

860 SPECIFICATIONS:

Model 860 is an alternating current (A.C.) operated band spread super-heterodyne radio, employing eight tubes and eight tuning scales. Three standard tuning scales are mounted on the left side of the dial. These scales cover the radio spectrum from 540 kilocycles to 22 megacycles. Five Spread Band Scales on the right side of the dial are designed to spread the short wave frequencies more than 20 times further apart than the standard tuning scales.

The Standard Tuning Scales are tuned by a variable condenser and the Spread Band Tuning Scales are tuned to stations by a three-gang permeability tuner driven by a common shaft.

Each tuning band scale is printed on an individual glass section which is separately illuminated when in use. The scales are selected by a "Band" switch. Additional features of design included in this model are: Tuned "R.F." stage; variable tone control, which adjusts Bass and Treble audio frequencies; automatic volume control; Bass audio frequency compensation in the volume control circuit; permeability tuned I.F. transformers; push-pull pentode audio output stage; band indication by a moving dial light, balanced field electrodynamic "8" inch speaker and provision for attaching a phonograph reproducer.

TUNING BAND RANGES:

Standard Tuning - 540 to 1720 KC; 2.3 to 7.3 MC; 7.2 to 22 MC.

Spread Band Tuning - 9.4 to 9.9 MC; 11.4 to 12 MC; 14.8 to 15.6 MC; 17.3 to 18.2 MC; and 20.9 to 21.9 MC.

Intermediate Frequency; 455 KC

Power Supply: 230 volts, 50 to 60 cycles A.C.

Power Consumption: 90 watts.

Audio Output: 6 watts.

Philco Tubes: 7A7E, R.F. stage; 7J7E, converter 7A7E, I.F. amplifier; 75, second detector, first audio; 76, audio driver; two 42E, audio output and an 80 rectifier.

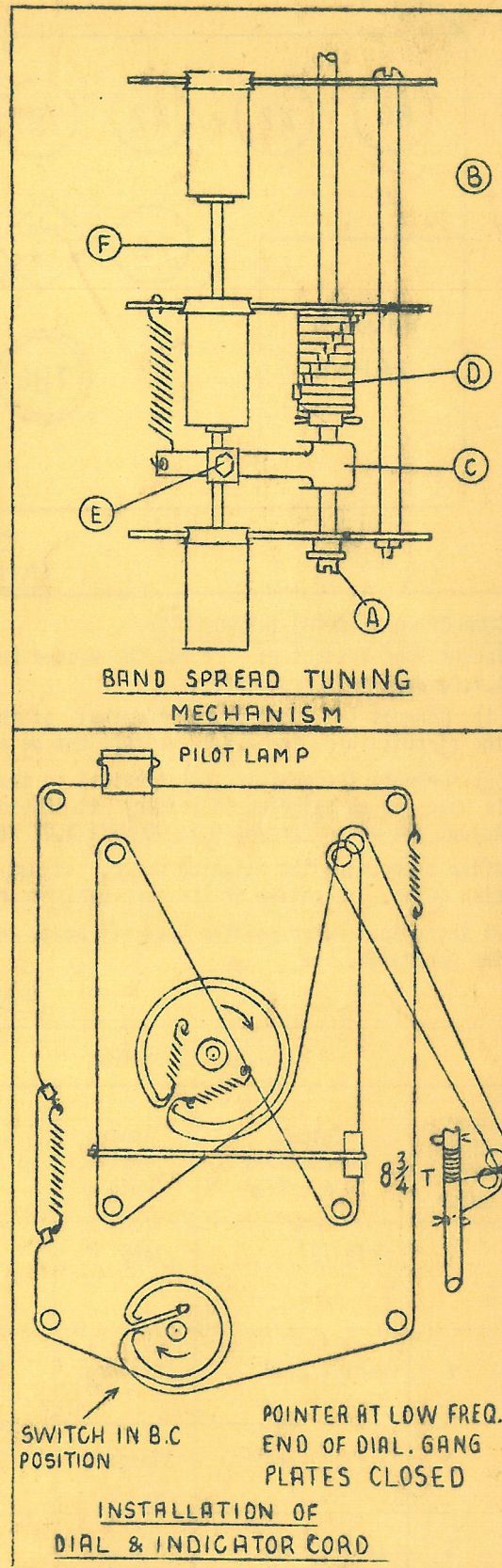
MECHANICAL ADJUSTMENTS - BAND SPREAD TUNING MECHANISM:

- Adjustment of Tuning Shaft.
End play can be removed by adjusting the rear bearing No. (A) Fig. (1). Care should be taken when adjusting the screw so that the shaft does not turn too tightly.
- Removing Tuning Shaft.
(a) Remove tuning knob shaft and coupling and R.F. tuner from chassis
(b) Loosen lock nut on rear bearing and remove adjusting screw and ball bearing.
(c) Remove cotter pin from stop assembly.
(d) Unscrew carriage as shaft is pulled out through front of R.F. tuner.
(e) When installing new shaft (B) adjust positions of stop assembly and carriage, before inserting cotter pin, so that the carriage (C) is approximately 5 turns from the stop assembly (D) with shaft in extreme counterclockwise position from front. The stop assembly is rotated until all washers are in contact. The bottom washer should be located between the stops farthest apart.

NOTE: The carriage clamp (E) must not be tightened excessively as this will bend the tuning core rod (F) and cause backlash.

ALIGNING R.F. AND I.F. COMPENSATORS EQUIPMENT REQUIRED:

- A signal generator covering the frequencies required in adjusting the radios.
- Indicating Device: To obtain maximum signal strength and accurate adjustment of the padders a vacuum tube voltmeter or rectifier type output meter is necessary. The method of connecting either of these instruments is listed below.
- Aligning Tools: Fibre handle screwdriver.



ADJUSTING BAND SPREAD TUNING RANGES

Mechanical Adjustments: Before the padders of the band spread tuning ranges are adjusted, the iron cores of the antenna, R.F. and oscillator transformers must be mechanically set as follows:

- Turn the band spread tuning control to the extreme counter-clockwise position (lowest frequency).
- Adjust location of "OSC" iron cores (blue) so that the end of the iron core is flush with the end of the transformer. With the "OSC" iron core in this position the antenna R.F. cores will be correctly located.
- When installing a new oscillator transformer or core, make sure that the iron core slides freely in the transformer. It is important to do this to eliminate backlash in the tuning mechanism. If adjustment is necessary slightly move transformer in the direction required.

After mechanically setting the transformers and iron cores, adjust the padders as given in the following tabulation:

PROCEDURE FOR PRODUCTION RUN NO. 2 CHASSIS

SIGNAL GENERATOR				RECEIVER			
Operations in Order	Output Connections to Receiver	Dummy Antenna Note A	Dial Setting	Dial Setting	Control Settings	Adjust Compensators for Maximum Signal	Special Instructions.
1	Antenna and Ground	Standard	9.7 MC	9.7 MC	Band Selector Position "31M" on Dial	13, 14, 15.	Note D.
2	Antenna and Ground	Standard	11.7 MC	11.7 MC	Band Selector Position "25M" on Dial	16, 17, 18.	Note D.
3	Antenna and Ground	Standard	15.2 MC	15.2 MC	Band Selector Position "19M" on Dial	19, 20, 21.	Note D.
4	Antenna and Ground	Standard	17.8 MC	17.8 MC	Band Selector Position "16M" on Dial	22, 23, 24.	Note D.
5	Antenna and Ground	Standard	21.5 MC	21.5 MC	Band Selector Position "13M" on Dial.	25, 26, 27.	Note B. Note D.

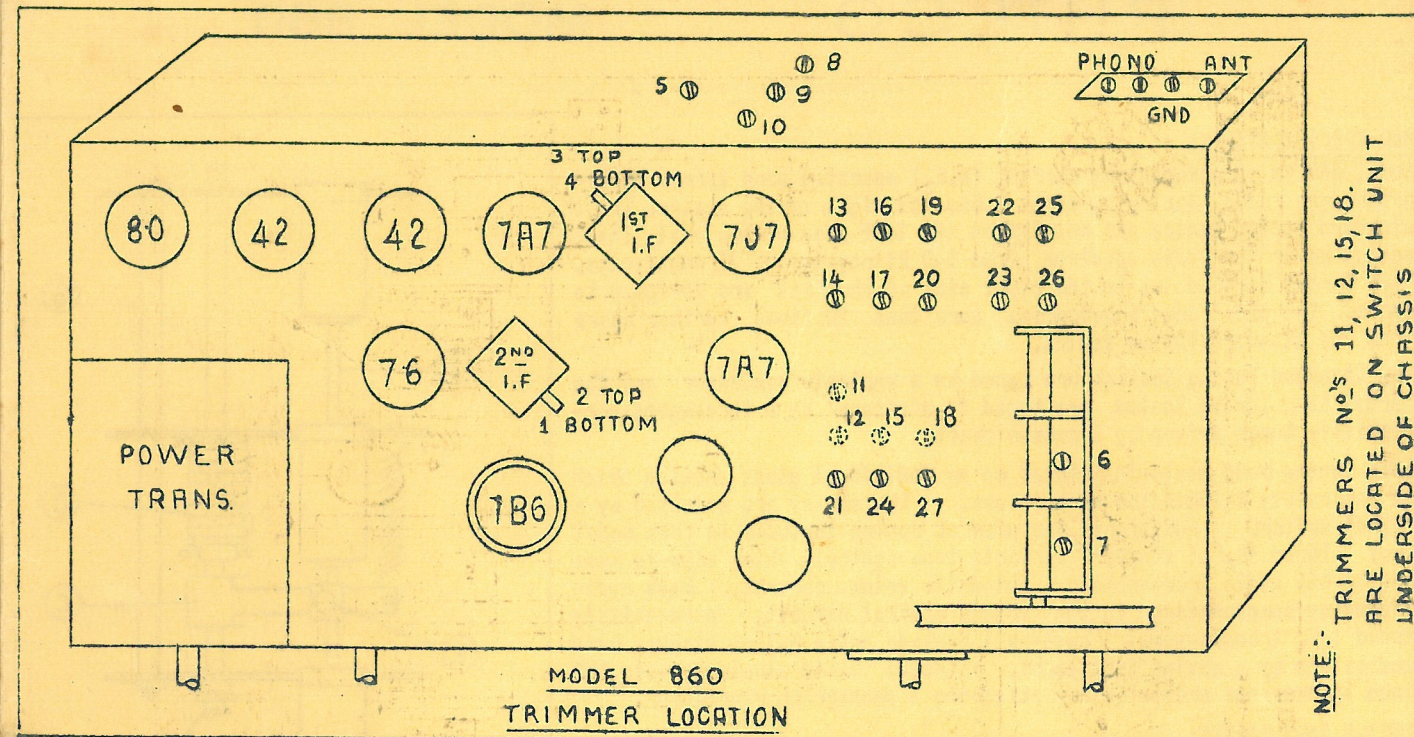
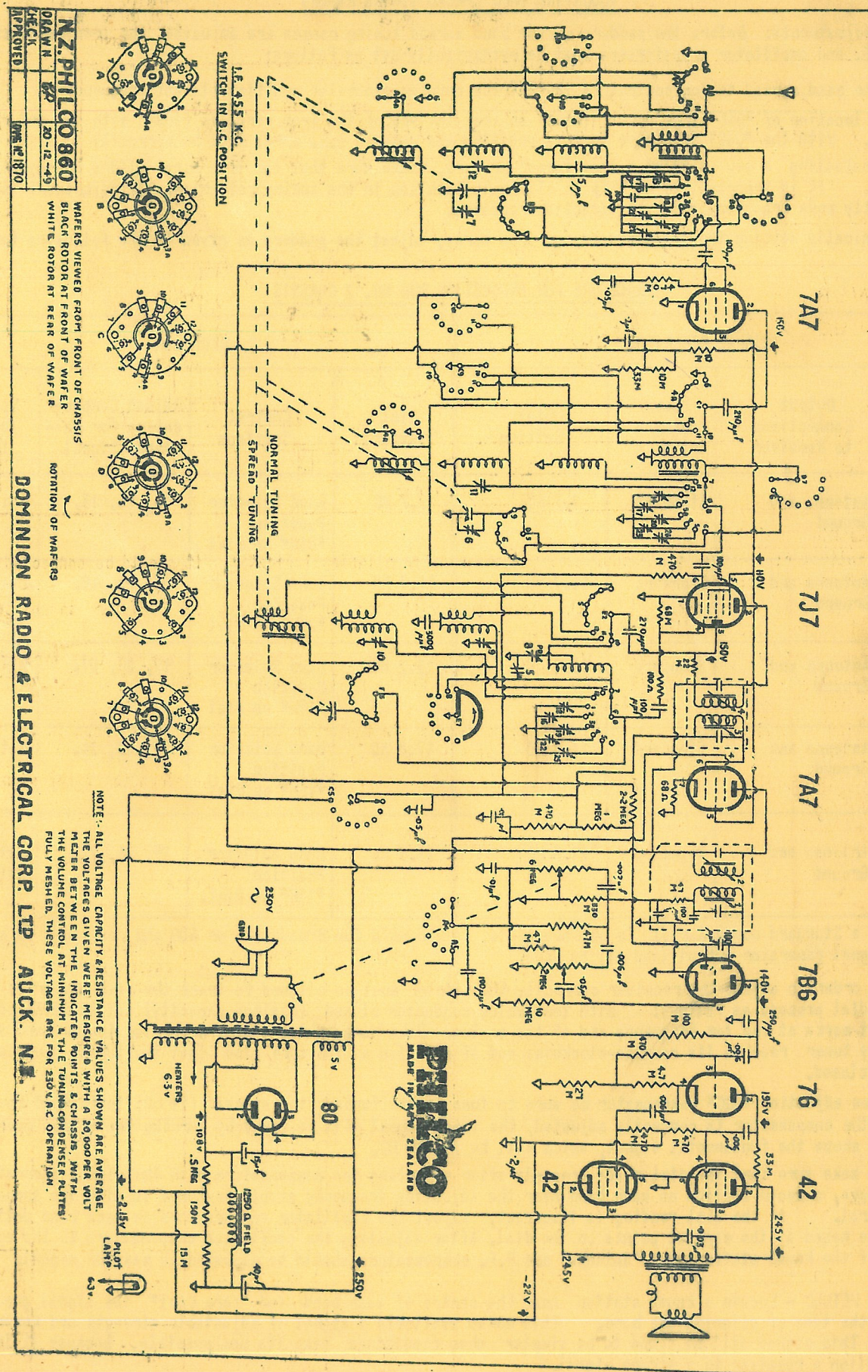
Note A - If a Standard Dummy Aerial is not available, a 200 mmfd for Broadcast or 400 ohm resistor in series with the signal generator output lead may be used.

Note B - In order to adjust the receiver correctly the pointer must be aligned to track the dial properly. To adjust the dial proceed as follows: With the tuning condenser closed (Maximum capacity) set the dial pointer on the first marks at the low frequency end of the scales. Make sure that the stop mechanism in the band spread permeability tuner reaches its counter-clockwise end of rotation at the same time that the tuning condenser is completely closed.

Note C - When adjusting "OSC" compensator be sure to tune in the fundamental signal (21 MC) instead of the image signal. If the compensator is correctly adjusted, the image signal will be found by turning the signal generator dial 910 KC above the fundamental signal, which will be 21.910 MC.

Note D - To make sure that the dial reads properly after adjusting the compensators with the signal generator as outlined above, a known station on each band near the adjusting frequency should be tuned in with the spread band tuning control. If the dial reading is incorrect, adjust the oscillator compensators on each band until the stations are heard at the correct points on the dial. After adjusting the oscillator compensators to the correct frequency of the known station, the "antenna" and R.F. compensators should be adjusted to maximum signal.

ALTERNATIVE METHOD - Locate a known station near the centre of each band and "zero Beat" the signal generator with it at the time of aligning the band. This makes available a signal of adjustable strength and known frequency. This method will be found to be simpler when conditions make its use possible, because it is much easier to align a receiver to a strong signal.



CONNECTING ALIGNING INSTRUMENTS:

Vacuum Tube Voltmeter: To use the vacuum tube voltmeter as an aligning indicator, it should be connected to the A.V.C. circuit as follows:

(1) Connect the negative (-) terminal of the vacuum tube voltmeter through a 2 megohm resistor to any point in the circuit where the A.V.C. voltage can be measured.

(2) Connect the positive (+) terminal to the chassis ground terminal. **Audio Output Meter:** If this type of meter is used as an aligning indicator, it should be connected to the plate and screen terminal of the output tube. Adjust the meter for the 0 to 30 volt A.C. scale.

After connecting the aligning meter, adjust the compensators in the order for each model as shown in the tabulation below. Location of the compensators are shown in Figures 6, 7, 10.

If the output meter pointer goes off scale when adjusting the compensators, reduce the strength of the signal from the generator.

ADJUSTING NORMAL TUNING RANGES

SIGNAL GENERATOR				RECEIVER			
Operations in Order.	Output Connections To receiver	Dummy Aerial Note A	Dial Setting	Dial Setting	Control Settings	Adjust Compensators for Maximum Signal	Special Instructions
1	Grid 7J7	.1mfd	455 KC	1700 KC	Range Switch Broadcast Volume "Max".	1, 2, 3, 4.	
2	Aerial Lead	Standard	1400 KC	1400 KC	Range Switch "Broadcast"	5, 6, 7.	Roll Gang.
3	Aerial Lead	Standard	600 KC	600 KC	Range Switch "Broadcast"	8.	Roll Gang.
4	Aerial Lead	Standard	6.0 MC	6.0 MC	Range Switch "S.W.1."	9.	Roll Gang.
5	Aerial Lead	Standard	21 MC	21 MC	Range Switch "S.W.2."	10, 11, 12.	Notes B, C.