TECHNICAL INFORMATION

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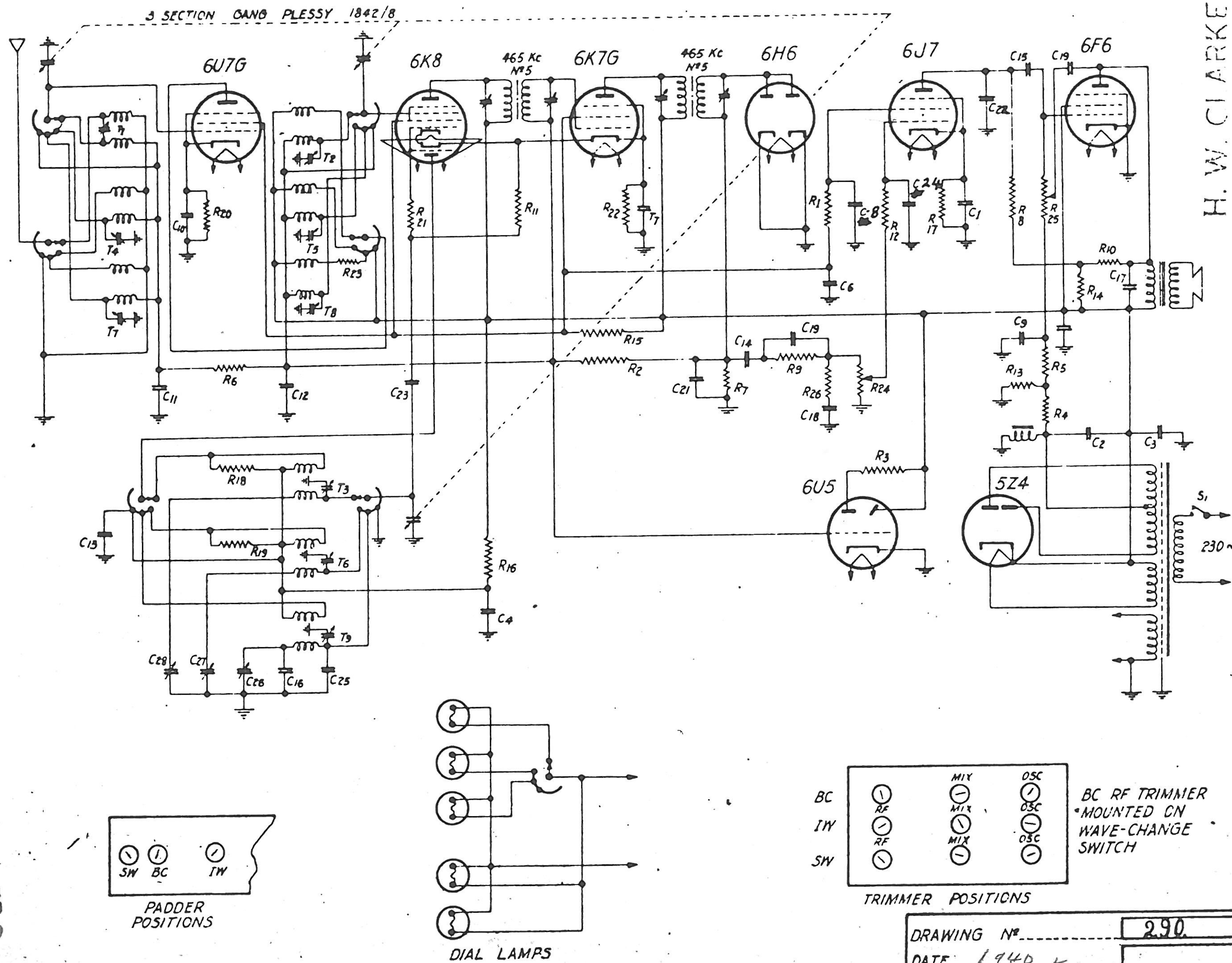
TECHNICAL DESCRIPTION AND ADJUSTMENT PROCEDURE
OF 8-VALVE ALL-WAVE RECEIVER
GULBRANSEN MODEL 830.

RECEIVER

COLLIER & BEALE LTD.

WELLINGTON

GULBRANSEN RECEIVER TYPE 830
CHEMATIC DIAGRAM



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H. W. CLARKE (N.Z.) ... P.O. BOX ... WELLINGTON. C.

TECHNICAL DESCRIPTION AND ADJUSTMENT PROCEDURE

OF 8-VALVE ALL-WAVE RECEIVER

GULBRANSEN MODEL 830.

Model 830 Receiver is of the Superheterodyne type and employs a total of eight valves used in the following arrangement.

1 - type	6U7G	signal frequency amplifier (all bands)
1 - "	6K8	mixer oscillator
1 - "	6K7G	intermediate frequency amplifier (465-kc/s)
1 - "	6H6	diode rectifier
1 - "	6J7	first audio amplifier
1 - "	6F6	power amplifier
1 - "	6U5	visual tuning indicator
1 - "	5Z4	power supply rectifier

Note: Certain models of this series have been equipped with type 5Y3G directly heated rectifier.

This receiver, although conventional insofar as the basic receiver circuit is concerned, embodies a number of circuit innovations that have a material bearing on the performance achieved.

Three 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 immediately adjacent lower frequency coil in any particular section, thus avoiding "trapping" of the band in use, due to stray coupling between connecting leads of the various sections and the wave-band 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 audio frequency portion of the circuit. One of these is the provision of a tone equilising circuit made up of two separate branches, one embracing resistor R-9 and condenser C-19 and effecting high frequency correction, and the other made up of resistor R-26 and condenser C-18 effecting the bass correction. The high frequency correction in this case is necessitated by the "side-band cutting" introduced by the more sharply selective intermediate frequency transformers now fitted. The bass correction circuit produces a pronounced rise in the reproduction below approximately 200-cp/s and provides an order of fidelity in reproduction, even in the table model of this new series, which is rarely exceeded in larger cabinet models.

As a further aid in improving the fidelity of reproduction, "negative feed-back" is applied the output stage by the use of a simple series circuit. This is accomplished in Model 830 by feeding the anode

of the first voltage amplifier (type 6J7) from a voltage-dividing network across the output of the power amplifier stage. The resistors involved in performing this function are designated R-10 and R-14 in schematic diagram attached. In all other respects the receiver circuit is entirely conventional and adjustment, if ever required, should follow along orthodox lines.

An 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 on Drawing No.290 attached, are included.

Intermediate Frequency Amplifier Alignment. The intermediate frequency used in Model 830 is 465-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 (6K7G) 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, 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 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 nedessity 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 nostation 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 two remaining wave-bands should be undertaken in an identical manner to that described above, the only requirement being the exercise of greater care in the adjustment of oscillator trimmer condensers, which, in the case of the high frequency short-wave band, will be found to be critical. The same remarks - in regard to the avoidance of altering trimmer adjustments if the performance of the receiver is satisfactory - apply in these bands 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
66 GHUZNEE STREET,
WELLINGTON, C.2

6th. January, 1943.

COMPONENT SCHEDULE FOR MODEL 830 RECEIVER.

CONDENSERS:

C-1	25-mfd.	Cathode by-pass condenser (1st A.F. stage)
2	8 ")	Power supply filter condensers
3	8 ")	
4	8 "	Oscillator H.T. by-pass
5	.25 "	H.T. R.F. by-pass
6	.25 "	Screen R.F. by-pass
7	.25 "	Cathode R.F. by-pass
8	.1 "	Screen by-pass (first A.F. stage)
9	.1 "	A.F. bias filter
10	.1 "	Cathode R.F. by-pass
11	.05 "	A.V.C. filter
12	.05 "	" "
13	.01 "	Oscillator R.F. by-pass
14	.01 "	Audio coupling condenser
15	.01 "	" " "
16	.004 "	Fixed padding condenser (S.W. band)
17	.001 "	Audio filter
18	.001 "	L.F. audio correction
19	.0005 "	H.F. audio correction
20	.00025 "	Tone control condenser
21	.0001 "	Diode load by-pass
22	.0001 "	R.F. plate filter
23	.0001 "	Oscillator grid condenser
24	.0001 "	R.F. grid filter
25	7.5-mmfd.	H.F. band stabilizing condenser
26	2000 "	H.F. band padding condenser
27	1800 "	Intermediate band padding condenser
28	550 "	Broadcast " " "
T-1 to T-9	(inclusive)	H.F. alignment trimming capacitors.

RESISTORS:

R-1	1-megohm	Screen feeding resistor (first A.F. stage)
2	1 "	A.V.C. filter
3	1 "	Plate load resistor tuning indicator
4	.5 "	Audio bias potentiometer
5	.5 "	" " filter
6	.5 "	A.V.C. filter
7	.5 "	Diode load
8	.25 "	Diode load resistor (1st A.F.)
9	.25 "	H.F. audio correction
10	.1 "	Negative feed-back potentiometer
11	50,000-ohm	Oscillator grid leak
12	50,000 "	R.F. grid suppressor
13	75,000 "	A.F. bias potentiometer

RESISTORS (Cont'd)

R-14	15,000-ohm	Negative feed-back potentiometer
15	15,000 "	Screen feed resistor
16	20,000 "	Oscillator feed resistor
17	2,000 "	Cathode bias (1st A.F. stage)
18	1,000 "	Feed-back equalizer (broadcast band)
19	1,000 "	" " " (I.W. band)
20	600 "	Cathode bias resistor
21	200 "	Oscillator grid suppressor
22	150 "	Cathode bias resistor
23	25 "	R.F. suppressor (S.W. band)
24	.5-megohm	Volume control
25 &	.5 "	Tone control
26	.1 "	L.F. audio correction

NOTE: R-10 and R-14, in first issues of this Model were 100,000-ohms and 15,000-ohms respectively.
R-1, in first issues was 1-megohm.

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TUBE POSITIONS FOR TYPE 830