GEC CLEANER—*Continued*

the motor and return it to the factory for overhaul.

Removal of motor and fan unit. Remove end cap of cylinder. Disconnect both leads from switch terminals. Slide back insulated sleeve on black mains lead, remove Screwit connector and untwist the two joined wires. Undo and remove the bolt securing cable cleat and earth leads to cylinders.

Remove other end cap and dust bag and stand the machine on end, with motor uppermost, preferably on suitably protected surface to avoid scratching end of cylinder. Place hook of special spring-lifting tool under the curl of one spring and, with the machine steadied by both knees, pull the spring upward sufficiently to allow it to be moved over edge of motor frame and released (Fig. 4). Next remove spring which is diagonally opposite and then the remaining two springs. Motor and fan can now be withdrawn from cylinder.

Dismantling motor. If it is necessary to dismantle the motor and fan unit to replace armature, field coils, bearings or fan runners, the following procedure must be adopted.

Warning. A wattmeter or alternative method of accurately measuring the machine's consumption, and a water gauge capable of accommodating 60in. of water lift, are essential requirements for the satisfactory reassembly of this unit if either armature or field coils have to be replaced or brush position altered.

Removal of fans. Carefully pull off outer steel end cap. Hold outer fan runner, taking particular care not to damage it by distortion, and remove the righthand-threaded nut on end of armature shaft. Remove spring washer, clamp washer and then outer fan runner. Ease out the centre baffle plate. Slide off the flanged spacer, inner fan runner, and finally inner flanged collar and hard felt dust washer.

Removal of fan end bearings or armature. Proceed as above to remove the fans, then lift carbon brushes clear of the commutator. Remove the four screws holding motor frame to pressed steel end cover. Armature end cover may now be drawn off the frame dowel pins as a combined unit. The three screws inside the end cap retaining the bearing cap should now be removed. End cap should be pushed back on armature shaft and bearing withdrawn from shaft by means of a suitable extractor tool.

Replacement of field coils. Spare field coils *will not* be supplied and if these fail the fitting of complete stator iron and coils is necessary. For replacement of defective field coils a complete assembly of coils, stator iron and motor frame is available and replacement is effected by the transfer of the brush gear and commutator end bearing from the defective unit to the replacement assembly. The commutator end bearing is a self-aligning oil-retaining type with a felt pad reservoir housed in spot-welded pressed-steel bearing caps, fastened to the frame by three screws.

Reassembly of motor, etc. To reassemble motor and fan unit the above detailed procedure should be reversed. The plate carrying the brush holders should be provisionally set at the mid point of adjustment. It should also be ensured during reassembly that the fan end ball bearing is suitably packed with high speed light bearing grease—Shell Albania Three, any Lythgen grease, or Skefco ball race grease. General medium greases are not to be used owing to the motor's normal operating speed.

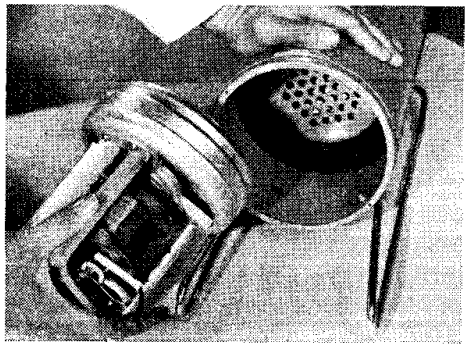


Fig. 5—Showing moulded rubber motor mounting ring and baffle

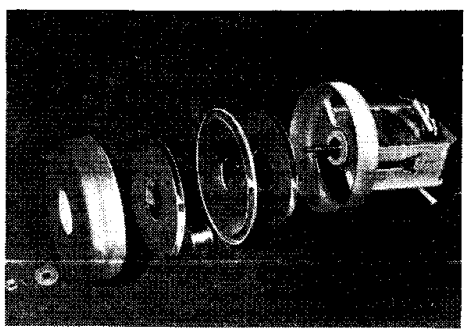


Fig. 6—Motor with exploded view of fan assembly

When fully assembled the machine should be run up to speed, preferably by means of a variable voltage control, to check balance of armature and fan assembly. Balance of assembly may be satisfactorily obtained by rotating the outer fan runner relative to the armature shaft in 10deg. stages until a position is reached in which no undue vibration is felt during the run up and at the operating speed. Care must be taken after each adjustment of fan runner position on shaft that the fan runners are clear in their housing and that the shaft end locking nut is tight before carrying out a test run. A wattmeter should now be inserted in the supply mains, and with machine operating on an open orifice, the brush position adjusted until sparkless commutation is obtained and an input of between 390-400 watts is indicated in conjunction with a water gauge of 40-44in.

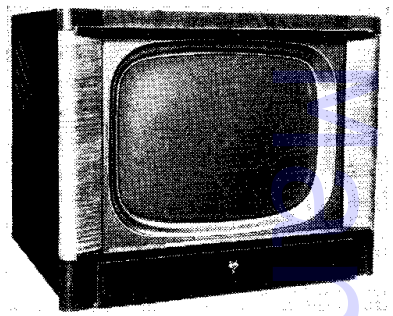
Instructions for fitting radio and TV suppressor unit assembly. Remove motor and fan unit as described above. Fit suppressor unit to motor frame and connect condenser earth lead (black) with screw and nut provided. Connect field coil leads to chokes making connections to solder tags, pairing up with condenser leads (red). Refit motor unit, off-setting motor 180deg. from original position (this is to prevent switch fouling suppressor unit). Connect red lead to switch. Connect black lead to mains cable with Screwit connector and refit cable cleat and earth clamp. Replace end cover and test.

Important. If it is necessary to return the motor for repair, the serial number of the machine must be quoted in the advice note and correspondence.

VIDOR CN4217, 4218

Prices and release dates: CN4217, £75 12s. 0d. (£56 11s. 0d. plus £19 1s. 0d. tax), September, 1953; CN4218, £66 3s. 0d. (£49 9s. 7d. plus £16 13s. 5d. tax), October, 1953.

Fourteen-valve five-channel television receivers employing rectangular grey screen CRT. Suitable for 194-255V DC and AC 50c/s. Manufactured by Vidor, Ltd., Erith, Kent.



BOTH receivers are table models using the same chassis and differing only in size of CRT. Model CN4217 is fitted with a 17in., and model CN4218 with a 14in. CRT.

The receivers employ a superhet circuit operating on lower sideband of vision carrier. RF, frequency-changer and first IF stage are common to both vision and sound channels. Aerial input, RF and oscillator circuits are separately tunable over a range covering all five BBC television channels.

Vision interference and sound noise suppression circuits are incorporated, the former being provided with a plug and socket switch giving a choice of two degrees of limiting and an off position. EHT is obtained from line flyback pulses. Mains consumption is 120 watts approximately.

Aerial input is for use with 75 ohms coaxial feeder. The outer screen of cable should be connected to the large pin of aerial plug. Feeder is isolated from chassis by R1 C1 and C2 C3. L1A C2, tuned to 16 mc/s, function as an IF filter, and L1B C4 is a second-channel rejector.

Sensitivity. This is a three-position plug and socket type of control in cathode circuit of RF amplifier V1 which allows the gain of this valve to be coarsely adjusted to suit local conditions. Normally the Sensitivity control should be adjusted to permit Contrast control to operate around its mid-setting position.

Contrast control R5 gives a fine adjustment of cathode bias and hence gain of RF amplifier V1 and common vision and sound IF amplifier V3.

Vision Noise Limiter is a three-position plug and socket type of control which brings into circuit load resistors R19 R20 across interference limiter diode V5B, which is connected between anode of video amplifier V6 and chassis through C26. Maximum degree of limiting is given in position 3 of plug when R19 only is shunted across V5B. With plug in position 2 then R19 R20 are in circuit and limiting action is reduced. In position 1 of plug the diode is placed inoperative by disconnecting its shunt load resistor.

Brightness control R25 varies the positive bias applied to grid of CRT. R25 in series with R24 are connected as a potential dividing network across the HT line.

On-Off switch S1, which is a double-pole type breaking both mains leads to receiver, is controlled by spindle of Brightness control.

Fuses F1, F2 are 1¼in. tubular glass type rated at 1A each.

Mains voltage adjustment is accomplished by a single plug located just above fuses on rear face of line output transformer screening box. It is in effect a shorting plug which in the 205V setting short circuits sections R73 to R76 of mains dropper resistor. In 225V setting only sections R74 R75 are shorted, whilst in its 245V position all sections of the dropper are in circuit.

HT is provided by two indirectly-heated half-wave rectifiers V16 V17 which are connected in parallel. Choke-capacity smoothing is by L22 C67 C68. Reservoir smoothing capacitor C68 should be rated to handle 500mA ripple-current. Note that neutral mains lead is connected to chassis through R70 to provide a negative bias of approximately 6.3V for grid of video amplifier, etc. Bias voltage is smoothed by C69.

Heaters of all valves, except V15, are wired in a series circuit and fed from the mains through R77 and thermal surge limiter R78 shunted by R79. R78 is a Brimistor type CZ1 or Mullard Varite VA1005.

Volume control R31 is in cathode of demodulator diode V9A and controls amount of signal fed to cathode of series type sound noise suppressor diode V9B.

Vertical hold control R48 varies time constant of charging network of capacitors C49 C51 in grid of triode frame scan blocking oscillator section of V11.

Height of picture is adjusted by R52 which varies HT to anode of frame scan oscillator. To maintain correct frequency of oscillation with variation of HT voltage by R52, the Vertical Hold control network is connected to slider of Height control.

Vertical linearity is controlled by R51, which allows negative feedback, applied from anode to grid V12A, to be adjusted to correct input waveform. R81, which is mounted on top of deflector coil assembly, together with C72, compensates for changes in frame height and linearity which occur due to heating up of deflector coil assembly.

Horizontal hold. Line-scan waveform is developed by a phase reverser V12B used in conjunction with a pentode amplifier V14. The circuit is caused to oscillate by feedback, from secondary of line output transformer LT1, applied through C63 to grid of phase reverser V12B. Frequency of oscillation is controlled by adjustment of grid resistance of V12B by R58, the Horizontal Hold control.

Continued on page 35.

Component values are given in the circuit diagram and are always below the code numbers.

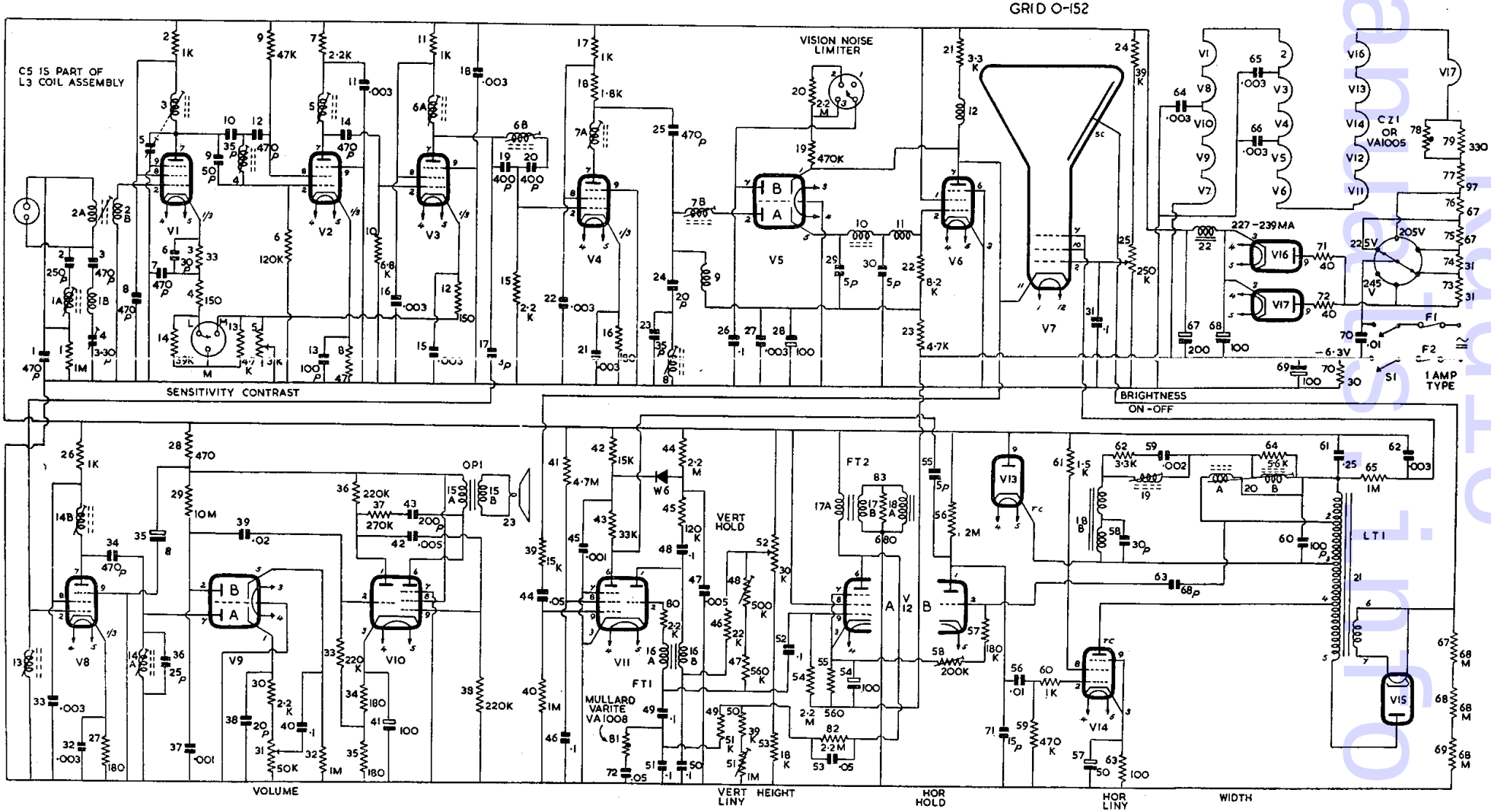
RESISTORS

¼ watt type—R53
1 watt type—R21, R64, R70
1 ,, ,, —4kV working R67, R68, R69
2 ,, ,, —R63
3 ,, ,, —R5, R52, R62
5 watt type—R61, R71, R72
6 watt type—R75, R76, R79
7.5 ,, ,, —R73, R74
8.75 ,, ,, R77
R5 is a wirewound type potentiometer.
R25, R48, R58 are linear carbon potentiometers.
R31, R51 are log carbon potentiometers.
R81 is a Mullard Varite VA1008.
R78 is a Brimistor CZ1 or Mullard Varite VA1005.
All other resistors are ¼ watt type.

CAPACITORS

Silver Ceramic 250V—C1, C3.
,, 350V—C7, C8, C11, C12, C14, C15, C16, C18, C21, C22, C25, C27, C32, C33, C34, C62, C64, C65, C66.
,, ,, 500V—C17, C29, C30, C63.
Silver Mica 350V—C2, C6, C9, C10, C13, C19, C20, C23, C24, C36, C38, C43, C55, C71.
5kV Pulse type—C58.
Tubular 350V—C26, C31, C37, C39, C40, C42, C44 to C53, C56, C61, C72.
,, 300V AC—C70.
Electrolytic 25V—C28, C41, C54, C57, C69.
,, 275V—C35, C67, C68.
Silver Ceramic 3.5kV—C60.

	EF80	EF80	EF80	EF80	EB91	PL83	MW43-64 OR MW36-24	PY82
A	175	174	173	159	50 (B)	173	12·3KV	207RMS
G2	175	76	173	175	—	190	141	—
K	2-4·7	·28	2-4·8	2	173(B)	0	173 GRID 0-152	202



	EF80	EB91	ECL80	ECL80	ECL80	PY81	PL81	EY51
A	177	NO READINGS	59 172	160 90	171 20	190	NO READING	—
G2	177		— 181	10 —	190 —	—	159	—
K	2·1		6·3	0	8·9	416	14·9	12·3KV

Additional HT for anode of line amplifier V14 and second and third anodes of CRT is provided by charge built up on C61 by V13 when it rectifies and damps out shock oscillation set up in LT1 at end of each line scan.

Horizontal linearity is controlled by adjustment of inductance of series coil L19, the core of which operates on a high DC flux density induced by field of a permanent magnet. This causes the coil to act as a variable inductance over the scanning cycle, being low at the end of the cycle due to saturation.

Width of line scan is controlled by a differential circuit consisting of a variable coil L21A shunted across section of line output transformer LT1, and a variable coil L21B connected in series with deflector coils. Increase of inductance of one coil gives reduction of inductance of the other and thus transformer loading is maintained constant.

Adjustments

Horizontal linearity control is situated on top right-hand side of chassis. Care should be taken not to touch tags connected to coil. Position of magnet relative to coil is adjusted at factory and will not normally require alteration. If, however, it has been disturbed the plunger should be set half-way in coil and then magnet position adjusted to give optimum linearity. The white spot on magnet should point towards rear of chassis.

Ion trap should be placed on neck of tube with its arrow pointing to rear of chassis and rotated 180 degrees from etched line on neck. Adjust by moving it along neck and rotating slightly to give maximum picture brightness. There may be two positions along neck of tube which fulfil this condition—the position towards rear of tube is the correct one.

Removal of chassis from cabinet. Remove back of cabinet. Remove the two wood runners secured on underside of cabinet by three screws each. Undo and remove the four chassis-fixing screws exposed by removal of above runners. Unplug speaker lead from socket on chassis. Chassis can now be withdrawn.

When replacing chassis, check to see that the dust-excluding rubber band around face of tube engages around implosion guard moulding.

Removal of CRT. Unplug socket from base of tube, remove ion trap and disconnect anode lead from side cap of tube. Slacken one pair of screws at top of clamping strap and undo and remove the other pair. Support front of tube by placing one hand under flare so as to hold it against the body, and then carefully withdraw tube, keeping it perfectly parallel.

When replacing tube make sure that the two springs contacting the aquadag outer coating are inserted between rubber band and metal clamping strap, and that the insulating washer is inserted over neck of tube between rear end of deflector coils and its clamping plate.

Adjustment of focus bracket. Loosen the four screws at base of bracket, loosen the two screws at top which secure bracing straps, loosen the two screws securing deflector coil clamp plate. Focus bracket can now be repositioned. When retightening the two clamp plate screws, check to see that both plate and deflector coils are as far forward on neck of tube as possible.

Removal of line output transformer. Remove top and side panel of transformer screening box. Unsolder EHT lead from contact on transformer, and also the three leads which come up through chassis. Unplug top connectors from V13 V14. Transformer can now be withdrawn by undoing the four nuts securing it to bolts on chassis.

Alignment Procedure

Apparatus required. Insulated trimming tools, 500 ohm resistor, 0-500 microammeter, 0-50 milliwatt output meter, signal generator. The latter should have a reliably calibrated attenuator and be able to give up to 0.1V output, with an output impedance of 80ohms.

When carrying out RF alignment or taking RF sensitivity or bandwidth measurements, it is important that the output impedance is about 80ohms. If generator output impedance is not 80ohms, the appropriate correcting series or parallel resistor should be incorporated between generator and receiver.

Unsolder earthy end of vision diode load reistor R22 and connect microammeter in series, positive of microammeter to resistor, negative to tag from which resistor was unsoldered. Connect output meter across primary of sound output transformer. Set contrast control in approximate centre of track and set sensitivity control in high gain position. Allow receiver to warm up for 10-15 minutes before attempting re-alignment.

Sound IF Alignment

Connect generator between pin 2 of V2 and chassis. Inject modulated 19.5 mc/s signal and tune 1st and 2nd sound IF coils (L13 and L14A) for maximum output, reducing input as gain increases. Repeat until maximum gain is achieved.

Sound Rejection

Inject 19.5 mc/s CW, increasing input to give about 60 microamps reading on microammeter. Tune L6B and L8 for minimum reading on microammeter, increasing input as correct alignment is approached. Inject 19.5 mc/s modulated signal and re-check sound IF alignment.

Vision IF Alignment

Inject 18.7 mc/s CW and adjust input to give about 300 microamps reading in microammeter. Tune 1st vision IFT L5 for maximum output. Inject 16.75 mc/s CW as above and tune 2nd vision IFT L6A for maximum output. Connect 500ohm resistor across secondary connections of 3rd vision IFT L7B. Inject 16.35 mc/s CW and tune 3rd vision IFT primary L7A for maximum output on microammeter. Now connect 500 ohm resistor across L7A inject 17.45 mc/s CW and tune L7B for maximum output. Remove resistor.

Channel 1

Connect generator to aerial socket. Inject modulated 41.5 mc/s and tune L4 for maximum sound output (1st peak with core coming out). Inject 43 mc/s CW and tune L3 for maximum output on microammeter. Inject 43 mc/s CW and tune L2 for maximum output on microammeter. Inject 16 mc/s CW and increase input until a reading is obtained on microammeter.

Tune IF rejector L1A for minimum response (contrast control will probably have to be turned up to maximum gain). Leave contrast at maximum gain. Inject 78 mc/s CW and increase input until reading is obtained on microammeter. Tune 2nd channel rejector C4 for minimum output.

For other channels, refer to the following table of alignment frequencies, all in mc/s :—

	L2	L3	L4	C4
Channel 2	49.75	49.75	48.25	83.75
3	54.75	54.75	53.25	88.75
4	59.75	59.75	58.25	93.75
5	64.75	64.75	63.25	98.75

INDUCTORS

L		*Ohms*	
1A-4	...	Very low	
5	...	.4	
6A	...	.4	
B	...	.4	
7A	...	.75	
B	...	.75	
8	...	Very low	
9	...	.4	
10	...	Very low	
11	...	6	
12	...	6	
13	...	.3	
14A	...	.25	
B	...	.75	
15A	...	700	
B	...	.4	
16A	...	750	
B	...	490	
17A	...	1500	
B	...	3.5	
18A	...	15.5	
18B	...	43	
19	...	3.8	
20A	...	56	
20B	...	12	
21	...	1-2	6.3
		2-3	13.5
		3-4	10.9
		4-5	180
22	...	45	
23	...	2.75