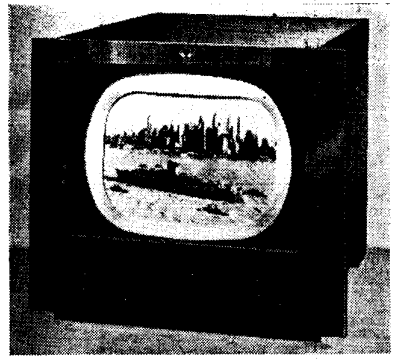
KOLSTER-BRANDES FV30, FV40, FT50



Nineteen valve television receiver fitted with 12in. CRT giving a 10 by 7½in. picture. Model FV30 is housed in highly polished walnut table cabinet and FV40, FT50 in similarly finished console cabinets. Versions available for each service area as indicated by suffix letters, L, B, etc. Suitable for 200-250V 50c/s. Made by Kolster-Brandes, Ltd., Footscray, Sidcup, Kent.

THE receiver is a superhet designed to operate on lower sideband of vision carrier. The RF and frequency-changer stages are common to vision and sound channels. A separate temperature-compensated local oscillator is employed. Vision interference and sound noise suppression circuits are incorporated; EHT is obtained from line flyback pulses. Mains consumption is approximately 130W.

Circuit shown is that of the London model. Circuit changes in Birmingham and Holme Moss receivers are described towards end of text.

Aerial input circuit is for 75-80ohm balanced twin feeder which is balanced to earth by R1 R2 and connected through isolating capacitors C1 C2 to primary L1 of aerial coupling transformer RFT1.

RF amplifier. Secondary L2 of RFT1 feeds grid of RF amplifier V1, gain of which is controlled by R3, **Contrast** control, in its cathode. Negative feedback across R7 compensates for changes in input capacity of V1 with variation of bias. Amplified signal at anode is single-peak transformer coupled by RFT2 to grid of mixer V2. Secondary L5 of RFT2 is damped by R11 to provide bandwidth to cover both vision and sound channels.

Oscillator, V10, connected as a triode in a modified Hartley circuit, employs slug-tuned inductance L3 and temperature compensating capacitors C5 C6 to ensure frequency stability. Bias is developed on C7 with R5 as leak. Output is taken from grid by C8 and fed to signal grid of mixer V2.

Mixer. RF and oscillator signals fed to grid V2 produce across primary L6 of IFT1 a vision carrier IF of 16.5mc/s and sound IF of 20mc/s.

Vision channel consists of two IF amplifiers V3, V4, signal rectifier V5A, interference limiter V5B, and video amplifier V6. Single-peak IF transformers are employed, alignment being staggered to give a bandwidth of 2.75mc/s. Sound-on-vision rejection at 20mc/s is given by L23 C39 in grid of first sound IF amplifier V11 and by L12 C19, inductively coupled to IFT3, in anode of V4.

Video signal is developed across R18 C23 and DC coupled, through peaking coil L13 damped by R19, to grid of video amplifier V6, the output of which is fed direct to cathode of CRT. **Picture Definition** control T1 across video amplifier cathode load R24 enables degree of feedback at higher frequencies to be adjusted.

Interference limiter is diode V5B connected with cathode to anode of video amplifier V6 and its anode down to chassis through R80 R20 C22. Anode is biased positively from R20, the **Noise Limiter** control, so that with peak white signal the diode is just cut-off. When an interference pulse of greater amplitude than peak-white appears with video signal then V5B conducts and short circuits the interference pulse to chassis through C22.

Sound channel consists of two IF amplifiers V11 V12, signal rectifier V13A, noise suppressor V13B, AF amplifier V14 and sound output valve V15.

Sound IF of 20mc/s is taken from anode of mixer V2 and fed by C9 to L23 C39 in grid of first sound IF amplifier V11. The anode of this is bandpass transformer coupled by IFT4 to V12 another bandpass transformer feeds rectifier V13A. Audio signal across R53 R54 is fed through series noise suppressor V13B and **Volume Control** R55 to triode AF amplifier section of V14 thence passed by C52 to beam-tetrode ouput amplifier V15. A transformer OP1 drives a 6in. PM speaker L28.

Noise suppressor. This is a carrier-biassed differential, or rate-of-rise, circuit. The demodulator diode V13A feeds a bridge circuit, the two arms being R53 R54, and R52 C46. C49 in series with C46 is the diode feed capacitor. The suppressor diode V13B is connected with its cathode to the junction of R53 R54, and its anode, via R55, to the junction of R52 C46. The anode is normally positive to the cathode and the valve conducts, passing the AF signal to volume control R55. On interference pulses, the time constant of R55 with associated stray capacity is such that the anode cannot follow the cathode and the valve cuts off.

Sync separator. Signal at anode of video amplifier V6 is fed through R25 C25 to grid of sync separator V7. Positive sync pulses drive the valve into grid current and the resultant bias produced across R26 is sufficient to place video portion of signal beyond cut-off; thus only the sync pulses appear at anode. Anode and screen voltages are low to shorten grid base and ensure separation on weak signals.

Line sync pulses are developed across L14 and fed by C26 to anode of line scan oscillator V17.

Frame sync pulses are developed across R28, differentiated on R29 C27 and applied through C28 R31 to triode limiter V8A. Grid of this valve is provided with a small positive bias through R32 R35 and is fitted with stopper R31. The bias is just enough to cause positive half-cycle of sync signal to drive V8A into grid current thus attenuating the smaller amplitude line sync pulses. The larger frame pulses are amplified by V8A and fed through C31 to grid of frame scan oscillator V8B.

Frame scan oscillator is triode V8B operated as grid-blocking oscillator with anode-grid back coupling by transformer FT1. Scan wave-form is developed on C32. Variation of series grid resistance by R40 gives **Vertical Hold** and adjustment of oscillator HT by R37 gives **Height** control.

Frame amplifier. Scan waveform on C32 is fed through correcting network R41 C33 and C34 to grid of beam-tetrode amplifier V9. Amplified waveform is transformer coupled by FT2 to frame deflector coils L19 L20 on CRT. **Vertical Linearity** is controlled by variation of anode-grid negative feedback by R42. R46 R47 damp deflector coils to prevent ringing.

Line scan oscillator is triode V17, a grid-blocking oscillator with back-coupling by LT1. Scan waveform is developed on C59. Variation of series grid resistance by R68 gives **Horizontal Hold** and adjustment of oscillator HT by R66 gives **Horizontal Drive** control.

Line amplifier. Waveform on C59 is fed through correcting network R69 C58 to beam-tetrode V18 which is auto-transformer coupled by LT2 to line deflector coils L33 L34. **Width** of line scan is adjusted by tappings on anode section of LT2.

Reclaim rectifier. Additional HT for anode and screen of line amplifier V18 and for anode V14 and screen of V15, the sound AF and output valves respectively, is provided by V20 which damps out flyback oscillations set up in LT2 when V18 cuts off.

Additional HT is stored on C62. L36 which is in series with HT feed to V20 and line amplifier V18 provides control of **Horizontal Linearity.**

EHT of approximately 10kV for anode of CRT is obtained by rectification by V19 of the high surge voltage set up across overwind on line auto-transformer LT1 when V18 is cut off. Heater current for rectifier is obtained from winding L35 on LT2. EHT is smoothed by C60 and fed direct to anode of CRT.

HT comes from metal rectifier MR1 which is fed through limiter R78 from 250V tapping on primary L41 of valve heater transformer MT1. Choke-capacity smoothing is provided by L42, C63, C64. HT line is RF decoupled by C13.

Reservoir capacitor C63 should be rated to handle 500mA ripple current.

Heaters. V1-7 V10-15 are parallel connected and obtain their current from secondary L40 of MT1. V8, V9 and V17, V18 are also parallel connected and fed from secondary L37. V20, the reclaim rectifier, is fed from high-voltage insulated secondary L39. CRT heater is supplied from secondary L38.

Mains input transformer is tapped for 200-250V 50c/s AC. S1, ganged to **Brightness** control, is

VOLTAGE READINGS

V	Type	A	G_2	K	Remarks
1	8D3—6AM6	228	228	1.8	R3 at max. R55,
2	8D3—6AM6	240	240	3.2	R61, R64 at min.
3	8D3—6AM6	240	240	1.5	All slider controls
4	8D3—6AM6	230	230	1.5	at top of slots.
5	6AL5	—	—	K_2 210	
6	8D3—6AM6	210	240	2	
7	8D3—6AM6	90	26	0	
8	6SN7GT A	.2	—	0	G 40V negative
	6SN7GT B	95	—	0	G 40V negative
9	6V6GT	240	240	25	
10	8D3—6AM6 —6BA6	97	97	0	
11	8D3—6AM6	240	240	1.7	
12	8D3—6AM6	230	240	1.8	
13	6AL5	—	—	—	
14	6Q7GT	50	—	0	
15	6V6	230	260	25	G=6V.
16	C12B	10KV	—	210	
17	6J5GT	80	—	.3	
18	6BG6G	—	268	0	G=15 negative.
19	EY51	—	—	10KV	
20	5V4G	250	—	275	

Total HT current through MR1=230mA.
Total mains consumption=530mA.
Voltage on reservoir smoothing capacitor=280V.
Smoothed voltage=250V.
Focus coil voltage=25V approx.

8D3 or 6AM6	6AL5	6SN7GT	6V6GT	6Q7GT	C12B	6J5GT	6BG6G	EY51	5V4G	6BW6	6AT6
V1-4, 6, 7, 10, 11, 12	V5, 13	V8	V9, 15	V14	V16 - CRT	V17	V18	V19	V20	V9, 15	V14

ON/OFF switch. Live mains lead incorporates a 1.5A fuse. Earth socket is connected to chassis through R77.

CRT is a Brimar C12B 12 in. triode. Electromagnetic focusing is employed, the focus coil L29 being shunted across cathode load of sound output valve V15, the cathode current of which is adjusted by variation of bias by R61 the **Focus** control.

Video signal is fed to cathode of tube and picture brilliance is adjusted by variation of grid voltage by R64 the **Brightness** control.

Recent issues of the receiver have been modified as follows:—

Frame amplifier V9 and sound output valve V15 are the type 6BW6—this valve has identical characteristics to the 6V6 but has the B9G base. Sound AF amplifier V14 is type 6AT6 with B7G base. The diodes are not connected in parallel with noise limiter V13B diode anode but are earthed.

Receivers suffixed with letter B differ from the circuit as follows:—R11 deleted, R12 changed to 360 ohms. C1 C2 changed to 7pF and C5 C6 changed to 18pF and 12pF respectively. L1 L2 L4 L5 changed to cover the appropriate frequencies. Core of L3 replaced by iron dust type.

Receivers suffixed with letter H differ from the circuit as follows :—C1 C2 changed to 7pF. C5 C6 changed to 132 and 66pF respectively and connected in series across L3. An additional 33pF capacitor is shunted across C5. L1 L2 L4 L5 changed to cover appropriate frequencies. Core of L3 replaced by iron dust type.

ALIGNMENT INSTRUCTIONS

Apparatus required: signal generator covering 15-60mc/s, Avo or DC valve voltmeter and power output meter. Connect Avo or DC valve voltmeter between g1 of V6 and chassis. Connect power output meter across secondary L27 of OP1. Remove V10 and place R3 fully clockwise.

Inject 16.66mc/s (L & B), 16.06mc/s (H) to aerial input and trim L6/7 for maximum vision output. Change to 18.82mc/s (L & B), 18.22mc/s (H) and trim core L8/9 for maximum vision output.

Unscrew core L12 (top) until top of core is flush with top of can. Change to 17.71mc/s (L & B), 17.10mc/s (H) and trim L10/11 (bottom) for maximum vision output.

Change to 20mc/s (L & B), 19.4mc/s (H) and modulate signal. Detune L24 by unscrewing core until it is half out of former. Trim L25 (bot.) for maximum sound output. Detune L22 and trim L24 (top) for maximum sound output. Detune L21 and trim L22 (bot.) for maximum sound output. Detune L23 and trim L21 (top) for maximum sound output.

Replace V10 and inject 41.5mc/s (L), 58.25mc/s (B), 48.25mc/s (H) modulated signal to aerial input.

Trim L3 for maximum sound. Increase sig-gen output to give reasonable indication on vision output meter and trim L12 L23 for minimum vision output.

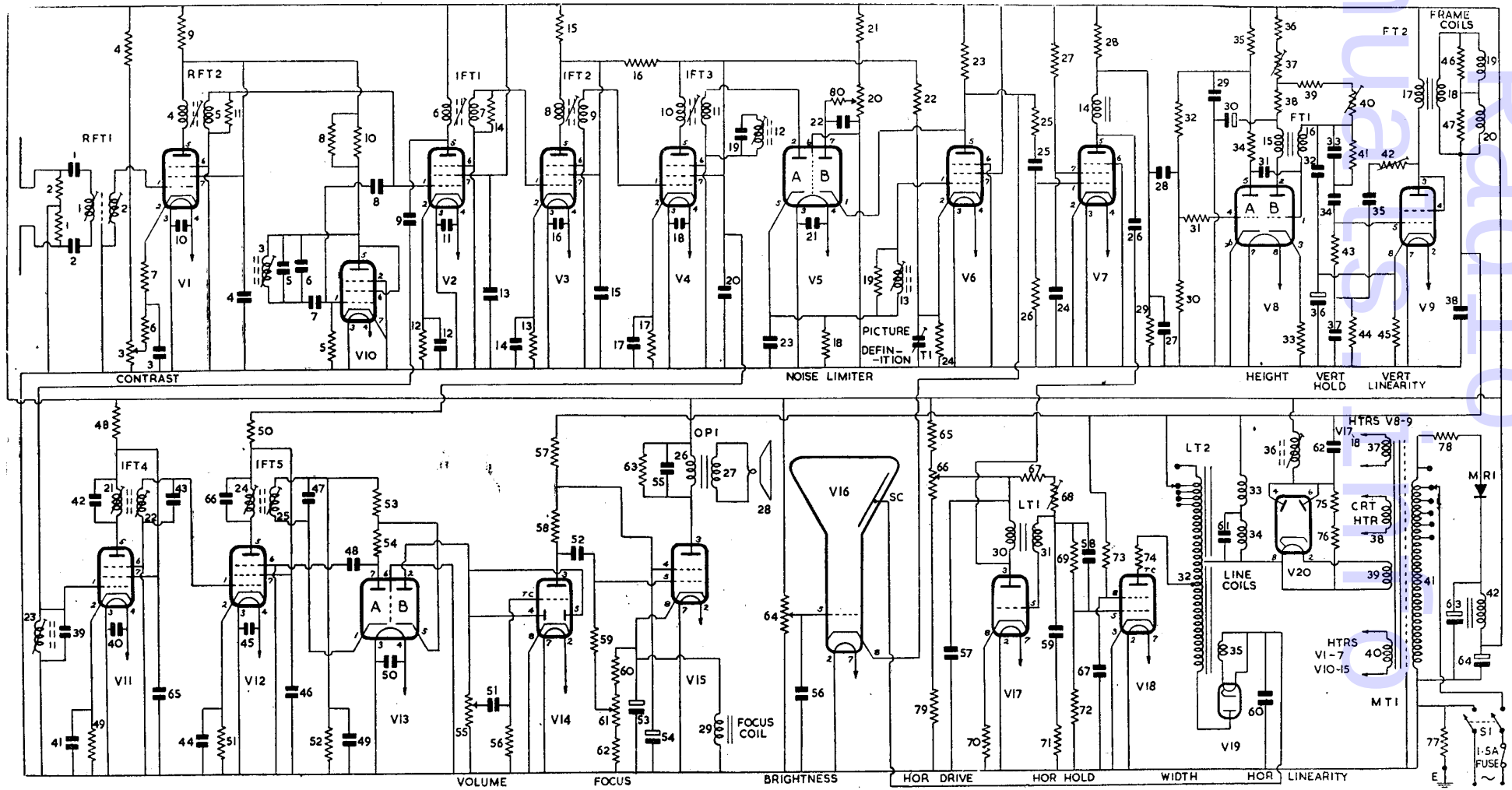
Inject 43.25mc/s (L), 60mc/s (B), 50mc/s (H) to aerial input. Trim L4/5 for maximum vision output.

Damp L1 with 40pF capacitor and trim L2 for maximum is ion output. Damp L2 with 40pF and trim L1 for maximum vision.

With receiver connected to aerial and utilising transmission of test pattern place T1 fully anti-clockwise and adjust core L13 for maximum picture definition consistent with acceptable amount of " overshoot."

INDUCTORS

L			Ohms
1–12	...	...	Very low
13	...	...	35
14	...	...	60
15	...	...	100
16	...	...	300
17	...	...	800
18	...	...	.5
19	...	...	5.25
20	...	...	5.25
21–25	...	...	Very low
26	...	...	500
27	...	...	.5
28	...	...	2.5
29	...	...	730
30	...	...	20
31	...	...	20
32	...	...	580 total
33	...	...	5.25
34	...	...	5.25
35	...	...	Very low
36	...	...	6.5
37–40	...	...	Very low
41	...	...	25
42	...	...	145



CAPACITORS

C	Capacity	Type
1	3.9pF	Temp Co-eff.
2	3.9pF	Temp Co-eff.
3	3000pF	Tubular 350V
4	3000pF	Tubular 350V
5	39pF	Temp Co-eff.
6	22pF	Temp Co-eff.
7	50pF	Tub. Ceramic
8	3pF	Tubular Ceramic
9	5pF	Tubular Ceramic
10	.01	Tubular 150V
11	.01	Tubular 150V
12	.003	Tubular 350V
13	.003	Tubular 350V
14	.003	Tubular 350V
15	.003	Tubular 350V
16	.01	Tubular 150V
17	.003	Tubular 350V
18	.01	Tubular 150V
19	200pF	Silver Mica
20	.003	Tubular 350V
21	.01	Tubular 150V
22	.1	Tubular 350V
23	10pF	Silver Mica
24	.1	Tubular 350V
25	.02	Tubular 500V
26	30pF	Silver Mica
27	.001	Tubualr 350V
28	.05	Tubular 500V
29	.05	Tubular 500V
30	2	Electrolytic 350V
31	220pF	Silver Mica
32	.1	Tubular 350V
33	2500pF	Silver Mica
34	.1	Tubular 350V
35	.05	Tubular 350V
36	50	Electrolytic 50V
37	.005	Tubular 500V
38	.1	Tubular 500V
39	100pF	Silver Mica
40	.01	Tubular 150V
41	.003	Tubular 350V
42	20pF	Silver Mica
43	200pF	Silver Mica
44	.003	Tubular 350V
45	.01	Tubular 150V
46	.001	Tubular 350V
47	40pF	Silver Mica
48	:1	Tubular 350V
49	50pF	Tubular Ceramic
50	.011	Tubular 150V
51	.01	Tubular 150V
52	.01	Tubular 350V
53	30	Electrolytic 25V
54	8	Electrolytic 350V
55	.005	Tubular 750V
56	.003	Tubular 350V
57	.1	Tubular 350V
58	.1	Tubular 350V
59	1000 or 500pF	Silver Mica
60	.005	Visconol 12.5KV
61	125pF	Silver Mica 750V
62	.25	Tubular 350V
63	60	Electrolytic 350V
64	100	Electrolytic 350V
65	.001	Tubular 350V
66	35pF	Silver Mica
67	.1	Tubular 350V

RESISTORS

R	Ohms	Watts
1	470K	¼
2	470K	¼
3	5K	WW Potr.
4	200K	¼
5	22K	¼
6	100	¼
7	47	¼
8	47K	½
9	220	¼
10	47K	¼
11	3.9K	¼
12	1K	¼
13	150	¼
14	6.2K	¼
15	220	¼
16	220	¼
17	150	¼
18	2.7K	¼
19	33K	¼
20	100K	Slider Potr.
21	18K	¼
22	33K	2W
23	4.7K	2W
24	150	¼
25	10K	¼
26	390K or 680K	¼
27	1M	¼
28	68K	¼
29	56K	¼
30	82K	¼
31	1M	¼
32	270K	¼
33	220	¼
34	150K	¼
35	330K	¼
36	22K	¼
37	100K	Slider Potr.
38	10K	¼
39	150K	¼
40	500K	Slider Potr.
41	390K	¼
42	100K	Slider Potr.
43	470K	¼
44	33K	¼
45	3.3K	¼
46	220	¼
47	220	¼
48	220	¼
49	150	¼
50	220	¼
51	150	¼
52	240K	¼
53	15K	¼
54	11K	¼
55	500K	Potr.
56	10M	¼
57	2.4K	¼
58	470K	¼
59	470K	¼
60	10K	¼
61	100K	Potr.
62	68K	¼
63	33K	¼
64	500K	Potr with switch
65	47K	¼
66	50K	Slider Potr.
67	120K	¼
68	500K	Slider Potr.
69	1M	¼
70	560 or 1.5K	¼
71	5.6K	¼
72	1M	¼
73	2.7K or 3.9K	¼
74	47	¼
75	68K	¼
76	68K	¼
77	1M	¼
78	10	1
79	22K	¼
80	100K	¼