EKCO - BT359

Intermediate frequencies:
A.M., 470kc/s; F.M., 10.7Mc/s.

Transistor Table

Transistor	Collector (V)	Base (V)	Emitter (V)
VT1 OC171	7·2	1·7	0·95
VT2 OC170	6·0	1·2	0·96
VT3 OC170	6·0	1·2	0·9
VT4 OC170	6·0	1·2	0·9
VT5 OC71	5·0	0·75	0·7
VT6 OC81-D	8·8	1·4	1·5
VT7 OC81§	9·0	1·5	†
VT8 OC81§	9·0	1·5	†

§*VT7 and VT8 are a matched pair.*
†*No reading quoted.*

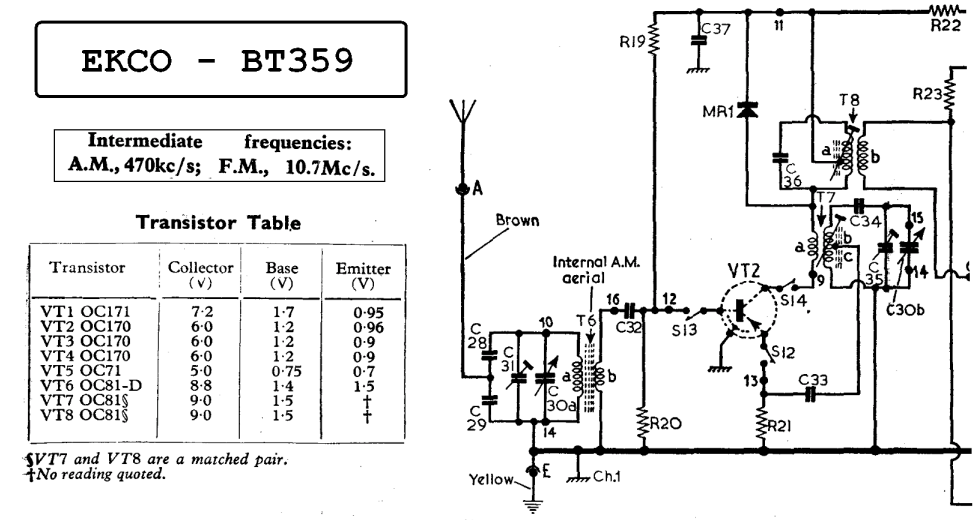
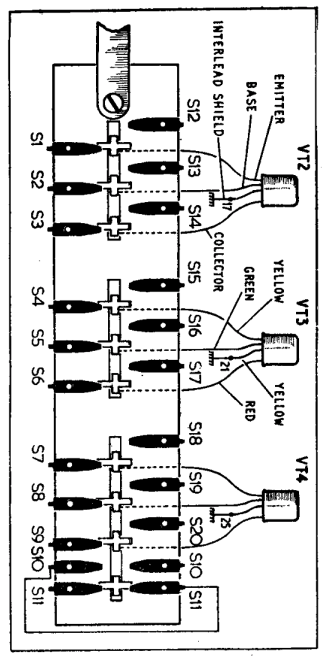
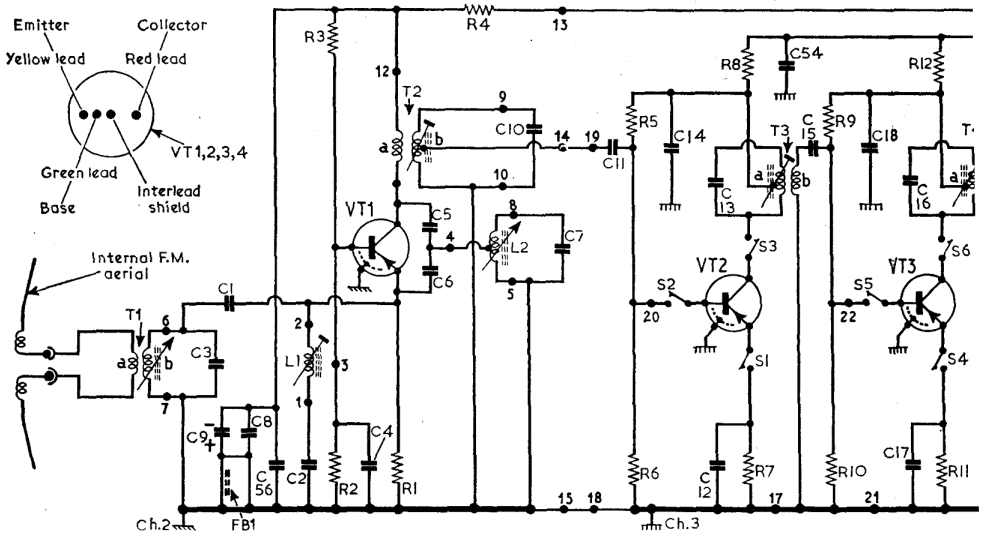
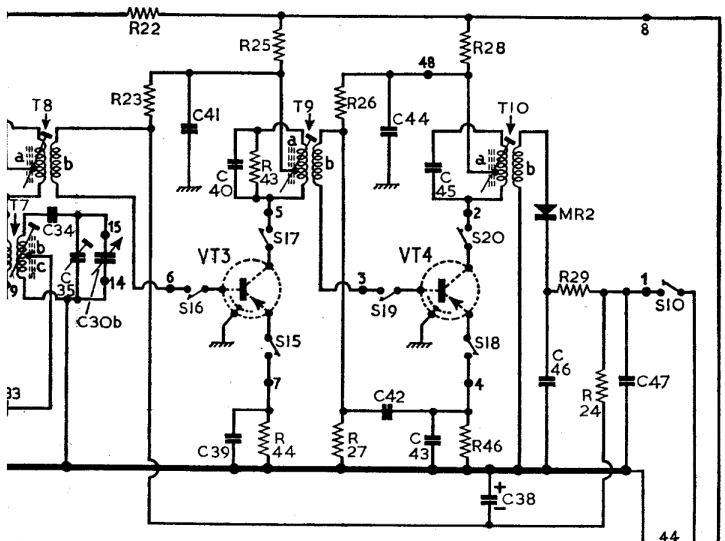
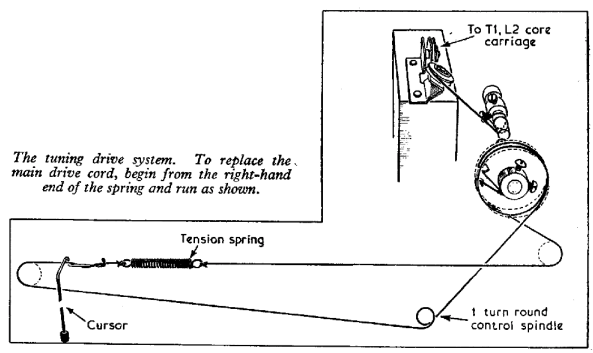


Diagram of the switch unit. Transistors are connected to the moving contacts as shown.

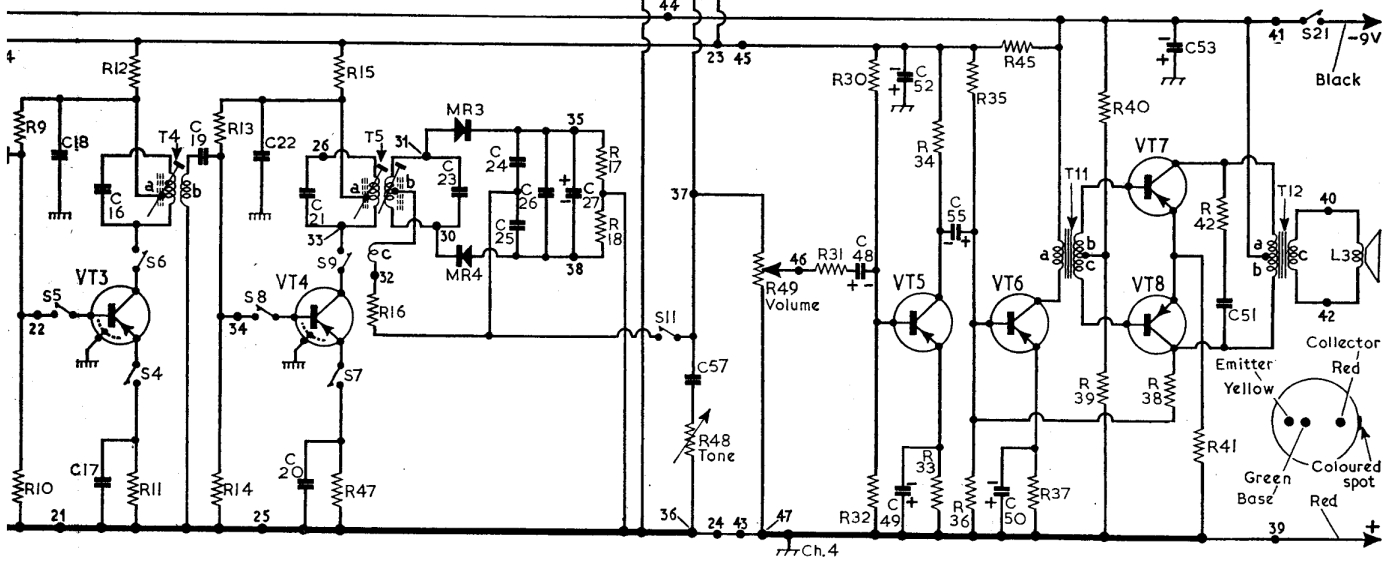








The tuning drive system. To replace the main drive cord, begin from the right-hand end of the spring and run as shown.



Resistors

R1	560Ω	E4
R2	1·5kΩ	E4
R3	6·8kΩ	E4
R4	680Ω	E4
R5	10kΩ	B2
R6	2·7kΩ	B2
R7	1kΩ	B2
R8	1·2kΩ	B2
R9	10kΩ	C2
R10	2·7kΩ	C2
R11	1kΩ	B2
R12	1·2kΩ	C2
R13	10kΩ	C2
R14	2·7kΩ	C2
R15	1·2kΩ	C2
R16	150Ω	D2
R17	22kΩ	D2
R18	22kΩ	D2
R19	6·8kΩ	C2
R20	1·2kΩ	C2
R21	1kΩ	B2
R22	1·2kΩ	C1
R23	120kΩ	C1
R24	18kΩ	C1
R25	1·2kΩ	C1
R26	10kΩ	C1
R27	2·7kΩ	C2
R28	1·2kΩ	C1
R29	1·5kΩ	D2
R30	68kΩ	B3
R31	10kΩ	B3
R32	10kΩ	B3
R33	1kΩ	B3
R34	3·9kΩ	B3
R35	47kΩ	B3
R36	12kΩ	B3
R37	680Ω	C3
R38	220kΩ	C3
R39	39Ω	C3
R40	2·2kΩ	C3
R41	3·3Ω	D3
R42	270Ω	C3
R43	100kΩ	C2
R44	1kΩ	C2
R45	220Ω	C3
R46	1kΩ	C2
R47	1kΩ	C2
R48	25kΩ	A2
R49	25kΩ	A2

Capacitors

C1	6·8pF	E4
C2	220pF	E4
C3	12pF	E4
C4	0·001μF	E4
C5	68pF	E4
C6	5pF	E4
C7	18pF	E4
C8	0·04μF	E4
C9	100μF	E4
C10	68pF	E4
C11	0·001μF	B2
C12	0·01μF	B2
C13	39pF	B2
C14	0·04μF	B2
C15	0·001μF	C2
C16	39pF	C2
C17	0·01μF	C2
C18	0·04μF	C2
C19	0·001μF	C2
C20	0·01μF	C2
C21	30pF	C2
C22	0·04μF	C2
C23	39pF	C2
C24	0·001μF	D2
C25	0·001μF	D2
C26	0·01μF	D2
C27	10μF	D2
C28	3pF	C1
C29	12pF	B1
C30a	—	A1
C30b	—	A1
C31	40pF	B1
C32	0·01μF	B2
C33	0·01μF	B2
C34	450pF	B2
C35	40pF	B2
C36	250pF	C2
C37	0·04μF	C2
C38	8μF	C2
C39	0·04μF	C2
C40	250pF	C2
C41	0·04μF	C2
C42	0·04μF	C2
C43	0·04μF	C2
C44	0·04μF	D1
C45	250pF	D2
C46	0·01μF	D2
C47	0·01μF	D2
C48	8μF	B3
C49	100μF	B3
C50	100μF	C3
C51	0·1μF	C3
C52	100μF	B3
C53	500μF	D3
C54	0·04μF	C2
C55	8μF	B3
C56	0·002μF	E4
C57	0·04μF	A2

Coils*

L1	—	E5
L2	—	E5
L3	2·75	—

Miscellaneous

MR1	OA70	C2
MR2	OA79	D1
MR3	OA79	D2
MR4	OA79	D2
FB1	—	E4
S1, S2	—	†B2
S3-S8	—	†C2
S9-S11	—	†D2
S21	—	A2

Transformers*

T1	a	—	E5
	b	—	
T2	a	—	E4
	b	—	
T3	a	—	B2
	b	—	
T4	a	—	C2
	b	—	
T5	a	—	C2
	b	—	
	c	—	
T6	a	1·5	B1
	b	0·5	
T7	a	0·5	B2
	b	total 2·2	
	c		
T8	a	7·0	C2
	b	1·2	
T9	a	7·0	C2
	b	1·2	
T10	a	7·0	D2
	b	1·2	
T11	a	200·0	C3
	b	28·0	
	c	28·0	
T12	a	1.5	D3
	b	1.5	
	c	—	

** Approximate D.C. resistance in ohms.*
† See separate diagram overleaf.

CIRCUIT ALIGNMENT

Instructions are given for both visual (wobbulator) and meter methods of alignment for the I.F. amplifier of the F.M. receiver. Different equipment is required for each method, of course, and the requirements are explained at the beginning of each section. This applies also to the A.M. alignment that follows it.

F.M. Receiver

Wobbulator method.—Switch receiver to F.M., tune it to the low frequency end of the band, and turn volume and tone controls fully anti-clockwise. Connect the oscilloscope Y leads across **R18** and disconnect one end of **C27.** In addition to the wobbulator equipment for the I.F. stages, an A.F. output meter or a 0-2.5V A.C. voltmeter will be required for alignment of the R.F. and oscillator stages.

1.—Connect wobbulated signal generator output to **VT4** base and chassis, feed in a 10.7Mc/s signal, and adjust the core of **T5** primary (C2), then its secondary, for maximum output.
2.—Transfer signal generator leads to **VT3** base, and adjust core of **T4** (C2) for a level response over a range of 200kc/s, properly centred so that it is level for 100kc/s either side of 10.7Mc/s, within the limit of −3dB (two-thirds of maximum) at the extremes.
3.—Transfer oscilloscope, connecting one lead to the junction of **R16** and winding **c** on **T5** and the other to chassis. Reconnect **C27,** then adjust **T5** secondary core for the best S-shaped waveform, readjusting the primary core if necessary to improve the waveform.
4.—Disconnect **C27** again, and return oscilloscope leads to **R18.** Transfer signal generator leads to **VT2** base, and adjust the core of **T3** (B2) to obtain the same waveform as in operation 3.
5.—Transfer signal generator leads to **VT1** base and adjust the cores of **T2** (E4) for the same response again as in operation 3.
6.—Transfer signal generator leads to F.M. dipole sockets and, while still feeding in a 10.7Mc/s signal, adjust **L1** (B1) for minimum output.

This completes the wobbulated alignment of the F.M. I.F. amplifier. The R.F. and oscillator adjustments are the same for either the wobbulated or spot-frequency method, and are explained in next column.

Meter method.—In addition to a standard A.M./F.M. signal generator, two indicating instruments and two matched 100kΩ resistors are required. One instrument is a 0-50μA meter, and the other may be an output meter or a 0-2.5V A.C. voltmeter.

Switch receiver to F.M., tune it to the low frequency end of the band, and turn the volume and tone controls fully anti-clockwise. Connect the two 100kΩ resistors in series, then connect their free ends to the outer ends of **R17, R18.** Connect the microammeter between the junction of the two 100kΩ resistors and chassis.

1.—Connect the F.M. signal generator output to **VT4** base and chassis, feed in an F.M. signal of 10.7Mc/s, and adjust the core of **T5** primary (C2) for peak output on the microammeter.
2.—Transfer the chassis microammeter lead from chassis to the junction of winding **c** on **T5** and **R16,** then adjust the secondary core until a zero reading is obtained on the meter. Swing the core in both directions and ensure that the current swings with it from one polarity to another, then reset it accurately to zero.
3.—Return the microammeter lead to chassis. Transfer signal generator lead to **VT3** base, and adjust the core of **T4** (C2) for maximum output.
4.—Transfer signal generator lead to **VT2** base, and adjust the core of **T3** (B2) for maximum output. Readjust the cores of **T4** and **T5** primary for peak output reading.
5.—Transfer signal generator leads to **VT1** base, and adjust the core of **T2** primary (E4) for maximum output.
6.—Recheck adjustment of **T5** primary, **T4** and **T3** cores to ensure that peak output is obtained.

F.M. R.F. Stages.—Connect the output indicating instrument to the speech coil circuit, and turn the volume and tone controls fully clockwise. Adjust the input to produce just under 50mW output, and reduce it as the circuits come into line so as not to exceed 50mW (0.5V on voltmeter.

Connect the signal generator output to the F.M. dipole sockets. Tune to 92Mc/s mark on scale, feed in a 92Mc/s F.M. signal, and adjust **L2** core (E5) for maximum output to ensure accurate calibration, and then readjust **T2** core for maximum output.

A.M. Receiver

I.F. stages.—Switch receiver to M.W., tune it to a quiet spot at about 500m (600kc/s), and turn both volume and tone controls fully clockwise. Disconnect speech coil and replace it with the output meter with a 3Ω load; or alternatively, if the voltmeter is used, leave the speech coil connected and connect the meter across it. Two 0.1μF isolating capacitors will be required.

Connect the signal generator output, via a 0.1μF capacitor in each lead, across the primary winding of **T6** (B1). Feed in a 30 per cent amplitude modulated signal of 470kc/s and adjust the cores of **T10, T9** and **T8** (C2, D2) for maximum output, reducing the input signal as the circuits come into line to avoid exceeding an output of 50mW (0.5V on voltmeter). Repeat these adjustments until no further improvement can be obtained.

R.F. stages.—Coupling to the receiver is effected by means of a radiating loop, which should consist of 20 turns of 20 S.W.G. enamelled copper wire, evenly spaced on a 4in diameter former and occupying a space about 2⅜in long. Its inductance should be about 40μH.

The signal generator should be connected to the loop by a screened low-capacitance cable, and the loop should be located about 15in from the centre of the ferrite rod and should be concentric with it.

The aerial coils on the ferrite rod are accurately adjusted at the factory and then sealed, and they should not require readjustment unless the rod is replaced.

Tune the receiver to 500m on scale, feed in a 600kc/s signal to the loop, and adjust **T7** core (B2) for maximum output, then adjust **T6** (B1) on its core if that is necessary.