Galbransen
951

TECHNICAL INFORMATION

BULLETIN NO. 148

(TYPE)

951

COLLIER-BEALE MODEL 951 9-VALVE

BAND SPREAD RECEIVER.

SERIES 1. Bulletin 148 21st Nov. 1941

RECEIVER

COLLIER & BEALE LTD.

WELLINGTON

951

CONDENSERS:

C - 11	.02-mfd.
12	.02 "
13	.02 "
14	.01 "
15	.01 "
16	.005 "
17	.005 "
18	.0001 "
19	.00005 "
20	.00005 "
21	.00005 "
22	25 "
23	600-mmfd
24	.0005-mfd
25	.0005- "
26	.001 "
27	.1 "
28	8 "
29	8 "
30	.00005 "

MISCELLANEOUS:

T - 1	3-30-mmfd.	)
2	" "	)
3	" "	)
4	" "	)
5	" "	)
F - 1	100 "	F
2	50	
3	15 "	F
B - 1	25 "	B
2	25 "	

COLLIER & BEALE LIMITED,
66, GHUZNEE STREET,
WELLINGTON, C.2.
21st. November, 1941.

Model 951

COMPONENT SC

RESISTORS:

R - 1	1-megohm
2	1 "
3	1 "
4	.5 "
5	.5 " pot.
6	.5 "
7	.25 "
8	50,000-ohm
9	15,000- "
10	.2-megohm
11	.1 "
12	60,000-ohm
13	60,000 "
14	25,000 "
15	25,000 "
16	.5-meg
17	2,000-ohm
18	2,000 "
19	200 "
20	25 "
21	.5-megohm pot.
22	50,000-ohm
23	15,000 "
24	2,000 "
25	1,000 "
26	20,000 "
27	1-megohm
28	.25 "
29	.1 "
30	20-ohm

by

CONDENSERS:

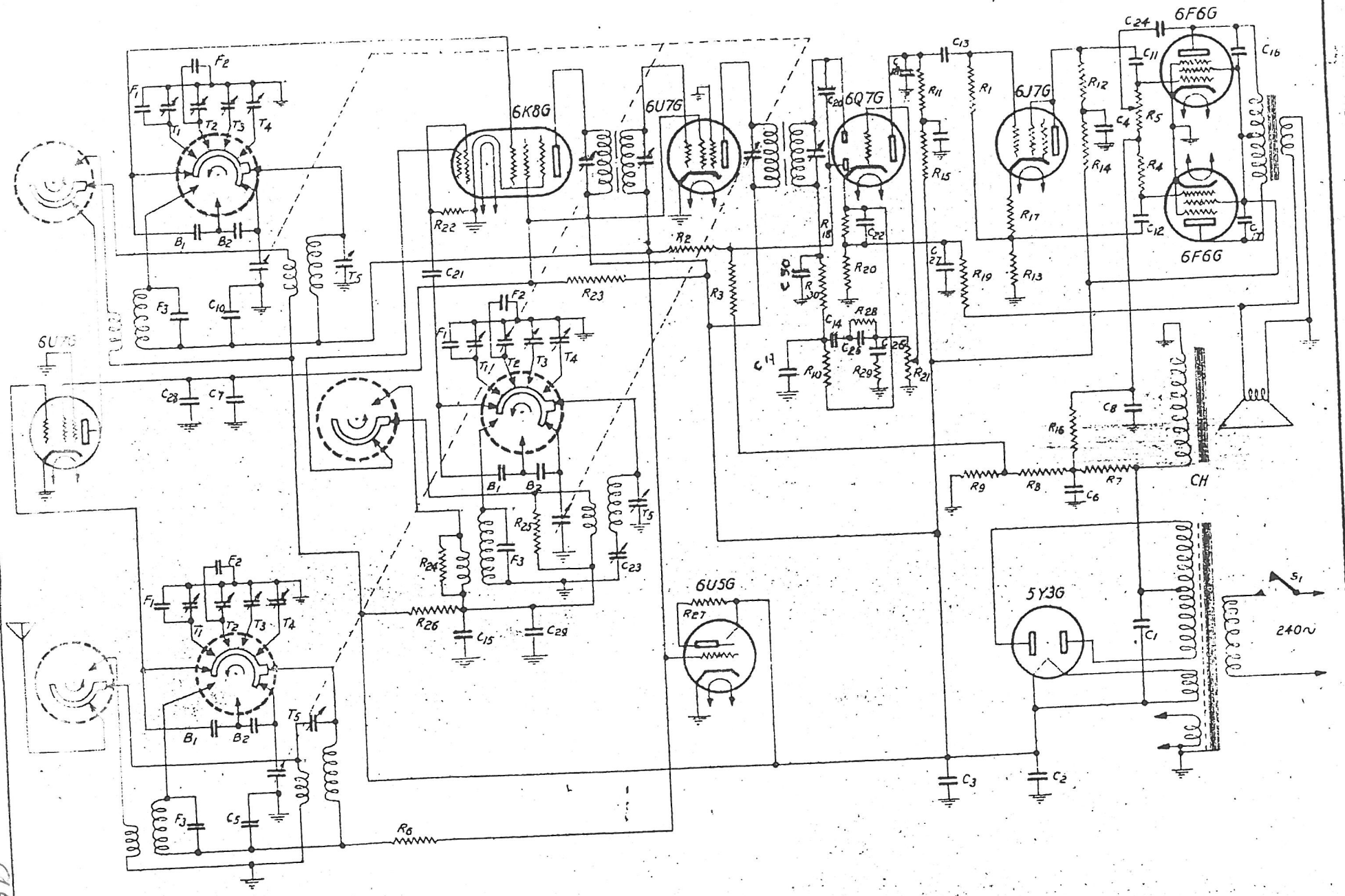
sp

C - 1	8-mfd
2	8 "
3	.25 "
4	8 "
5	.25 "
6	.25 "
7	.25 "
8	.1 "
9	.05 "
10	.05 "

COLLIER & BEALE LIMITED
66 GHUZNEE STREET, WELLINGTO
21st. November, 1941.

SCHEMATIC DIAGRAM

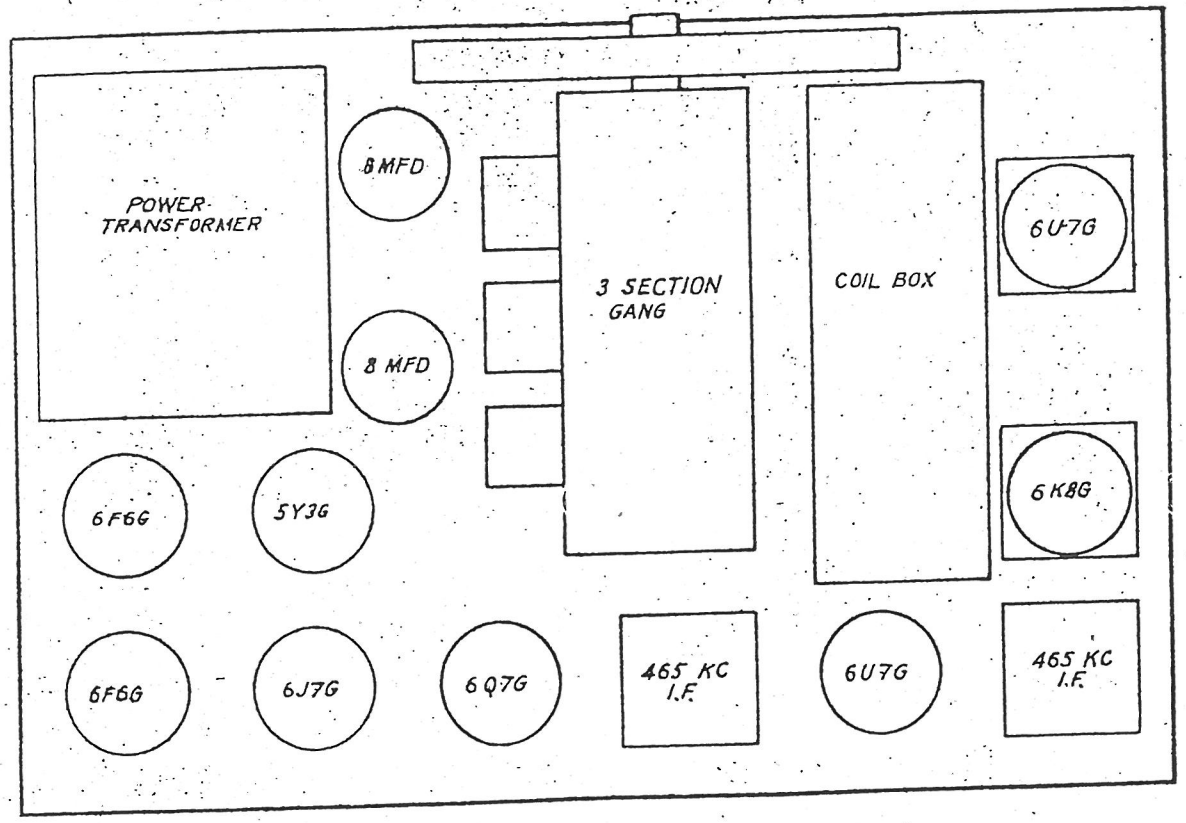
951 SERIES - 1



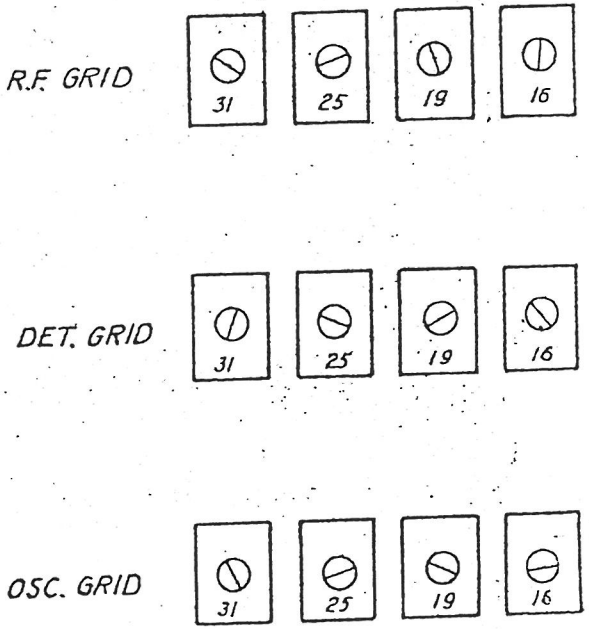
C+B 951

LOCATION [illegible]

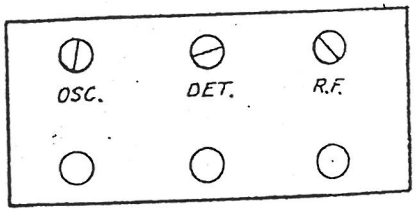
TUBE POSITIONS FOR TYPE



S.W. TRIMMER POSITIONS



BC TRIMMER POSITIONS



H-708A

EX RESK

GUY E. MILNE
ELECTRONIC TECHNICIAN

Bulletin No.148.

TECHNICAL DESCRIPTION AND ADJUSTMENT PROCEDURE

OF 9-VALVE BAND SPREAD RECEIVERS

GUILDRANSEN MODEL NO.951.

Nov 1941

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or
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plifier
rs
indicator
ectifier

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ERRATA

PAGE I - VALVE SCHEDULE.

Diode rectifier should read :-
1 - type 6Q7G diode rectifier and first audio amplifier.
First audio amplifier should read :-
1 - type 6J7G phase inverter

PAGE II - 2nd paragraph.

The Broadcast trimmers are located as usual on the coil assembly and not, as stated, on the switch bracket.

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 audio frequency portion of the circuit and in the manner of sectionalising a single short-wave tuning circuit to obtain the four spread bands covering the principal International short-wave ranges.

The departures from standard in the audio frequency portion of the circuit are the inclusion of a high frequency tone correcting circuit in the first audio amplifier stage (6J7G), and made up of resistor R-28 shu by capacitor C-25, and the push-pull output stage. The push-pull stage is excited by the phase "Inverter" valve (type 6J7G) with equal loads in its cathode and anode circuits. This stage being highly degenerative does not contribute materially to the audio gain of the receiver, the principal amplification being obtained from triode section of the demodulator valve (type 6Q7G) and the valves comprising the output stage. The output stage comprises two Pentodes (type 6F6G) in a push-pull arrangement, the output circuit being somewhat unconventional in that a portion of the voice coil potential is injected in the cathode circuit of the demodulating valve (type 6Q7G) to obtain approximately 15% overall reverse feed-back in the output stage. The benefits from such a system are the reduction of output valve plate impedance and harmonic distortion. The high frequency corrective network, previously mentioned, is for the purpose of counteracting "side-band cutting" by the sharply selective I.F. transformer fitted.

EK RESK

GUY E. MILNE
ELECTRONIC TECHNICIAN

Bulletin No.148.

TECHNICAL DESCRIPTION AND ADJUSTMENT PROCEDURE

OF 9-VALVE BAND SPREAD RECEIVERS

GULBRANSEN MODEL NO.951.

Nov 1941

Series 1.

Model No.951 Receiver is of the Superheterodyne type and employs a total of nine 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
2 - " 6F6 power amplifiers
1 - " 6U5 visual tuning indicator
1 - " 5Y3G power supply 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.

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 audio frequency portion of the circuit and in the manner of sectionalising a single short-wave tuning circuit to obtain the four spread bands covering the principal International short-wave ranges.

The departures from standard in the audio frequency portion of the circuit are the inclusion of a high frequency tone correcting circuit in the first audio amplifier stage (6J7G), and made up of resistor R-28 shu by capacitor C-25, and the push-pull output stage. The push-pull stage is excited by the phase "Inverter" valve (type 6J7G) with equal loads in its cathode and anode circuits. This stage being highly degenerative does not contribute materially to the audio gain of the receiver, the principal amplification being obtained from triode section of the demodulator valve (type 6Q7G) and the valves comprising the output stage. The output stage comprises two Pentodes (type 6F6G) in a push-pull arrangement, the output circuit being somewhat unconventional in that a portion of the voice coil potential is injected in the cathode circuit of the demodulating valve (type 6Q7G) to obtain approximately 15% overall reverse feed-back in the output stage. The benefits from such a system are the reduction of output valve plate impedance and harmonic distortion. The high frequency corrective network, previously mentioned, is for the purpose of counteracting "side-band cutting" by the sharply selective I.F. transformer fitted.

The method of sectionalising the single short-wave circuit to provide for the four spread bands 16, 19, 25, 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 condensers are shown as B.1 and B.2 in attached print. Fixed capacitors of approximately 25 mmfd are permanently connected across the inductors, and these are located in the unit coil assembly and designated F.3 in schematic diagram.

The broadcast portion of the circuit is entirely conventional, the high frequency trimmer condensers being located on the same bracket supporting the shunt trimmers of the feed-spread circuits, the actual positions of the whole series of trimmers being clearly shown on location plan attached.

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 th: particular case and may be indicated by fair discrepancies in calibration.

Such discrepancies, however, can be corrected for, and in the event of adjustment being required, the following notes, which should be used in conjunction with the location plan, drawing No.708A attached, are supplied.

Intermediate Frequency Amplifier Alignment. The intermediate frequency used in Model 951 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 (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.

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With an accurate signal generator set at some convenient high frequency, 1,500-kc/s or 1,600-kc/s, and with the gang condenser set at the correct position, 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 condensor has occurre

The adjustment of the four remaining band spread ranges should be undertaken in an identical 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 to be quite critical and in the use of test frequencies in accordance with the following schedule. It should be possible to adjust the signal source to an accuracy of ± 10-15 kc/s.

16	meter band	17,800	kc/s
19	" "	15,200	kc/s
25	" "	11,800	kc/s
31	" "	9.600	kc/s

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.
21st. November, 1941.

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