TECHNICAL INFORMATION

BULLETIN NO. 139

(TYPE)

Cromwell + GULBRANSEN MODEL 720 7-VALVE DUAL WAVE RECEIVER.

same Bulletin does for both 720 + 722. very slight difference regards tubes.

17 July 1940

RECEIVER

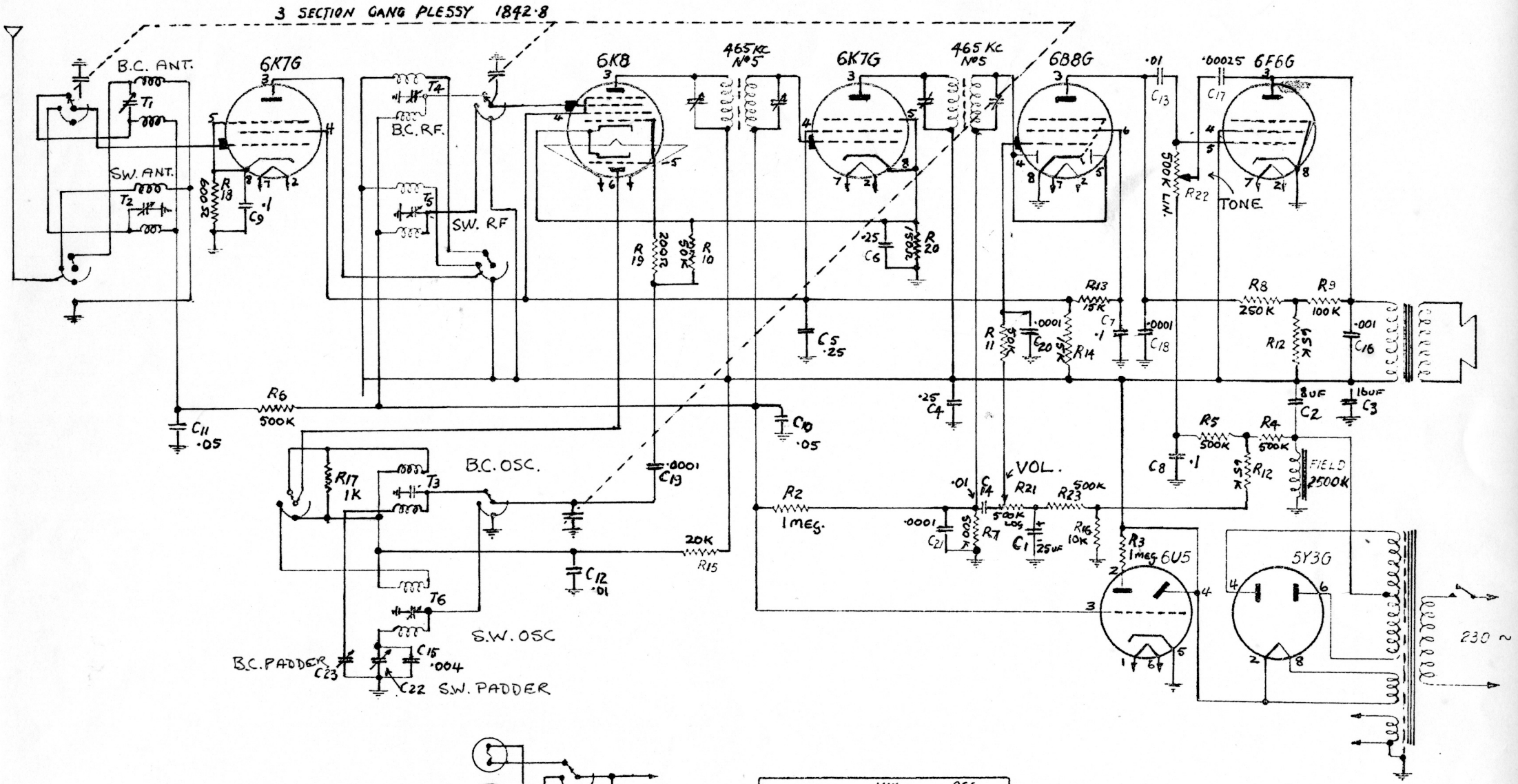
COLLIER & BEALE LTD.

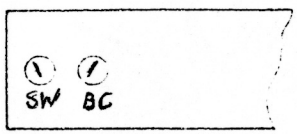
WELLINGTON

cil

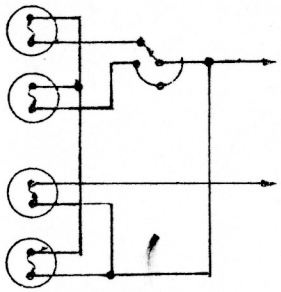
720

SCHEMATIC DIAGRAM ~ GULBRANSEN TYPE 720

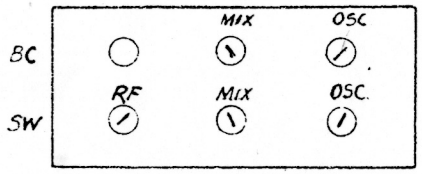




PADDER POSNS



DIAL LAMPS

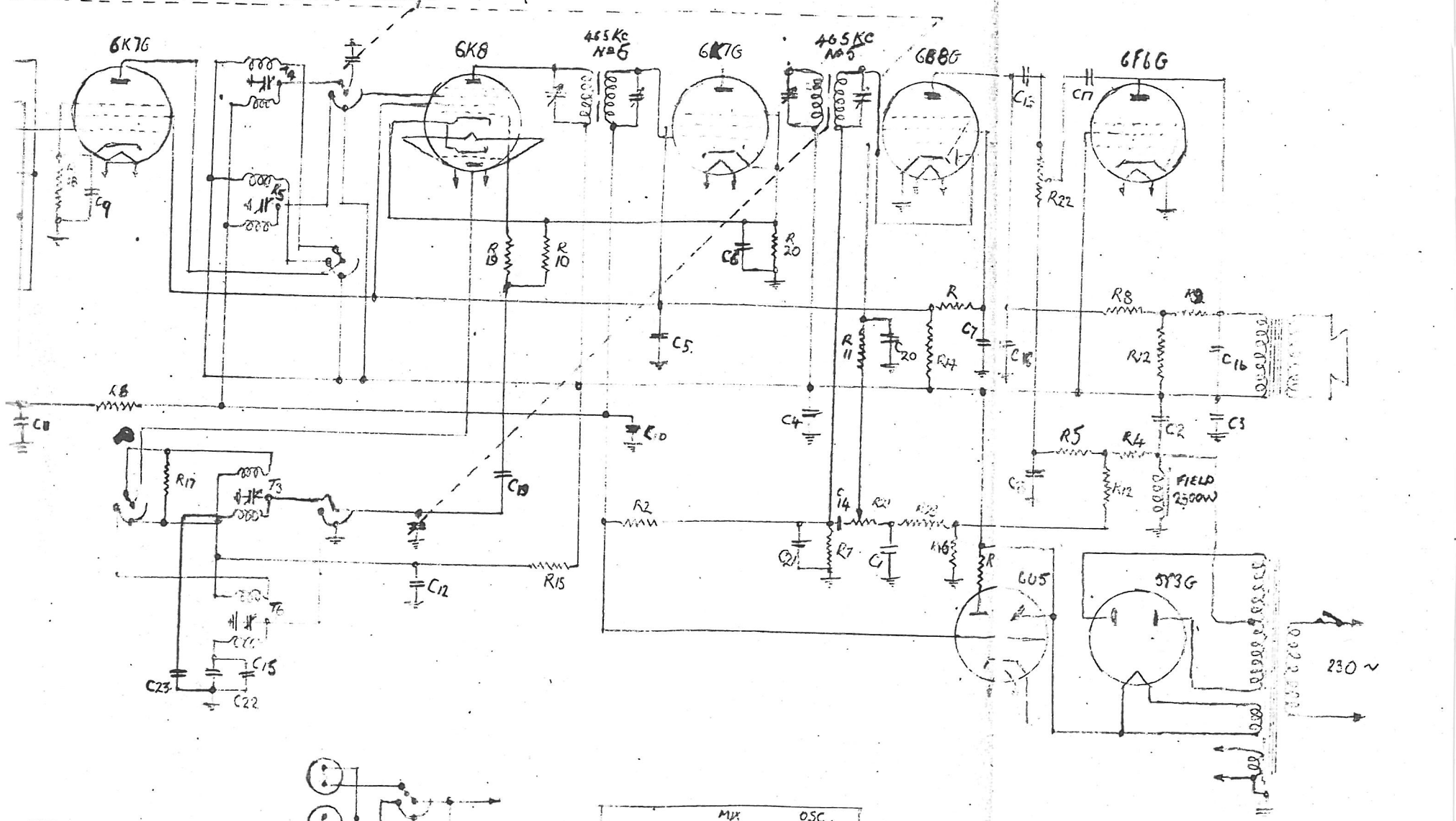


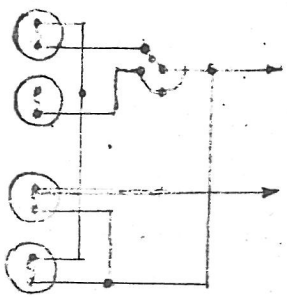
TRIMMER POSNS

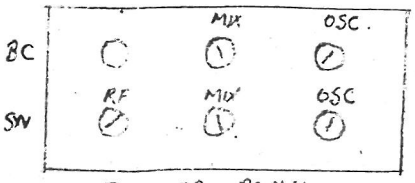
BC RF TRIMMER MOUNTED ON WAVE-CHANGE SWITCH

THIS APPLIES TO SERIAL Nº .....
OUR REFERENCE Nº .....
DRAWING Nº .....
COLLIER & BEALE LTD WELLINGTON
DATE .....

SCHEMATIC DIAGRAM ~ GULBRANSEN TYPE 720







BC RF TRIMMER MOUNTED WAVE-CHANGE SWITCH

720

THIS APPLIES TO SERIAL NO
OUR REFERENCE NO

RECEIVER.

CONDENSERS:

C-1	25-mfd.	Cathode by-pass condenser (1st A.F. stage)
2	8 ")	Power supply filter condensers
3	16 ")	
4	.25 "	H.T. R.F. by-pass
5	.25 "	Screen R.F. by-pass
6	.25 "	Cathode R.F. by-pass
7	.1 "	Screen by-pass (1st A.F. stage)
8	.1 "	A.F. bias filter
9	.1 "	Cathode R.F. by-pass
10	.05 "	A.V.C. filter
11	.05 "	" "
12	.01 "	Oscillator R.F. by-pass
13	.01 "	Audio coupling condenser
14	.01 "	" " "
15	.004 "	Fixed padding condenser, (S.W. band)
16	.001 "	Audio filter
17	.00025 "	Tone control condenser
18	.0001 "	R.F. plate filter
19	.0001 "	Oscillator grid condenser
20	.0001 "	R.F. grid suppressor
21	.0001 "	Diode load by-pass
22	2,000-mmfd.	Padding condenser, (S.W. band)
23	550 "	Padding condenser, (broadcast band)
T-1)		
2)		R.F. alignment trimming capacitors
3)		
4)		
5)		
6)		

RESISTORS:

R-1	.5-meg.	Screen feed (1st A.F. stage)
2	1 "	A.V.C. filter
3	1 "	Plate load (tuning indicator)
4	.5 "	Audio bias potentiometer
5	.5 "	" " filter
6	.5 "	A.V.C. filter
7	.5 "	Diode load
8	.25 "	Plate load (1st A.F. stage)
9	.1 "	Negative feed-back potentiometer
10	50-K-ohm.	Oscillator grid leak
11	50 " "	R.F. grid suppressor
12	65 " "	A.F. bias potentiometer
13	15 " "	Negative feed-back potentiometer
R-14	15-K-ohm.	Screen feed resistor
15	20 " "	Oscillator feed resistor
16	10 " "	A.F. bias potentiometer
17	1 " "	Feed-back equaliser (B.C. band)
18	600 "	Cathode bias resistor
19	200 "	Oscillator grid suppressor
20	150 "	Cathode bias resistor
21	.5-meg.	Volume control
22	.5 "	Tone control
23	.5 "	Audio bias filter

COLLIER & BEALE LIMITED,
66 GHUZNEE STREET,
WELLINGTON, C.2.
17th July, 1940.

720

TECHNICAL DESCRIPTION AND ADJUSTMENT PROCEDURE

OF 7-VALVE DUAL-WAVE RECEIVER

GULBRANSEN MODEL 720.

Model 720 receiver is of the Superheterodyne type and employs a total of 7 valves used in the following arrangement:-

1 - type	6U7-G	Signal frequency amplifier (both bands)
1 - "	6K8	Mixer oscillator
1 - "	6K7-G	Intermediate frequency amplifier (465-Kc/s.)
1 - "	6B8-G	Diode rectifier and 1st audio amplifier
1 - "	6F6-G	Power amplifier
1 - "	6U5	Visual tuning indicator
1 - "	5Y3-G	Power supply rectifier

The circuit embodied in this receiver is conventional, other than the use of series negative feed-back in the output stage.

Two frequency ranges are covered by a unit coil assembly, the range desired being brought into action by a panel operated switch of the type that short-circuits the unused coils in all sections, thus avoiding "trapping" of the band in use, and production of dead spots in the tuning range of the short-wave band.

As previously stated, the basic circuit is entirely conventional, and, other than the provision of high "Q" intermediate frequency transformers, with consequent limited band width and reduction of receiver back-ground noise, the only modification is in the audio frequency portion of the circuit. This modification, although a very simple one, materially reduces so-called pentode distortion by the application of negative feed-back in the output stage by the use of a series circuit. This is accomplished in Model 720 by feeding the anode of the first voltage amplifier (type 6B8) from a voltage dividing network across the output of the power amplifier stage. The resistors involved in performing this function are designated R-9 and R-13 in schematic diagram attached. In all other respects the receiver circuit is entirely conventional and adjustment, if ever required, should follow along orthodox lines.

As an aid in ensuring the correct adjustment procedure being applied, the following notes, which should be used in conjunction with the location plan of trimmer positions in Drawings Nos. 291 and 292, are included.

Intermediate Frequency Amplifier Alignment. The intermediate frequency used in Model 720 is 465-Kc/s., both transformers being adjusted for maximum output, and under no circumstances should a "staggered" adjustment be used as the "gain" of the whole receiver will be materially affected. Adjustment of these two transformers should be undertaken by first aligning the diode transformer alone, this being accomplished by clipping the signal generator lead on to the grid of the intermediate frequency amplifier tube (6K7-G) and adjusting for maximum output. The generator unit should then be transferred to the grid of the mixer tube (6K8) and the first transformer treated in a similar manner. In this latter adjustment it is desirable to make certain that the wave-band switch is in the "broadcast" position, otherwise the comparatively low impedance of the short-wave tuned circuits at this test frequency will place the equivalent of a short-circuit across the generator terminals and so make the obtaining of an adequate test

voltage difficult. An alternative arrangement - to avoid any possibility of loss in the detector input circuits - is to entirely remove the grid lead from this valve, and to complete the grid circuit temporarily with a fixed resistor of approximately 50,000-ohms. resistance.

Signal Frequency Circuits Alignment. Adjustment of the signal frequency circuits, although not difficult, should be undertaken with a fair amount of care, particularly in the setting of the oscillator trimmer condensers, and, in no case, unless the performance of the receiver is in question, should any attempt be made to disturb the factory adjustments, regardless of minor errors in dial readings. In all cases, the broadcast band should be treated first; the order of adjustment is as follows:-

With an accurate signal generator set at some convenient high frequency, say 1,500-Kc/s. or 1,600-Kc/s., and with the gang condenser set at the correct position as indicated by the dial scale, the oscillator trimmer should be adjusted for maximum output. With this adjustment made, both the mixer and R.F. trimmers may then be adjusted, it being noted that the R.F. trimmer of the broadcast band is located under the chassis and mounted on the wave-change switch. Neither of these two latter adjustments is critical or difficult to perform and very rarely, unless the receiver has been tampered with, will any major variation be required to be made.

With these adjustments satisfactorily made, the receiver should be aligned or "padded" at the low frequency end of the band, this adjustment taking place at approximately 600-Kc/s. The most satisfactory way of adjusting the padding condenser is to use a highly damped signal source, rather than the signal generator, to avoid the necessity of constantly "rocking" the tuning mechanism, to ensure the optimum adjustment that provides maximum output. The most suitable highly damped source is generally available in the variety of electrical disturbances that constitute the usual background of a radio receiver when connected to an antenna. The receiver, therefore, should preferably be tuned to a frequency of 600-Kc/s., making sure that no station carrier wave is present, and the padding condenser adjusted for maximum noise output. After satisfactory adjustment of the padding condenser, it is wise again to recheck the high frequency oscillator trimmer condenser, this latter adjustment only being necessitated if a considerable movement of the padding condenser has taken place.

The adjustment of the short-wave band should be undertaken in an identical manner to that described above, the only requirement being the exercise of greater care in the adjustment of the oscillator trimmer condenser, which, in this case, will be found to be quite critical. The same remarks in regard to the avoidance of altering trimmer adjustments, if the performance of the receiver is satisfactory, apply in this band as well, and in the event of dial readings being appreciably out, movement of the pointer should be suspected and adjustment made accordingly. In certain cases unequal stretching of the dial operating cord can produce fair discrepancies in dial reading, and in such cases, the remedy is quite simple and necessitates only the repositioning of the cursor on the dial operating cord.

As an aid in servicing the receiver in the event of failure in any of the

components fitted, a component schedule is appended which is to be used in conjunction with the schematic diagram attached.

COLLIER & BEALE LIMITED,
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TUBE POSITIONS FOR TYPE 720