximum output.

4. — Repeat operations 2 and 3 for optimum results.

5. — Switch receiver to l.w., tune to 2,000m. and feed in a 150kc/s a.m. signal. Adjust for maximum output, L6/L7 and L3/L4 by sliding along the ferrite rod.

6. — Tune receiver to 1,000m. and feed in 250kc/s a.m. signal. Adjust C10 and C4 for maximum output.

7. — Repeat operations 5 and 6 for optimum results.



Resistors			Capacitors			Coils and Transformers*			Miscellaneous								
R1	10kΩ	C2	R35	1kΩ	A2	C22	68pF	C1	C59	200pF	B2	L6	—	C2	L42	25-0Ω	B2
R2	6.8kΩ	C2	R36	20kΩ	A1	C23	1,000pF	B1	C60	50pF	B2	L7	—	C2	T1	$\begin{bmatrix} a & 150\Omega \\ b & 35\Omega \\ c & 35\Omega \end{bmatrix}$	A1
R3	1.5kΩ	C2	R37	150Ω	B1	C24	150pF	C1	C61	8μF	B2	L8	—	B1	T2	—	A2
R4	68Ω	C2	R38	820Ω	B2	C25	140pF	C2	C62	0.02μF	B2	L9	4.5Ω	C1			
R5	1.5kΩ	C2	R39	12Ω	A2	C26	2,000pF	C1	C63	0.02μF	B2	L10	25.0Ω	C1			
R6	10kΩ	C2	R40	470Ω	A2	C27	2,000pF	B1	C64	30pF	A2	L11	—	A1			
R7	6.8kΩ	C2	R41	18kΩ	A2	C28	60pF	B1	C65	100pF	B2	L12	2.5Ω	B1			
R8	390Ω	C2	R42	390kΩ	A2	C29	4.7pF	C2	C66	220pF	A2	L13	10.0Ω	C1			
R9	3.3kΩ	B2	R43	6.8kΩ	B2	C30	5pF	C2	C67	180pF	A2	L14	—	B2			
R10	2.2kΩ	B2	R44	220Ω	B1	C31	266pF	C2	C68	90pF	A2	L15	—	B2			
R11	68Ω	B2	R45	2.2Ω	A1	C32	20pF	B2	C69	330pF	A2	L16	—	C2			
R12	4.7kΩ	C2	R46	47kΩ	B1	C33	20pF	B1	C70	330pF	A2	L17	—	C2			
R13	180kΩ	B1				C34	0.01μF	C1	C71	0.01μF	B2	L18	3.0Ω	C2			
R14	3.3kΩ	B2				C35	0.01μF	B2	C72	8μF	A2	L19	—	C2			
R15	3.3kΩ	B2				C36	2,000pF	B2	C73	0.1μF	B1	L20	—	C2			
R16	10kΩ	B2				C37	2,000pF	B2	C74	0.01μF	B2	L21	—	C2			
R17	330Ω	B2				C38	25pF	C2	C75	0.01μF	A2	L22	5.0Ω	B2			
R18	1.2kΩ	B2				C39	5pF	C2	C76	2μF	B2	L23	2.0Ω	B2			
R19	330kΩ	B2				C40	4.7pF	B1	C77	25μF	A1	L24	—	B2			
R20	100Ω	C2				C41	25pF	B1	C78	150μF	B2	L25	6.0Ω	B2			
R21	330Ω	C2				C42	270pF	B1	C79	4μF	B2	L26	—	B2			
R22	820Ω	B2				C43	266pF	C2	C80	100μF	A2	L27	—	B2			
R23	8.2kΩ	B2				C44	290pF	B1	C81†	56pF	A2	L28	5.0Ω	B1			
R24	22kΩ	B2				C45	5,000pF	B1	C82	0.01μF	A1	L29	2.0Ω	B2			
R25	330Ω	B2				C46	0.2μF	B2	C83	0.01μF	A1	L30	—	B2			
R26	6.8kΩ	B2				C47	2,000pF	B2	C84	300μF	A1	L31	6.0Ω	B2			
R27	18kΩ	B2				C48	50pF	B2	C87‡	0.033μF	A1	L32	—	B2			
R28	150Ω	A2				C49	0.02μF	B2				L33	—	B2			
R29	330Ω	A2				C50	2,000pF	B2				L34	—	A2			
R30	680Ω	B2				C51	0.05μF	B2				L35	—	A2			
R31	4.7kΩ	B2				C52	0.05μF	B2				L36	—	A2			
R32	1.5kΩ	B2				C53	5,000pF	B2	L1	—	C2	L37	—	A2			
R33	4.7kΩ	A2				C54	200pF	B2	L2	—	C2	L38	—	A2			
R34	4.7kΩ	A2				C55	50pF	B2	L3	—	C2	L39	—	A2			
						C56	0.02μF	B2	L4	—	C2	L40	5.0Ω	A2			
						C57	5.6pF	B2	L5	—	C2	L41	—	A2			

Transistor analysis

Transistor voltages given in the table overleaf were taken from information supplied by the manufacturers. They were measured on a 20,000Ω/V meter and are all negative with respect to each transistors positive line, except where otherwise indicated. There was no signal input.

Circuit alignment

Equipment required—A signal generator covering the range 100kc/s-200Mc/s, 30 per cent amplitude modulated, an f.m. signal generator (25kc/s deviation) with outputs at 10.7Mc/s and in the range 80-100Mc/s; an audio output meter of 25Ω impedance to be used in place of the loudspeaker, or a model 8 Avometer, set to the 2.5V a.c. range, connected in parallel with the loudspeaker; one each 0.1μF and 20pF capacitors, an r.f. coupling coil and a non-inductive trimming tool.

In order to avoid alignment error due to the action of a.g.c. the signal input level to the receiver should be attenuated to maintain the audio output at approximately 50mW with the volume control set at maximum.

1. — Switch on signal generators and allow 15 minutes to warm up. Connect, in the appropriate manner the output meter to be used, turn tuning gang to maximum capacitance and connect a.m. signal generator output via a 0.1μF capacitor to the junction **C45/S14**.

2. — Switch receiver to m.w. and feed in a 475kc/s a.m. signal. Adjust **L40/41**, **L31**, **L28/29**, **L25** and **L22/23** in that order for maximum output. Repeat in the same order until no further improvement can be obtained.

3. — With tuning gang at maximum capacitance, check that the cursor coincides with the 'zero' pips at right hand edge of scale. Slide cursor along drive cord to correct any error in calibration.

Note: M.w. must be aligned first. Check that the 'Car' press-button is in the 'off' position and loosely couple the a.m. signal generator output to the ferrite rod aerial via the r.f. coupling coil.

4. — Switch receiver to m.w., tune to 500m calibration mark, and feed in a 600kc/s a.m. signal. Adjust **L18** and **L12** (slide ring along ferrite rod) for maximum output.

5. — Tune receiver to 200m calibration mark and feed in a 1,500kc/s a.m. signal. Adjust **C39** and **C30** for maximum output.

6. — Switch receiver to l.w., tune to LW calibration mark and feed in a 220kc/s a.m. signal. Adjust **C41** and **L13** (slide coil former along ferrite rod) for maximum output.

7. — Disconnect lead to telescopic aerial and connect a.m. signal generator output to the lead via a 20pF capacitor.

8. — Switch receiver to s.w., tune to 6.77Mc/s calibration mark and feed in a 6.77Mc/s a.m. signal. Adjust **L21** and **L14** for maximum output.

9. — Tune receiver to 15.45Mc/s calibration mark and feed in a 15.45Mc/s a.m. signal. Adjust **C38** and **C32** for maximum output.

10. — Repeat operations 4-9 as necessary to obtain maximum output and accurate calibration.

11. — Switch receiver to v.h.f./f.m. and feed in a 10.7Mc/s (25kc/s deviation) f.m. signal via a 0.1μF capacitor to the junction **C45/S14**. Adjust **L36/37**, **L34/35**, **L32/33** and **L26/27** for maximum output.

12. — Connect a.m. signal generator output via a 0.1μF capacitor and feed in a 10.7Mc/s a.m. signal. Adjust **L38/39** for minimum output (a.m. rejection).

13. — Repeat operations 11 and 12 for maximum f.m. output and minimum a.m. output until no further improvement can be obtained.

14. — Tune receiver to 88Mc/s calibration mark and feed in an 88Mc/s (25kc/s deviation) f.m. signal adjust **L5** and **L3** for maximum output.

15. — Tune receiver to 96Mc/s calibration mark, and feed in a 96Mc/s f.m. signal. Adjust **C12** and **C9** for maximum output.

16. — Tune receiver to 91Mc/s calibration mark and feed in a 91Mc/s f.m. signal. Adjust **L6** and **L7** for maximum output.

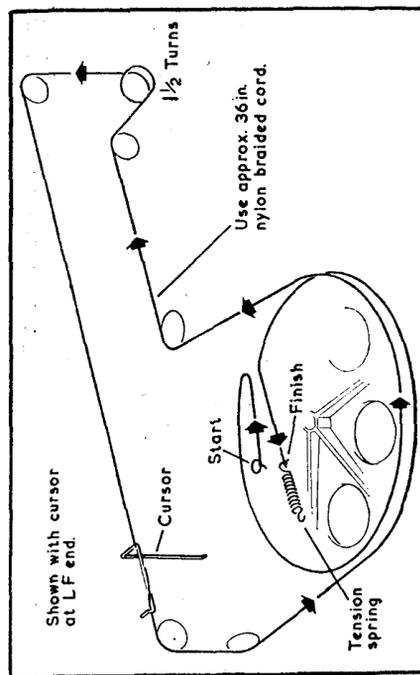
17. — Repeat operations 14-16 until no further improvement can be obtained.

Car aerial circuits. — Switch receiver to m.w. and depress 'Car' press-button. Tune receiver to 500m calibration mark, and feed a 600kc/s a.m. signal into car aerial socket via a dummy aerial comprising an 18pF capacitor in series with signal generator output, followed by a 60pF shunt capacitor. Adjust **L9** for maximum output.

Tune receiver to 200m calibration mark and feed in a 1,500kc/s a.m. signal. Adjust **C25** for maximum output.

Switch receiver to l.w., tune to 1,400m calibration mark and feed in a 1,400kc/s a.m. signal. Adjust **L10** for maximum output.

Repeat the foregoing adjustments until no further improvement can be obtained.



ULTRA 6158

Circuit divergences

Ferguson model 3156. — On this chassis the press-button tone control is not used and switches **S23**, **S24** are used to switch in a scale lamp. This circuit is shown dotted at the right hand end of the main circuit diagram. **C81** becomes 100pF and **C87** is omitted.

All schedule A chassis. — Capacitor **C87** is 390pF and is connected between the common poles of **S23**, **S24** and the junction of **R42**, **C81** and **C83**. The remote poles of these switches are connected to the collector of **TR7**. This circuit is also shown dotted on the main circuit diagram.

* Approximate d.c. resistance in ohms.

† In schedule A receivers **C81** is 470pF.

In model 3156

C81 is 100pF.

‡ In schedule A receivers

C87 is 390pF.

Not fitted in

model 3156.

§ Model 3156 only.