Telegrame: "MARKSLIM"

Telephone 55-020

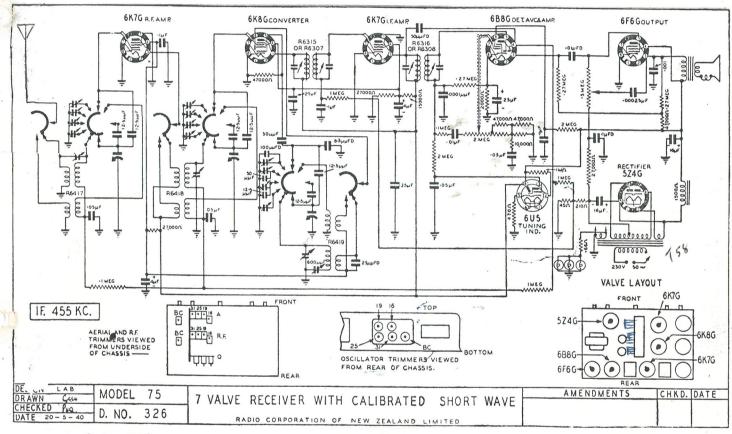
S40/2

#### SERVICE SUPPLEMENT.

24th May 1940

# MODEL 75

### 7 valve Receiver with Calibrated Short Wave Tuning



ase deferent ase coils (R641a) also minor differences ses in one circuity v. Also des slug-land IFT's Val cont has only one tap

H. L. Byrn, Radio Dealer, Queen Street, Masterton.



# SERVICE BULLETIN

No. 71
First Edition—SEPTEMBER, 1940 ) 32 to date to the total 20-5:40

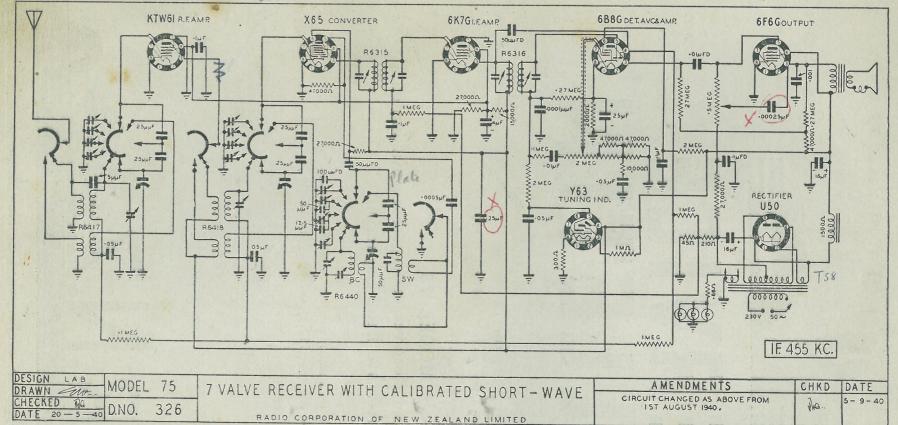
MODEL 75
7 Valve Five-Band Receiver, Incorporating Calibrated
Short-Wave Band Expansion.

[For earlier information please refer R.N.Z. Service supplements S40/1 of 24.5.40 and S40/7 of 15.8.40.]

nowfeld



80 Courtenay Place, Wellington, C.3., New Zealand.



V	OI	TA	GE	TESTS:

VOLTAGE TESTS:
A.C. High-voltage secondary of power transformer,
from each rectifier plate to: 350V
Centre tap 335V
Heater of rectifier 5V
All other heaters 6V
Dial Lamps 5V
D.C. (measured between point indicated and chassis)
First 16 mfd. electrolytic condenser 340V.
Second 16 mfd. electrolytic condenser 230V.
Screen of 6K7G X65 & KTW61 90V.
Plate of 6B8G 60V.
Cathode of 6B8G 1V.
All other cathodes 0V.
Negative terminal of first 16 mfd.
electrolytic condenser 17V.
Junction of 45 and 210 ohm resistors 3V.
All measurements should be made with the receiver
tuned to approximately 1000 k.c. and with no signal

input.

#### RESISTANCE TESTS

RESISTANCE TESTS	
Where Measured Approx	Resistance
Across power cord	45
Each rectifier plate to centre tap of	
power transformer secondary	300
Across speaker field	1500
Speaker transformer, primary	500
I.F. Transformer Coils	7
B/C aerial primary	35
B/C aerial secondary	5
B/C R.F. primary	70
B/C R.F. secondary	5
B/C Osc. primary	2
B/C Osc. secondary	4
S/W Aerial, R.F. and Osc. primary	0
S/W Aerial, R.F. and Osc. secondary	0
Between negative terminal of first 16 mfd.	
electrolytic condenser and chassis	255

#### SENSITIVITY TESTS:

(Microvolts input to give standard output of 50 milliwatts.)

		70	mimi	atts.)		
	Frequency		Inpi	at to		Micro- volts
	455 k.c.	Grid of	6K7C	I.F.	Amplifier	5000
	455 k.c.	Grid of	X65			150
	1400 k.c.	Aerial le	ead th	rough	standard	
		dumm	y an	tenna		Under 1
	1000 k.c.	,,	,,	"	"	Under 1
	600 k.c.	"	,,	,,	,,	1
	16 metre band	,,	,,	"	"	Under 1
	19 metre band	"	,,	,,	"	Under 1
	25 metre band	"	,,	,,	,,	Under 1
V.	31 metre band	,,	,,	,	,,	Under 1
0.0						

### MODEL 75-7 Valve Receiver with Calibrated Short-Wave

#### 1. GENERAL DESCRIPTION.

This is a 7 valve five-band receiver incorporating calibrated short-wave band expansion. The sensitivity on both broadcast and short-wave bands is of such a high order that any increase would be of no practical value in the average location. The frequency ranges are as follows:

Broadcast band High-frequency bands 17,540—18,440 k.c. 15,060—15,520 k.c. 11,400—12,120 k.c. 9,460— 9,820 k.c.

Thus the principal international shortwave bands are fully covered, and at the same time the tuning is expanded approximately twenty-five times. This results in the same ease of tuning on short-wave as on the broadcast band and produces an entirely new conception of short-wave listening.

In order to maintain absolute constancy of calibration silvered-mica fixed condensers and high-quality trimmers are used in the oscillator circuits and the receiver is also exactly compensated against changes in temperature. By means of a special circuit arrangement the oscillator frequency is maintained constant irrespective of changes in A.V.C. voltage. This greatly reduces the effects of fading.

A compensated volume control circuit is used in order to avoid loss of low frequencies at reduced settings of the control. The tone control operates on the negative feedback principle giving a wide range of control. A fixed amount of negative feedback is also employed to improve the tone quality of the reproduction. A "magic eye" is incorporated to ensure ease of accurate tuning.

The valves used are as follows:

KTW61 R.F. Amplifier
X65 Converter
6K7G I.F. Amplifier
6B8G Detector Amplifier and A.V.C.
6F6G Output pentode
Y63 Tuning Indicator
U50 Rectifier

#### 2. ALIGNMENT PROCEDURE:

I.F. Alignment. The intermediate frequency is 455 k.c. At the factory the I.F. channel is aligned with a frequency-modulated oscillator and oscillascope to produce a flat-top response curve and so no attempt to realign the intermediates should be made unless the I.F. sensitivity is found to be below normal. However, the characteristics of the I.F. transformers are such that, if they are aligned for maximum response using a normal amplitude-modulated signal generator or oscillator, the resonance curve will not depart very greatly from the flat-top shape. An approximate idea of the shape

of the curve may be obtained by swinging the signal generator frequency across 455 k.c. and noting the change in output after lining up in the usual way. It will generally be found that by screwing out the primary (plate circuit) trimmer in the first I.F. transformer (only) a fraction of a turn until the output voltage drops approximately 10 per cent., the correct resonance curve will be obtained.

The lead from the signal generator to the grid of the X65 tube should not provide a D.C. path to chassis, as this will remove the bias from the tube. A condenser should be inserted in the lead, if necessary, and the normal grid-cap should be left on the tube. This condenser is incorporated in the R.N.Z. All Wave Dummy Antenna.

B/C Band Alignment. Connect aerial and earth leads to signal generator through standard all wave dummy antenna and connect output meter in circuit across speaker transformer. Set dial-pointer so that centre of pointer is directly behind centre of line marking end of scale when gang plates are fully meshed. The location of trimmers under the chassis is shown separately on page 4.

Set signal generator frequency at 1400 k.c. and tune receiver to 1400 k.c. on dial scale. Tune in signal by adjusting B/C oscillator trimmer. Trimmer adjustments may be made, if desired, without removing the chassis from the cabinet, as slots are provided in the wood for this purpose. Adjust B/C, R.F. and aerial trimmers for maximum output. Set signal generator at 600 k.c. and tune-in signal. Rock gang and adjust padder for maximum output. If the padder setting is found to need appreciable alteration it will be necessary to repeat the previous adjustments at 1400 k.c. Calibration may then be checked by noting the positions of B/C stations on the dial or by switching on the 100 k.c. oscillator in the Frequency Standard SF1 and noting that the 100 k.c. points fall correctly on the dial.

S/W Bands Alignment. Switch to 16 metre band and set dial at 18 MC. Set signal generator frequency at 18Mc. and tune in signal by adjusting 16 metre band oscillator trimmer. Switch on 570 k.c. oscillator in Frequency Standard SF1 and note points on dial at which signal is received. These should be at 17,670 and 18,240 k.c. If high output from Frequency Standard is used, weaker signals, which are images of other harmonics, will be received at other points on the dial, so the output from the Frequency Standard should be reduced if these images prove confusing. Due to the difficulty in accurately setting the normal signal generator or oscillator it is necessary to use the Frequency Standard to set the oscillator frequency. The oscillator trimmer should be adjusted to bring the 17,670 and 18,240 k.c. signals at their correct points on the dial. The Frequency Standard may then be switched to 1000 k.c. and the calibration checked at 18,000 k.c. Finally switch to 100 k.c. and note that a

signal appears at each 100 k.c. point on the dial. Now set dial at 17,800 k.c. and adjust the signal generator till the signal is heard. Adjust 16 metre R.F. aerial trimmers for maximum output. If there is any slight discrepancy in the amount of bandspread the oscillator trimmer should be adjusted so that the calibration is correct within the recognised international S/W bands which are:

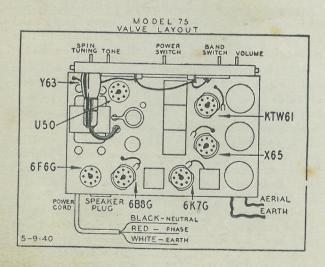
If the signals are received at two points when adjusting the oscillator trimmer, the correct adjustment is that with the trimmer screwed fartherest out. Similarly, if two peaks are noted when adjusting the R.F. and aerial trimmers, the correct setting is that with these trimmers screwed farthest in.

Now switch, in turn, to the 19, 25 and 31 metre bands and repeat the above procedure. The actual alignment of R.F. and aerial trimmers should be done at approximately the centre of the scale, that is, 15,200, 11,700 and 9,600 k.c. By utilising the Frequency Standard in conjunction with the receiver it will be possible to obtain approximate dial settings for the signal generator for these frequencies. However the 570 k.c. oscillator in the Frequency Standard should always be used to fix the exact calibration on the receiver being tested. The points at which harmonics of the 570 k.c. oscillator fall are:

17,670 k.c. 15,390 k.c. 11,400 k.c. 9,690 k.c. 18,240 k.c. 11,970 k.c.

#### 3. FREQUENCY STANDARD MODEL SF1.

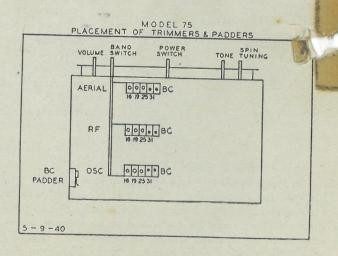
This consists of a temperature-compensated oscillator, with built-in power supply, which is capable of being set accurately to 570, 1000 or 100 k.c. The harmonics of this oscillator fall at convenient points in the S/W bands covered by Model 75, and are used for calibration and alignment.



Before using the Frequency Standard it is essential that its frequency be set accurately. To do this, tune in Station 2YA on the receiver under test and switch on the Frequency Standard. After allowing 10 minutes for the initial warming-up of the oscillator valve in the Frequency Standard, adjust the 570 k.c. trimmer knob on the front panel until the note which is heard is reduced to zero beat. The frequency is, by this means, adjusted to 570 k.c., and the harmonics will then serve as accurate frequency standards for alignment of the S/W Bands. One of these harmonics falls at 11,400 k.c. and this harmonic should then be tuned in on the Model 75 receiver. Switch the Frequency Standard to 100 k.c. and without touching the setting of the receiver dial adjust the 100 k.c. trimmer until a signal is heard. This process sets the frequency exactly to 100 k.c. Now switch the receiver to the B/C band and tune in the tenth harmonic of the 100 k.c. oscillator at 1000 k.c. Switch to 1000 k.c. and adjust the 1000 k.c. trimmer to bring the oscillator frequency exactly to resonance. The agreement between the 12th harmonic of the Frequency Standard when set to 1000 k.c. and the 120th harmonic when set to 100 k.c. can then be checked by tuning the receiver to 12,000 k.c. The 570, 100, and 1000 k.c. frequencies are thus set and the Frequency Standard is ready for use as previously described. The signal from the Frequency Standard may be modulated, if desired, but for accurate calibration it is preferable to have the signal unmodu-

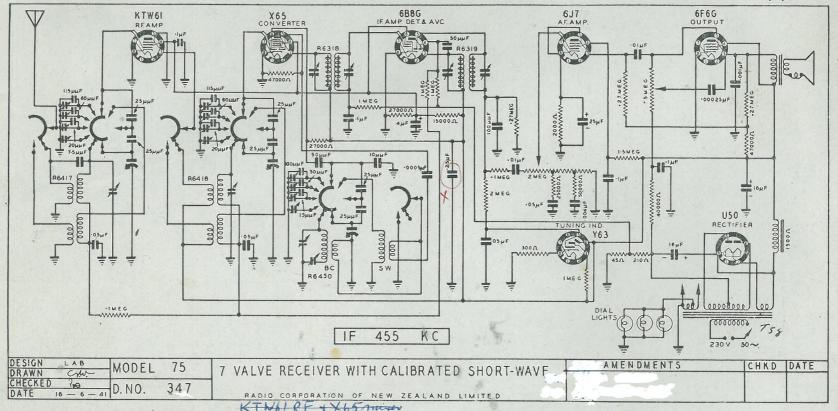
#### 4. GRAMOPHONE CONNECTION.

Owing to the limited demand for gramophone pick-up connections, it is not standard practice to incorporate such arrangements in this receiver. Instructions covering the necessary modifications may be obtained on application to the factory and, if required, the additional parts, already wired for connection to the receiver, can be supplied at a nominal charge.



Nate-capathene land IFT's

volume control is Controlat Midget Redichen 2 Mag total tapped 40016 from langua



MODEL 75: Except for the use of 6B8G as the I.F. Amplifier, detector and AVC valve, and 6J7G as the A.F. Amplifier instead of the 6K7G as the IF Amplifier and 6B8G as the detector, A.V.C. and the A.F. Amplifier, this circuit is the same as that on D. No. 326 as described in the Service Bulletin No. 71.

For alignment procedure reference should be made to the S.B. No. 71.

Voltage, resistance and sensitivity tests are listed on the back of this page.

75-06817 06098

5/N 14662 has suntiled tore control of moinful by and of sertifue & 657 intres

pplement to Service Bulleti

(Please attach

1st July, 1941

Dieg. No 347

4

# Model 75: (Circuit D. No. 347)

#### **VOLTAGE TESTS:**

A.C. High-voltage secondary of power transformer, from each rectifier plate to:
Centre tap 335V.
Heater of rectifier 5V.
All other heaters 6V.
Dial Lamps 4.5V.
DC (
D.C. (measured between point indicated and chassis)
First 16 mfd. electrolytic condenser 340V
Second 16 mfd. electrolytic condenser 230V
Screen of 6B8G, X65 & KTW61 80V.
Plate of 6J7
Catthode of 6]/
All other cathodes 0V.
Name in C. C.
Negative terminal of first 16 mfd.
electrolytic condenser 16V
Junction of 45 and 210 ohm resistors 3V.
All masses 1 111
All measurements should be made with the receiver
tuned to approximately 1000 k.c. and with no signal
input.

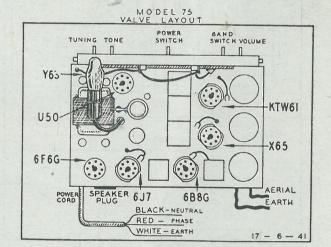
#### RESISTANCE TESTS

12010	
	. Resistance in ohms
Across power cord  Each rectifier plate to centre tap of	45
power transformer secondary	300
Across speaker field	1500
Speaker transformer, primary	500
I.F. I ransformer Coils	7
B/C aerial primary	35
D/C aerial secondary	5
D/C R.F. primary	70
B/C R.F. secondary	5
B/C Osc. primary	2
B/C Osc. secondary	4
S/W Aerial, R.F. and Osc. primary	0
S/W Aerial, R.F. and Osc. secondary	0
Between negative terminal of first 16 mfd.	
electrolytic condenser and chassis	255

#### SENSITIVITY TESTS:

(Microvolts input to give standard output of 50 milliwatts.)

Frequency 455 k.c.	Grid o	Inpu		Ampli	fier	Micr volt 500	S
455 k.c.	Grid of X65					15	50
1400 k.c.	Aerial	lead 1	hroug	h stand	dard		
	dummy antenna				U	nder	1
1000 k.c.	,,	"	,,	,,,	U	nder	1
600 k.c.	,,	;,	"	,,			1
16 metre band	,,	12	,,	,,	U	nder	1
19 metre band	,,	,,	"	,,	U	nder	1
25 metre band	,,	"	,,	,,	U	nder	1
31 metre band	"	,,	,,	,,	U	nder	1

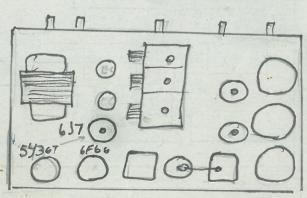


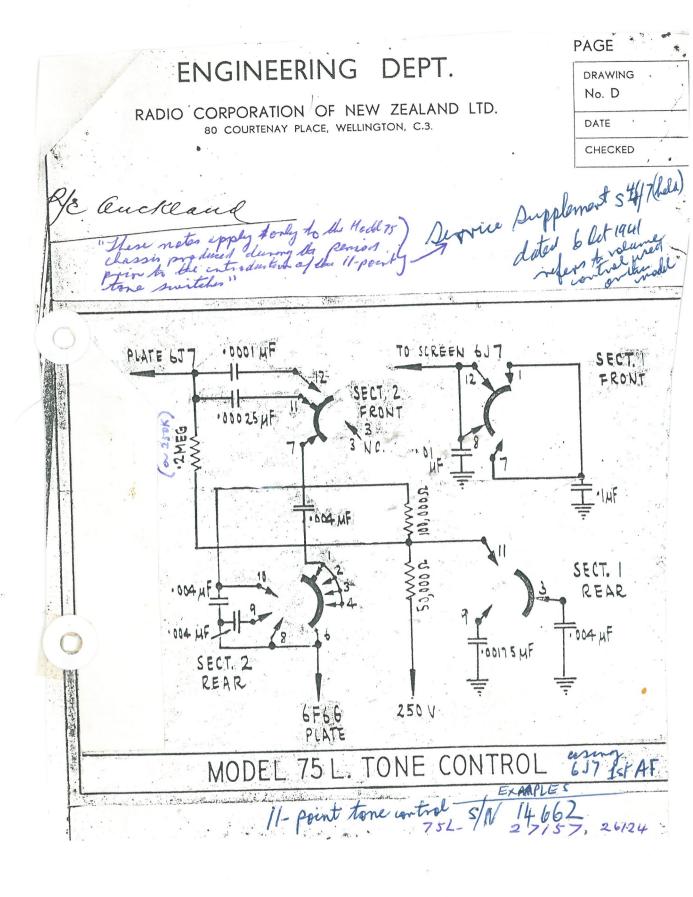
75A-21222 (arable)
75L-27157 (arable)

14662

Las suith
tore control

4637 remit





TELEGRAMS:

A

TELEPHONE 55-020

RADIO CORPORATION OF NEW ZEALAND LTD.

SERVICE SUPPLEMENT

ND. STOTT

PLACE, WELLINGTON, CJ.

Date 10th Oct., 1940.

# MODEL 75: ALIGNMENT PROCEDURE FOR SHORT WAVE BANDS WITHOUT USE OF FREQUENCY STANDARD S.F.1. or S.F.2.

Owing to the high degree of accuracy required in setting the calibration of Model 75 on the short wave bands it is not possible to align the receiver satisfactorily by means of a signal generator alone, as it is difficult to set the signal generator frequency to closer than within about 100 k.c. For this reason our Frequency Standard S.F.1 has been developed, but where this is not available it is possible to utilise another Model 75 chassis to generate a signal at 570 k.c. the harmonics of which can be used as marker points in each short wave band. Almost any other receiver with an I.F. in the region of 455 k.c. could be used for this purpose if desired. The only requirement is that the converter tube should continue to oscillate when the circuit is altered as below to tune to 570 k.c.

. In the case of a Model 75 chassis being used instead of the Frequency Standard, certain alterations must first be made.

- 1. Connect a .0005 mfd. fixed condenser across the Broadcast Oscillator secondary and then short circuit the padder by connecting the low potential end of the secondary direct to earth. Station 2YA is then tuned in on the receiver under test (which let us term "X"), which is to be aligned, and the tuning of the altered receiver, which we shall term FS 75 as it is being used as a Frequency Standard, is adjusted until a whistle is heard from the receiver under test ("X").
- 2. Adjust the tuning of FS 75 to bring the whistle to zero beat. The frequency of the oscillator in this FS 75 is then set at 570 k.c. It is left at this setting while the alignment is in progress.

It is desirable to have the volume control of this receiver (FS 75) turned right off all the time as beat notes heard from it have no significance and may prove confusing. No audible signal is required from it.

Now set your standard signal generator at 18 Mc., switch receiver "X" under test to 16 metre band, set dial at 18 Mc. and tune in signal by adjusting 16 metre band oscillator trimmer. If the signal is received at two points the correct adjustment is that with the trimmer screwed furthest out. Now adjust 16 metre aerial and R.F. trimmers for maximum output. Disconnect

aerial lead from dummy antenna and connect it directly to the control (top) grid of the X65 in the receiver FS 75 first removing the normal grid clip from this tube. Unmodulated signals should now be received at 17,670 and 18,240 k.c. and the oscillator trimmer should be adjusted to bring these signals to their correct points on the dial. The harmonics generated by the other receiver (FS 75) are not strong and, if the noise level in the test location is high, it may be necessary to rely on the partial closure of the magic eye to determine the point at which these harmonics are received.

Now set receiver dial of "X" at 17,800 k.c. and adjust your standard signal generator frequency till the signal is heard. Adjust 16 metre aerial and R.F. trimmers for maximum output. If there is any slight discrepancy in the amount of bandspread the oscillator trimmer should be adjusted so that the calibration is correct within the recognised international S/W bands, which are:

17,750—17,850 k.c. 11,700—12,000 k.c. 15,100—15,350 k.c. 9,500— 9,700 k.c.

Now switch, in turn, to the 19, 25 and 31 metre bands and repeat the above procedure. The actual alignment of aerial and R.F. trimmers should be done at approximately the centre of the scale, that is, at 15,200, 11,700, and 9,600 k.c. By utilising the harmonics of the 570 k.c. signal in conjunction with a receiver that has been lined up correctly it will be possible to obtain approximate dial settings for your standard signal generator for these frequencies. However the 570 k.c. oscillator or an altered Model 75 (FS 75) should always be used to fix the exact calibration on the receiver being tested. The points at which harmonics of 570 k.c. fall are:

16 M. 19 M. 25 M. 31 M. 17,670 k.c. 15,390 k.c. 11,400 k.c. 9,690 k.c. 18,240 k.c. 11,970 k.c.

When the receiver is actually installed in the customer's home it is essential that the aerial circuit trimmer for each band should be readjusted to suit the particular aerial in use. This is done by adjusting each aerial trimmer, through the slots provided in the cabinet to bring the noise level to a maximum with the dial set at mid scale. Please refer to Service Supplement S40/12 for full details of this procedure.



L

80 COURTENAY PLACE, WELLINGTON, C.S., NEW ZEALAND.

S.40/7.

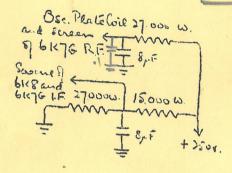
ALTERATIONS TO MODEL 7 SERVICE SUPPLEMENT.

15th Aug. '40.

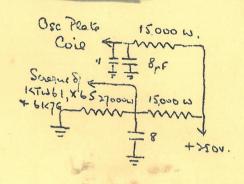
Subject

Date

Owing to the difficulty of obtaining supplies of 6K8G tubes it became necessary to substitute "Osram" type X65 as the convertor in Model 75. At first the only changes made in the chassis were as shown below.



MITH PK8



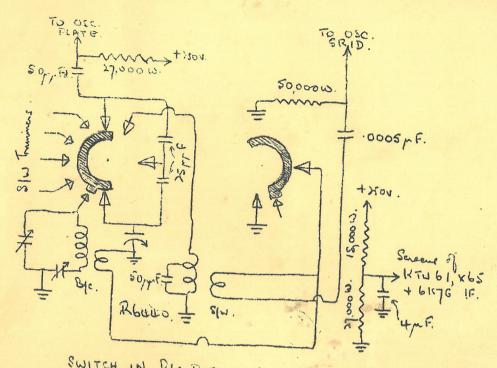
WITH X65

Because of the somewhat lower conversion conductance of the X65 the 6K7G R.F tube was replaced by a KTW61 which gives higher gain and results in overall sensitivity approximately the same as before the change. However, it has been found that the X65, especially when used with an oscillator coil and circuit more suited to its characteristics, gives a performance on the short wave which is superior to that of the 6K8 and therefore the X65 will be used in all subsequent Model 75s.

The altered circuit, which is shown below, incorporates coil type R.6440

 $\left(\frac{2}{43C}\right)$ 

model 75



EWITCH IN BIC. POSITION.
FRONT VIEW AS IN MODEL 75 CIRCUIT.

With these changes the sensitivity is slightly higher than before and the oscillator frequency remains extremely stable on short wave with large changes in A.V.C. voltage. This feature is especially good in reducing the effects of severe fading. It will also be found that there is no "pulling" of the oscillator frequency when adjusting the RF trimmers even on the M.c.band.

The X65 tube has a tendency to stop oscillating if the filament voltage is below normal. This could occur when the receiver is operated from a power line, the voltage of which is very low. However with the plate-tuned oscillator circuit it has been found that the majority of tubes will oscillate even when the filament voltage is as low as 4.8 volts so that no trouble should be experienced on this account.

An additional advantage in the use of a KTW61 and X65 improved.

especially set

 $\left(\frac{2}{43D}\right)$ 

TELEGRAMS:

V

TELEPHONE 55-020

RADIO CORPORATION OF NEW ZEALAND LTD.

10.

No. \$40/12

SERVICE

SUPPLEMENT

PLACE, WELLINGTON,

Date

e 10th Oct., 1940.

MODEL 75:

COURTENAY

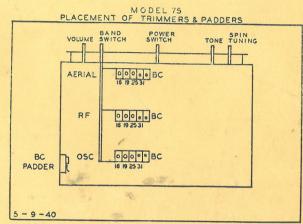
## ADJUSTMENT OF AERIAL TRIMMERS TO MATCH INDIVIDUAL AERIALS

(for full particulars of Model 75 please refer to Service Bulletin 71.)

Although the high sensitivity of Model 75 usually permits fair reception of short wave stations without any aerial whatever this receiver should never be left in the customer's home under these conditions. This model has been designed to give the best possible reception on short wave and, since a good aerial is essential with any receiver if the best signal-to-noise ratio is to be obtained, the aerial coil in Model 75 has been designed for use with an aerial at least 30 feet long, preferably more, and as high as possible. It is only under these conditions that the superlative short wave reception of which the receiver is capable will be realised to the full.

At the factory the receiver is aligned on a standard dummy antenna and it is also given an air test on a normal outdoor aerial. However, it must be realised that the characteristics of the aerial installed at the customer's home may differ quite widely from those of the standard dummy antenna and, whilst good results will be obtained on any aerial, the performance may nearly always be greatly improved by readjusting the short wave aerial circuit trimmers after the receiver has been installed and connected to the purchaser's aerial. As this adjustment can, in the case of some aerials, result in an effective increase in sensitivity of up to four times, it should be regarded as an essential part of the job of installing the receiver.

All trimmers are accessible through slots in the bottom of the cabinet (in the shelf in the case of consoles) and the location of each is shown in the following diagram.



First set the band switch to the 16 metre band and set the dial pointer at approximately at the centre of the scale (17,800 k.c.) at a point where no signals are received. Turn the volume control full on and adjust the 16 metre aerial trimmer until the noise which is heard is a maximum. At the same time the 16 metre R.F. trimmer may be peaked in the same way but this trimmer should not normally require any readjustment. Now repeat the above procedure, switching in turn to the 19, 25 and 31 metre bands and adjusting the appropriate aerial trimmer for maximum noise with the receiver tuned to the centre of the dial scale.

On no account should the oscillator trimmer be

On no account should the oscillator trimmer be touched unless the calibration, as checked against the frequencies of actual short wave stations received, is found to be slightly out. In this case the oscillator trimmer may be adjusted to correct the calibration but extreme care must be taken as these adjustments are critical and, once the calibration is lost, it will be necessary to use the Frequency Standards SF1 or SF2, or their equivalent as described in Service Supplement \$.40/11, to re-establish it.

After the short wave trimmers have been adjusted, switch to broadcast band, tune to 1400 k.c. and adjust the B/C. aerial trimmer for maximum noise. This trimmer will not generally require appreciable readjustment.

"RADICENTRE"

EALAND LTD.

SERVICE SUPPLEMENT

No.

TELEPHONE 55-020

G.P.O. BOX 1585

Date

S.41/7.

6th October, 1941.

REPLACEMENT OF 2 megohm TAPPED VOLUME CONTROLS IN MODEL 75.

There is a shortage of supplies of the 2 megohms tapped volume controls, making it necessary to replace them with 1 meg. Most of these controls have no tapping and therefore the low level tone compensation is omitted when rewiring the control. The leads which would normally go to the two taps on the 2 meg. controls In a few cases the 1 meg. should be disconnected inside the chassis. control supplied by the factory will have a single tap but this should be disregarded as resistance values are unsuitable for the Model 75 circuit.

These notesaapply only to the Model 75 chassis produced during the period prior to the introduction of the 11 point tone In the case of these newer chasses the low level tone compensation is unnecessary and a straight .5 meg. control is used as standard.

Nate: - I may on 2 may blain controls can also be used to replaced the 2 may tapped con