# TECHNICAL INFORMATION

BULLETIN NO. 152.

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(TYPE)

TECHNICAL DESCRIPTION AND ADJUSTMENT PROCEDURE ON

MODEL 755 & 756 7-VALVE BANDSPREAD RECEIVERS.

EM spkr ↗ ↖ PM spkr 14-1-46

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Dwgs. Nos. 760 & 761
" " 762 & 763

# RECEIVER

# COLLIER & BEALE LTD.

WELLINGTON

Bulletin No. 152.

# TECHNICAL DESCRIPTION AND ADJUSTMENT PROCEDURE

## ON MODEL 755 & 756 7-VALVE

## BAND-SPREAD RECEIVERS.

Models 755 & 756 are receivers of the Superheterodyne type and employ seven valves in the following arrangement :-

| | | |
|---|---|---|
| 6U7G | - | Signal frequency amplifier |
| 6K8GT | - | Mixer oscillator |
| 6U7G | - | Intermediate frequency amplifier (455-Kc/s) |
| 6Q7G | - | 2nd Detector and audio amplifier |
| 6F6G | - | Power amplifier (Model 755 only) |
| 6V6GT | - | " " ( " 756 " ) |
| 6U5 | - | Visual tuning indicator |
| 80 | - | Power supply rectifier (Model 755 only) |
| 6X5GT | - | " " " ( " 756 " ) |

Both receivers are conventional insofar as the basic receiver circuit is concerned, although certain circuit innovations have been embodied, which have a bearing on the performance achieved.

The only items of difference between the two receivers are contained in the following tabulation :-

| | Model 755 | Model 756 |
|---|---|---|
| Speaker | Energised Electro dynamic | Permanent Magnet |
| " field resistance | 2500 ohm | 500 ohm Choke |
| " transformer primary | 7000 " | 5000 " |
| Output Valve | 6F6 | 6V6GT |
| Rectifier " | 80 | 6X5GT |
| Power transformer H.T. | 385 Volts | 295 Volts |

Five frequency ranges are covered by a unit coil assembly, the particular range desired being selected and brought into circuit by a band-operated switch.

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 background noise, the major modifications occur in the manner of sectionalising a single short-wave tuning circuit to obtain the three spread bands covering the principal International short-wave ranges.

The method of sectionalising the single short-wave circuit to provide for the three spread bands 19, 25 and 31 meters is, in general, conventional and is achieved by the insertion of small capacitors of 25 and 12½ mmfds in series with the tuned circuits and by the use of suitable values of shunt capacities. The two series capacitor values, just mentioned, are obtained by the use of either one or two identical capacity condensers singly, or in series respectively. These

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condensers are shown as P.1 and P.2 in attached print. Fixed capacitors designated F.1, F.2 and F.3 of 130, 50 and 25 mmfds respectively, together with associated trimmer condensers T.1, T.2 and T.3 are automatically shunted across the short-wave range inductors in the spread band positions by a section of the wave change switch and for the bands 31, 25 and 19 meters respectively.

The usual general coverage short-wave range 16-6.5-mc/s has been retained in this receiver and when in use the series or shunt band spreading condensers are entirely disconnected. The high frequency alignment capacitors for the adjustment of this master range, designated T.4 in schematic diagram, being located in the unit coil assembly in the manner customary to standard 2 and 3 band receivers of conventional design.

The broadcast portion of the circuit is entirely conventional, the high frequency trimmer condensers for this band being also located in the self-contained tuning unit.

In general, the receiver should not be subject to any greater difficulties due to misalignment, than a standard broadcast and short-wave receiver, but it is to be noted that, due to the much restricted frequency spread of the short-wave ranges, the usual variations encountered in the standard receiver will become more evident in this particular case and may be indicated by fair discrepancies in calibration. Caution, however, is required to be observed in this particular model in that any adjustments made to the fixed range trimmer condensers (T.4) although not greatly affecting the calibration of the general coverage band which, due to the fact that they are permanently connected across the inductors that are also used in the band spreading circuits, will have a material bearing on the calibration accuracy of these latter bands. Discrepancies in calibration, therefore, may be due to a shift of general coverage adjustment trimmers (T.4) or the shunt trimmers associated with the band spreading circuits (T.1, T.2, T.3) and before attempting the realignment of the receiver on the spread bands, it is desirable that the calibration accuracy of the general coverage band be carefully checked.

In the event of adjustment being required the following notes, which should be used in conjunction with the location plan, drawings Nos. 761 & 763 attached, are supplied.

Intermediate Frequency amplifier Alignment. The intermediate frequency used in Model 755 & 756 is 455-kc/s and both transformers should be 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 (6U7G) and adjusting for maximum output. The generator unit should then be transferred to the grid of the mixer tube (6K8G) 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, regardless of minor errors in dial reading - should any attempt be made to disturb the factory adjustments. 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 1400-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 be adjusted, it being noted that all of the broadcast band trimmers are located in the top section of the unit coil assembly. 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 occurred.

The adjustment of the general coverage short-wave range and the three associated band spread ranges should be undertaken generally in the manner to that described above, the actual requirement being the exercise of greater care in the adjustment of the oscillator trimmer condensers, which in all cases will be found quite critical, and to observe the caution mentioned in an earlier paragraph of this bulletin, in respect to the connection existing between the adjustment of the general coverage band and its effect on the calibration accuracy of the spread ranges. The general coverage short-wave range should be aligned first and for which test frequencies of approximately 16/mc/s and 6.5-mc/s are required. With the high frequency and padding condenser adjustments made the spread ranges adjustments may now be undertaken using test frequencies of 15,200, 11,800 and 9,600-kc/s for the bands 19, 25 and 31 respectively. The accuracy of calibration of these bands will depend on the accuracy of the test signal source, it being desired that a unit capable of being set to an accuracy of ± 10/15-kc/s. be used.

The same remarks - in regard to the avoidance of altering trimmer adjustments if the performance of the receiver is satisfactory - apply in the above

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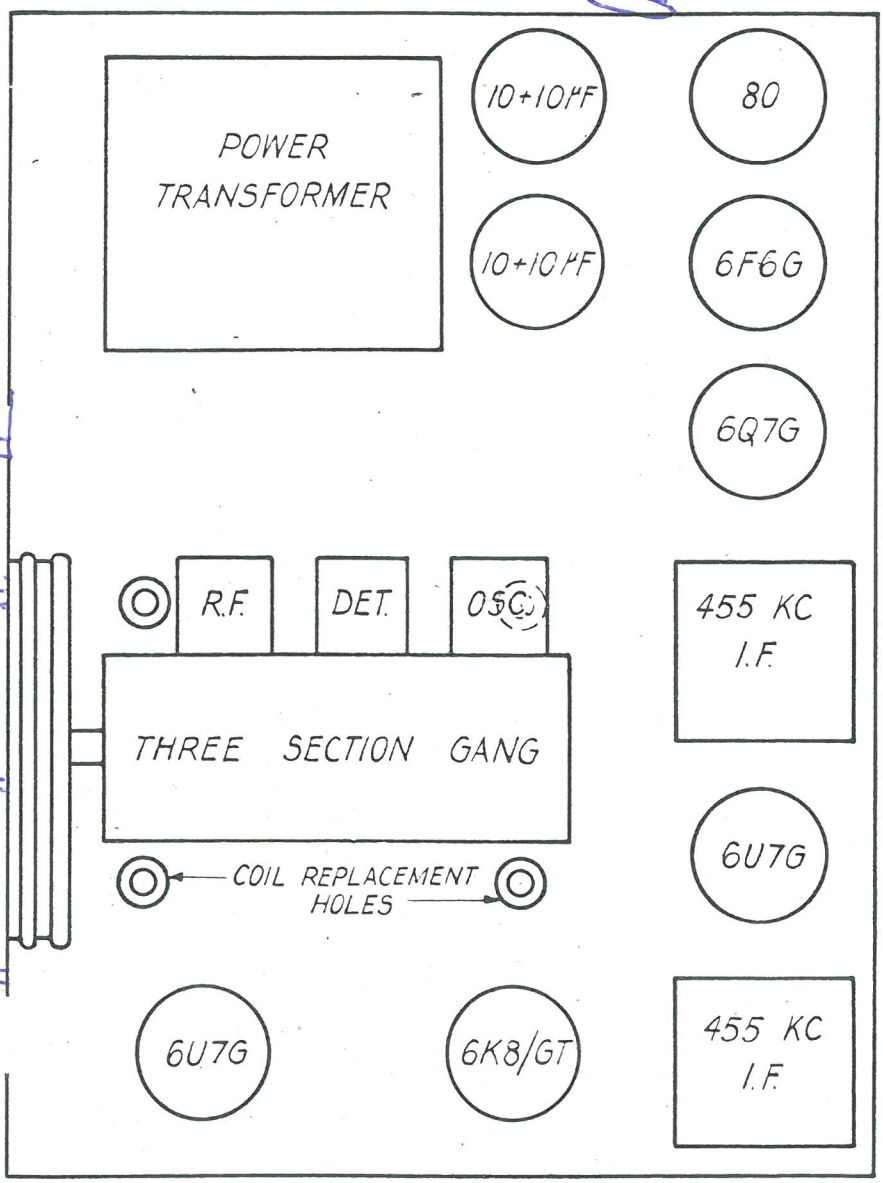
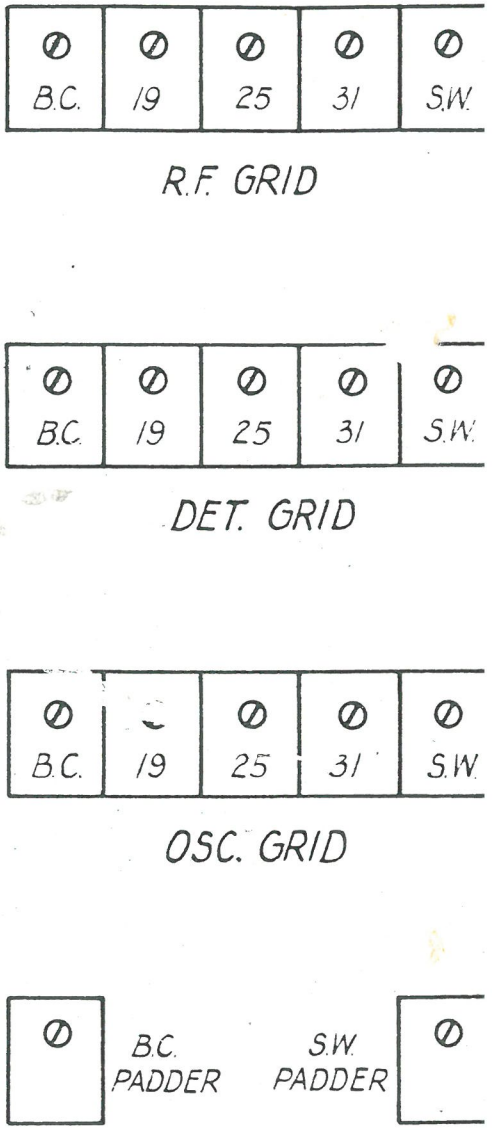
## BAND SPREAD LAYOUT




## H.F. TRIMMER POSNS.




BAND-SPREAD RECEIVER MODEL 755 & 756

CHASSIS LAYOUT & TRIMMER POSITIONS

COLLIER & BEALE LTD. WELLINGTON, NEW ZEALAND. 6.12.45. DWG. Nº

# COMPONENT SCHEDULE FOR MODEL 756

## BANDSPREAD RECEIVER.

Refer to Drawings 762 & 763.

### CONDENSERS:

| | | | | | |
|---|---|---|---|---|---|
| C1 | - | 25 | uFD | 25V | Output Cathode By Pass |
| C2 | - | 20 | uF | 450V | H.T. Filter |
| C3 | - | 16 | uF | 450V | H.T. Filter |
| C4 | - | 10 | uF | 450V | Osc. Plate Supply Filter |
| C5 | - | 10 | uF | 450V | Screen Filter |
| C6 | - | 0.25 | uF | 200V | Cathode R.F. By Pass (Mixer & I.F. Amp.) |
| C7 | - | 0.1 | uF | 400V | Osc. Plate supply R.F. By Pass |
| C8 | - | 0.1 | uF | 400V | Screen R.F. By Pass |
| C9 | - | 0.1 | uF | 400V | H.T. R.F. By Pass |
| C10 | - | 0.1 | uF | 200V | Cathode R.F. By Pass (R.F. Amp.) |
| C11 | - | 0.05 | uF | 200V ) | |
| C12 | - | 0.05 | uF | 200V ) | A.V.C. Filter |
| C13 | - | 0.05 | uF | 200V ) | |
| C14 | - | 0.01 | uF | 200V) | |
| C15 | - | 0.01 | uF | 200V) | Audio Coupling Condensers |
| C16 | - | 0.01 | uF | 200V) | |
| C17 | - | 0.004 | uF | | Fixed S.W. Padding Condenser |
| C18 | - | 0.001 | uF | | Audio Filter Condenser |
| C19 | - | 0.00025 | uF | | Tone Control |
| C20 | - | 0.0001 | uF | | Diode Load By Pass |
| C21 | - | 0.0001 | uF | | R.F. Plate By Pass (1st Audio Stage) |
| C22 | - | 0.0001 | uF | | Osc. Grid Coupling Condenser |
| C23 | - | 1 mmfd | approx. | | Neutralizing Condenser. |

### MISCELLANEOUS:

| | | | |
|---|---|---|---|
| S1 | - | | Main Switch fitted to tone control. |
| T1 | - | 3-30 mmfd ) | |
| T2 | - | 3-30 " ) | |
| T3 | - | 3-30 " ) | H.F. Alignment Trimmers. |
| T4 | - | 3-30 " ) | |
| T5 | - | 3-30 " ) | |
| F1 | - | 130 mmfd ) | Fixed Shunt Padder 31 metres |
| F2 | - | 50 " ) | " " " 26 " |
| F3 | - | 25 " ) | " " " 19 " |
| B1 | - | 25 mmfd ) | |
| B2 | - | 25 " ) | Band spread condensers |
| P1 | - | 600 mfd | Padder, Broadcast Padder ) Variable |
| P2 | - | 1000 mmfd | Padder, Short-wave Padder) |
| LS1 | | | 8" Permanent Magnet Speaker No.8-20 |
| LS2 | | | 500 ohm Filter Choke Code No. CH997 |

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## COMPONENT SCHEDULE FOR MODEL 756 BANDSPREAD RECEIVER. (Cont.)

### RESISTORS:

| | | | | |
|---|---|---|---|---|
| R1 | 10 | megohm | ½ watt | Grid Leak Bias Resistor |
| R2 | 1 | " | ½ " | A.V.C. Filter |
| R3 | 0.5 | " | | Potentiometer Tone Control |
| R4 | 0.5 | " | | " Volume " |
| R5 | 0.5 | " | ½ " | Diode Load Resistor |
| R6 | 0.25 | " | ½ " | A.V.C. Filters |
| R7 | 0.25 | " | ½ " | |
| R8 | 0.25 | " | ½ " | Plate Load 1st Audio Tube |
| R9 | 0.1 | " | ½ " | |
| R10 | 15,000 | ohm | ½ " | Inverse feed-back Potentiometer |
| R11 | 30,000 | " | 2 " | H.T. Dropper Osc. Stage |
| R12 | 50,000 | " | 2 " | H.T. Dropper Screen Supply |
| R13 | 50,000 | " | 1 " | Screen Bleeding Resistor |
| R14 | 50,000 | " | ½ " | Grid Leak Oscillator |
| R15 | 50,000 | " | ½ " | A.V.C. Filter |
| R16 | 300 | " | 1 " | Cathode Bias Output Stage |
| R17 | 300 | " | ½ " | Cathode Bias R.F. Amp. |
| R18 | 100 | " | ½ " | R.F. Suppresser Oscillator Stage |
| R19 | 150 | " | ½ " | R.F. Suppresser R.F. Amp. |
| R20 | 150 | " | ½ " | Cathode Bias (1st detector & I.F. Stages) |
| R21 | 50 | " | ½ " | R.F. Suppresser Mixer Stage |
| R22 | 1 | megohm | ½ " | Incorporated in Magic-Eye Holder. |

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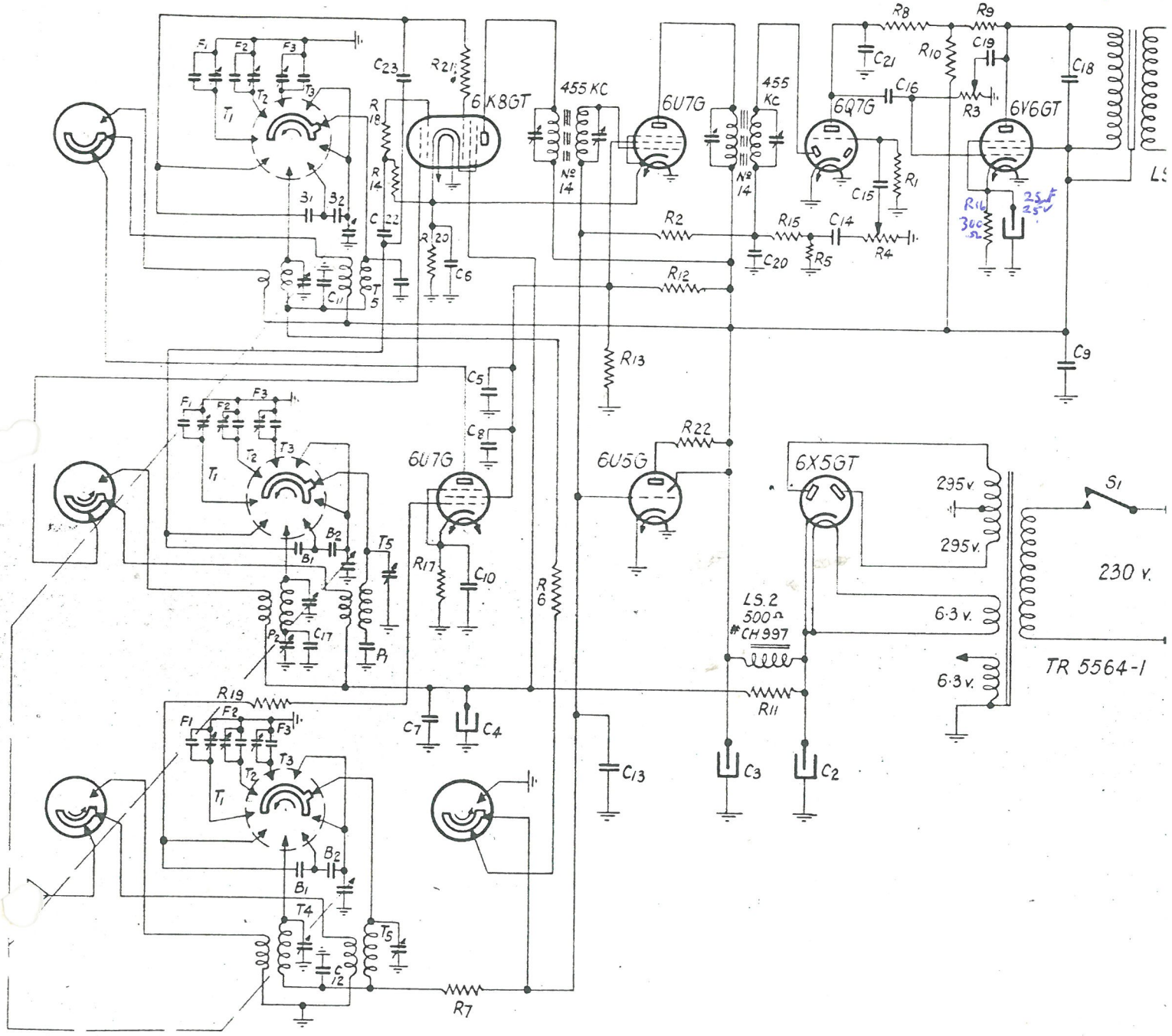


## FREQUENCY RANGES

| | |
|---|---|
| BROADCAST FREQUENCY | 535 KC - 1600 KC |
| SHORTWAVE " | 6 MC - 19 MC |

19. 25. 31 METRES FULL BAND SPREAD

NOTE
WAVE CHANGE SWITCH
SHOWN IN B.C. POSITION

# BAND SPREAD RECEIVER MODEL 756 → 1935 PM speaker (only difference from 755)

## SCHEMATIC CIRCUIT DIAGRAM

COLLIER & BEALE LTD., WELLINGTON, NEW ZEALAND. 14.1.46. DWG. N°

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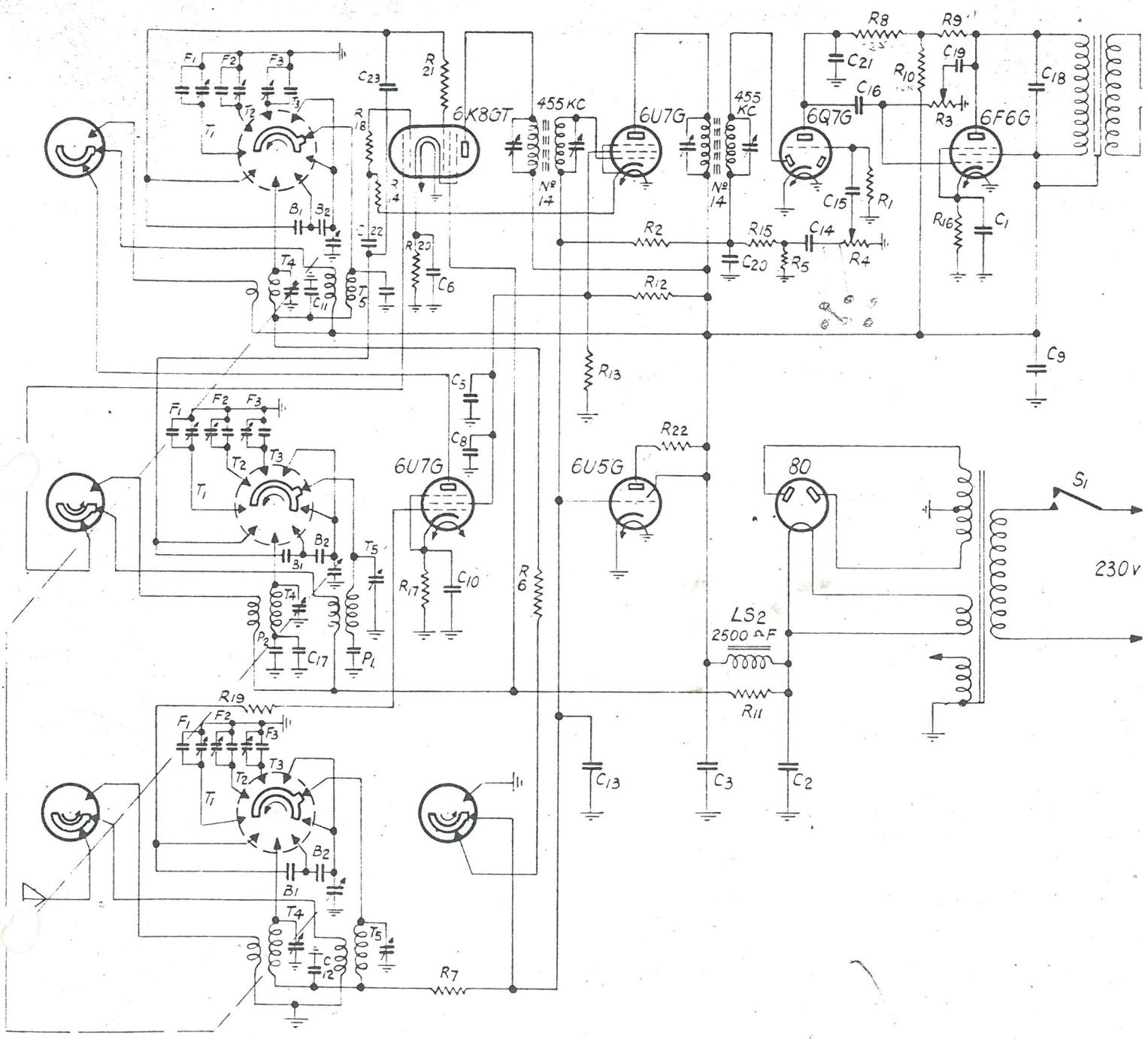


## FREQUENCY RANGES

BROADCAST FREQUENCY 535 KC - 1600 KC
SHORT-WAVE " 6 MC - 19 MC
19. 25. 31 METRES FULL BAND SPREAD

NOTE
WAVE CHANGE SWITCH SHOWN IN B.C. POSITION

# BAND-SPREAD RECEIVER MODEL 755

## SCHEMATIC CIRCUIT DIAGRAM

COLLIER & BEALE LTD. WELLINGTON, NEW ZEALAND. 6.12.45 DWG. N°

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