Ekco TA201 Add-on Vision Unit

Television add-on unit giving sound in conjunction with broadcast set. TRF 18-valve circuit, 6¼ by 5 in. picture. Price 22 gns., aerial and installation extra.

THIS receiver is a complete vision unit combined with a sound amplifier, giving an output suitable for feeding into the pick-up sockets of an existing radio set. Both the vision and sound sections work at the fundamental frequencies, being of the "straight" TRF type.

The input is taken from a low-impedance feeder through C1 to the vision input coil, L1, the connection being made to a tapping, so as to match the impedance suitably. The coil L1 is permeability-tuned and is loosely coupled to L2, the sound input coil, which is similarly tuned.

The vision channel consists of three H.F. pentodes, V1, V2 and V3, each provided with similar networks. The first vision amplifier, V1, has a gain control, R6, in the cathode circuit. This is the **contrast control** of the set. There is also a fixed bias resistor, R5, the cathode being decoupled by C4. One side of the heater is earthed and the other is decoupled through C5. The screen is decoupled through R3 and C3.

Alteration of the cathode resistance would tend to alter the input impedance of the valve and upset the tuning of L1, and accordingly this is returned to the cathode through a compensating network consisting of R1, R2 and C2.

The anode circuit of V1 is decoupled through R8 and C6, and contains L3, which is shunted by R7 and coupled to L4 feeding the input of V2. Both L3 and L4 are again permeability-tuned.

The feed network for V2 is identical with that of V1, with the following exceptions. There is a single-cathode resistor, R10, and the suppressor grid contains a rejector circuit, C10-L14, tuned by C10 to the sound frequency. This is to keep the sound off the picture.

The second valve, V2, is coupled to V3 by a similar network; a further network couples V3 to V4, the demodulation diode. The diode is inverted and has a load resistance, R17, and a shunt capacity, C17, which is DC-coupled to the grid of V5, the video stage. This has an anode load resistor, R18, and a boost choke, L13. There is an unshunted cathode resistor, R19, with the object of correcting the low-level diode distortion.

The tube is coupled from the anode of V5 through C18. Synchronisation and level compensation is accomplished by a diode, V6, in series with a diode, V7, and a reversal and separating stage, V8.

The cathode of V6 returns to the earth line through R20, and the anode is taken to earth through the inverted diode, V7. The anode of V6 is DC-coupled to the grid of V8, which has a cathode potentiometer consisting of R23 and R24 with a grid resistance, R22, taken to the junction of R23 and R24, the cathode being decoupled through C20.

The screen is fed through R21, and is decoupled by C21. The suppressor grid is taken from a potentiometer connection consisting of R27 and R28. The anode load is R25, from which the line synch. is taken through C39. The frame synch. is filtered through R26 and C19.

E. K. COLE, LTD., do not permit publication of the circuit diagram of this unit. We give, however, a detailed, almost component-by-component circuit description.

A Rapid Fault-Finder and the usual layouts and component lists are included.

There are no alignment instructions, as the unit is permanently adjusted in the factory.

Sound Channel

THE first sound amplifier is V9, in which the screen is decoupled through R30 and C23. The cathode resistor is R31, and is shunted by C24, the heater being decoupled by C25. The sound input coil L2 is not returned directly to the chassis, but through an AVC decoupling network, C22, R29. The anode is decoupled through R32 and C26, the anode circuit containing L9 coupled to L10, which feeds the grid circuit of V10.

This has a similar network to V9, the anode circuit containing L11 coupled to L12. This coil is connected to the signal diode of V11, a double-diode triode, in which the second diode is not used. The diode load is R37, and is shunted by C32. An AVC connection is made at the top of the diode load through R36 and C31.

The grid connection of the triode is taken through C32 and grid leak R38. The anode load is R41, decoupled through R40 and C38. There are two output levels, one from the diode through C37, and the other from the anode through C36.

Circuit description of Scanning and Power Sections, page iv.

VALVE READINGS

V.	Type.	Volts. Anode.	Screen.	Cathode.
	All Mazda.			
1	SP41	225	212	2
2	SP41	225	208	2
3	SP41	225	212	2
4	D1	diode only.		
5	SP41	230	265	1.1
6	D1	diode only.		
7	D1	diode only.		
8	SP42	2.5	27	1.9
9	VP41	230	218	6
10	SP41	225	212	1.9
11	HL41DD	105	—	2.3
12	T41	130	—	—
13	AC6Pen	260	200	7
14	Pen 45	112	160	5
15	T41	97		
16	U21	2,600A.C.		3,500
17	UU4	325 A.C.		360
18	UU4	275 A.C.		290
Tube	CRM71	3,500; heater, 2 volts.		

Practical Points

IN making any measurement of voltage on the chassis not involving the E H T circuit, *as a precautionary measure remove the EHT rectifier valve, V 16,* and anchor the anode lead to prevent it short-circuiting to the chassis.

In investigating the scan unit, it must be remembered that when the gas relays are generating there are high voltages at the anodes of the amplifiers. *The amplifiers are best investigated with the gas relays removed,* that is, V12 and V15.

It is also important to remember that each mains transformer, of which there are three, has a separate voltage adjustment.

The form-correction circuit is controlled by a variable resistance mounted on the scan unit, and has no control knob. This is initially adjusted at the factory, and should not require attention unless the edge of the picture is distorted.

The control is strong in action and requires careful adjustment, and is most conveniently adjusted with the contrast low and the brilliance turned up so that the margin of the picture is clearly visible.

As the receiver uses three chassis mounted round the sides of a rectangular framework, it is easy to turn it so that the desired chassis is most accessible. It must be remembered, however, that the *power pack on the bottom deck contains electrolytic condensers, which must on account be run on their sides or upside-down.*

Chassis Removal

THE complete chassis assembly, consisting of three chassis on a steel tubular framework, is held by four bolts at the bottom of the cabinet. After these are removed and the three control knobs on the front unscrewed, the assembly can be withdrawn.

Tube Removal

The tube is held in a wood framework, and is removed as follows: On the front of the wood mask board are four strips held by small wood screws. These are removed, and with them the rubber mask.

The tube can then be withdrawn. It must not be pulled out, but eased from the holder by gently pushing the spigot on the end cap. The thimble clip on the side of the tube must, of course, be previously removed.

Fitting New Tube

If, after fitting a new tube, the picture cannot be correctly aligned, the position of the focusing coil and also scan coils can be slightly adjusted by slackening the holding bolts.

A minute pivoting action of the focusing coil will make a large difference to the scan position. If the scan is not square with the mask it can be aligned by rotation of the scan coil assembly.

RAPID FAULT-FINDER — EKCO TA201

Vision Chassis

Remove EHT rectifier, V16, and connect output meter to C18 and chassis.

Video Stage, V5

Inject .5 volt AF at V5 grid. If defective, check :—

Voltages : V5 anode, 230; screen, 265; cathode, 1.1.

Resistances : Anode-HT, 3,300; grid-chassis, 3,900 ohms.

Third Amplifier and Demodulation, V3 and V4

Inject 45 mcs. at V3 grid. If defective, check :—

Voltages : Anode, 225; screen, 212; cathode, 2.

Resistances : Anode-HT, 4,700; screen-H T, 22,000; cathode-chassis, 180 ohms.

Second Amplifier, V2

Inject 45 mcs. signal at V2 grid. If defective, check as for V3.

First Amplifier, V1

Inject 45 mcs. signal at V1 grid. If defective, check as for V3.

Input Test

Inject 45 mcs. signal from 70-ohm attenuator at input socket. If defective, check input coils.

Sound Channel

Connect sound output to audio-amplifier (pick-up sockets of a receiver) and connect output meter to the amplifier.

Audio Stage, V11

Inject 1 volt AF at V11 grid. If defective, check :—

Voltages : Anode, 105; cathode, 2.3.

Resistances : Anode-HT, 74,000; grid-chassis, 470,000 ohms.

Second Sound Amplifier, V10

Inject 41.5 mcs. at V10 grid. If defective, check :—

Voltages : Anode, 225; screen, 212; cathode, 1.9.

Resistances : Anode-HT, 4,700; screen-HT, 22,000; cathode-chassis, 180 ohms.

First Sound Amplifier, V9

Inject 4.5 mcs. at V9 grid. If defective, check :—

Voltages : Anode, 230; screen, 218; cathode, 6.

Resistances : Anode-H.T., 4,700; screen-HT, 22,000; cathode-chassis, 560 ohms.

Synchronising Section, V8

Voltages : Anode, 2.5; screen, 27; cathode, 1.9.

Resistances : Anode-HT, 42,000; screen-HT, 15,000; cathode-chassis, 330 ohms.

Line Generator, V12

Voltage : Anode, 130.

Resistances : Anode-HT, 142,000; grid-chassis, 52,600; cathode-chassis, 2,560 ohms.

Line Amplifier, V13

Remove line generator, V12. Inject 5 volts AF V13 grid, and connect output meter across L16. If no voltage is obtained, check :—

Voltages : Anode, 260; screen, 200; cathode, 7.

Resistances : Anode-HT, 250; grid-chassis, 560,270; screen-HT, 10,000 ohms.

Frame Generator, V15

Voltages : Anode, 97.

Resistances : Anode-HT, 142,000; grid-chassis, 52,600; cathode-chassis, 2,560 ohms.

Frame Amplifier, V14

Remove frame generator and inject 3 volts AF at grid, and connect output meter to C46 and chassis. If defective check :—

Voltages : Anode, 112; screen, 160; cathode, 5.

Resistances : Anode-HT, 3,600; cathode-chassis, 180 ohms; grid-chassis, 1 megohm.

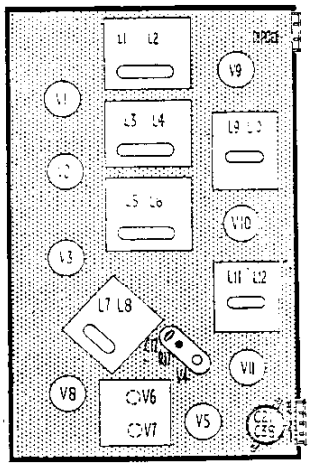
Receiver Unit Diagrams and Tables

CONDENSERS

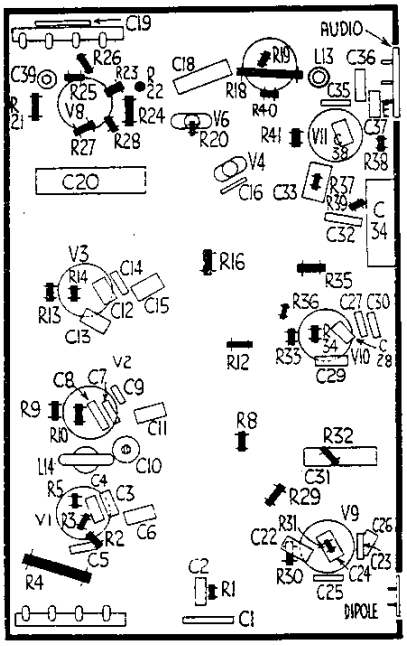
		Mfd
1	Feeder coupling	.001
2	Vision input return	.001
3	V1 screen decouple	.001
4	V1 cathode decouple	.001
5	V1 heater decouple	.001
6	V1 anode decouple	.001
7	V2 cathode decouple	.001
8	V2 heater decouple	.001
9	V2 screen decouple	.001
10	Sound rejector tune	.000025
11	V2 anode decouple	.001
12	V3 cathode decouple	.001
13	V3 heater decouple	.001
14	V3 screen decouple	.001
15	V3 anode decouple	.001
16	V4 heater decouple	.001
17	Diode load shunt	.00002
18	Tune coupling	.1
19	Frame pulse filter	.002
	V8 cathode decouple	50
	V8 screen decouple	8
23	V9 sound input return	.001
24	V9 screen decouple	.001
25	V9 cathode decouple	.001
26	V9 heater decouple	.001
27	V9 anode decouple	.001
28	V10 screen decouple	.001
29	V10 cathode decouple	.001
30	V10 heater decouple	.001
31	V10 anode decouple	.001
32	A.V.C. decouple.	.1
33	Audio coupling V11	.01
34	HF filter	.0003
35	V11 cathode decouple	25
36	V11 anode shunt	.001
37	Audio coupling high level	.01
38	Audio coupling low level	.01
39	V11 anode decouple	2
	V8 line synch. coupling	.00002

RESISTANCES

		Ohms.
1	Vision input compensating network (part)	82,000
2	Vision input network (part)	5,600
3	V1 screen feed	22,000
4	V1 cathode pot. (part)	56,000
5	V1 cathode bias.	180
6	Contrast control	10,000
7	V1 anode load shunt	5,600
8	V1 anode decouple	4,700
9	V2 screen feed	22,000



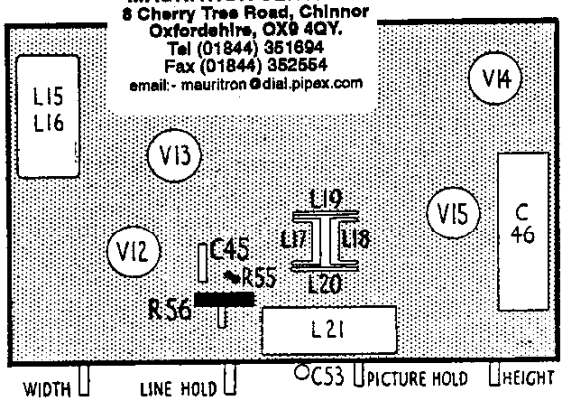
Surface (left) and underside layout diagrams of the receiver chassis. Components are identified by the adjoining lists. Separate diagrams for the scan and power chassis are on page iv.



10	V2 cathode bias		180
11	V2 anode load shunt		5,600
12	V2 anode decouple		4,700
13	V3 screen decouple		22,000
14	V3 cathode bias.		180
15	V3 anode load shunt		5,600
16	V3 anode decouple		4,700
17	V4 diode load		3,900
18	V5 anode load		3,300
19	V5 cathode bias.		68
20	V6 cathode load		560,000
21	V8 screen feed		15,000
22	V8 grid resistor		220,000
23	V8 cathode pot. (part)		180
24	V8 cathode pot. (part)		150
25	V8 anode load		27,000
26	Frame pulse filter		100,000
27	V8 suppressor pot. (part)		220,000
28	V8 suppressor pot. (part)		15,000
29	V9 A.V.C. decouple		470,000
30	V9 screen feed		22,000
31	V9 cathode bias.		560
32	V9 anode decouple		4,700
33	V10 screen feed		22,000
34	V10 cathode bias		180
35	V10 anode decouple		4,700
36	A.V.C. decouple.		470,000
37	V11 diode load		100,000
38	V11 grid leak		470,000
39	V11 cathode bias		1,000
40	V11 anode decouple		18,000
41	V11 anode load		56,000

WINDINGS

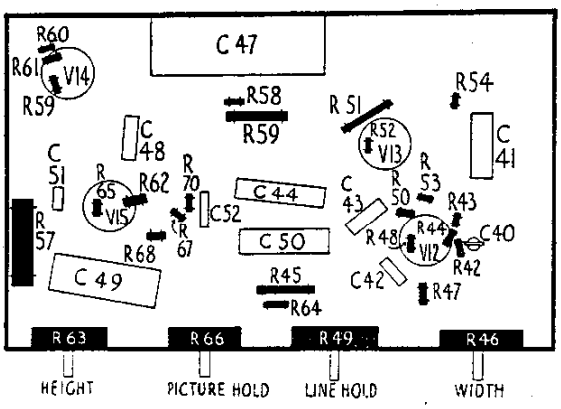
L.	Ohms.	Where measured.
1 to 12	all very low	On tags.
13	3.4	On tags.
14	low	On tags.
15	250	V15 anode and HT positive.
16+17		
+18	1.2	On tags.
19+20	790	On tags.
21	620	On tags.
22	510	On leads.
23	2,000	On leads.
24	220	On leads.
25	220	On leads.



EKCO ADD-ON UNIT

(C ontinued.)

Details of the time base or scan unit are given in these diagrams of the top (left) and underside (right).



Scanning Unit and Power Pack Circuit Details

THE scanning in both directions is effected through gas relays and pentode amplifiers. The line generator is V12, which has a cathode resistor, R48, and variable resistance R49, forming the speed control or **line hold** of the set, shunted by C41.

The cathode connection is actually potentiometer-fed through R45. The anode load comprises a fixed resistor, R47, and a variable unit, R46, which is the width pre-set control. C42 is the charging condenser, the grid return resistance is R43, and the grid is stood off by R44 from the line synch. through C40 and R42.

The condenser generator circuit includes a fly-back resistance, R50, the anode is coupled through C43 and the grid stopper, R52, to the grid of V13.

The screen circuit of V13 is fed through R51 and C44. The cathode resistance is R54, and, being unshunted, introduces a degree of feedback. The anode circuit contains the output transformer, the secondary of which feeds the line coils, and is shunted by a form-correction circuit consisting of C45, R55 and R56.

The frame generator is V15. This has a cathode resistor, R65, and a variable resistance, R66, which is the **frame hold** control, both being shunted by C50.

The grid is stood off through R67, and is returned through R70. The synch. is applied through C51 and R68 in series, with C52 in shunt. The anode load is R64, together with R63, the height control. The charge condenser is C49, which is returned to the earth line.

The fly-back resistance R62 is on the anode side. Coupling to the grid of V14 is through C48, and grid stopper R61, the grid leak being R60. The screen is fed through R58 and C47. The cathode resistance R59 is again unshunted. The anode load R57, feeds the frame coils through C46.

THREE rectifiers are used: V16, for EHT; V17 for the scan unit and focusing coils, and V18 for the sound and vision receiver. The output of V16 is smoothed by R71 and C55 and C54.

The cathode of the tube is returned to the junction of R74 and R75. The resistance R75, however, is shunted by R76, the **brilliance control** of the set, which in turn is shunted by C53.

The output of V17 is smoothed by C56 and C57 in conjunction with L23 and C58, together with R22. The circuit from L22 supplies the line scan valves, and that from L23 the frame scan. The focus coil circuit is taken from this supply through R77 and R78, the circuit being in series with the total feed.

A double smoothing circuit is used on V18, consisting of C61, the reservoir condenser, followed by L24 and C60, in turn followed by L25 and C59.

SCANNING UNIT
RESISTANCES

42	Line synch. input		10,000
43	V12 grid resistor		47,000
44	V12 grid stopper		5,600
45	V12 cathode pot. (part)		560,000
46	Width control		60,000
47	V12 anode load		82,000
48	V12 cathode pot. (part)		560
49	Line hold		2,000
50	Line flyback		180
51	V13 screen feed		10,000
52	V13 grid stopper		270
53	V13 grid resistor		560,000
54	V13 cathode bias		120
55	Form correction		470
56	Linearity control		2,000
57	V14 anode load		3,300
58	V14 screen feed		10,000
59	V14 cathode resistor		180
60	V14 grid resistor		1 meg.
61	V14 grid stopper		270
62	Line flyback		100
63	Height control		60,000
64	V15 anode load		82,000
65	V15 cathode bias		560
66	Frame hold		2,000
67	V15 grid stopper		5,600
68	Frame synch. filter		560,000
69	V15 cathode bias pot. (part)		560,000
70	V15 grid resistor		47,000

CONDENSERS

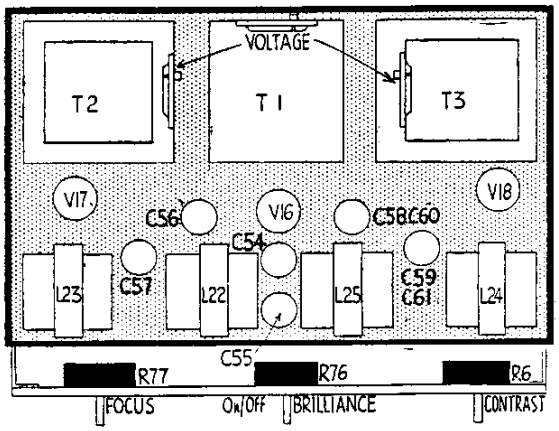
40	Line synch. couple	.00002
41	V12 cathode decouple	25
42	Line charge condenser	.01
43	V13 grid coupling	.02
44	V13 screen decouple	.5
45	Form correction	.01
46	Frame coil coupling	40
47	V14 screen decouple	.24
48	V14 grid coupling	.1
49	Frame charge condenser	2
50	V15 cathode decouple	25
51	Frame synch couple.	.01
52	V15 grid filter	.001

POWER PACK
RESISTANCES

71	EHT smoothing	1 meg.
72	EHT bleeder network (part)	1.8 meg.
73	EHT bleeder network (part)	1.8 meg.
74	EHT bleeder network (part)	1 meg.
75	Tube bias	470,000
76	Brilliance control	250,000
77	Focus control	2,000
78	Focus series resistor	330

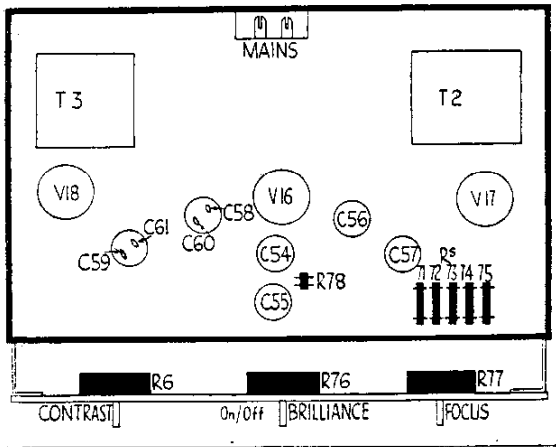
CONDENSERS

53	Tube bias shunt	.25
54	EHT smoothing	.1
55	EHT smoothing	
56	Scan unit HT smoothing	
57	Scan unit HT smoothing	
58	Scan unit HT smoothing	16
59	Vision unit HT smoothing	16
60	Vision unit HT smoothing	8
61	Vision unit HT smoothing	8



POWER PACK CHASSIS

The power supply section also has a chassis to itself. These diagrams give details (top on left) and the relative circuit description is above.



Printed in Great Britain and Published by the Proprietors, ODHAMS PRESS LTD., Long Acre, London, W.C.2.—May 6, 1939.