INSTRUCTION BOOK No. 60600R
GENERAL PURPOSE
COMMUNICATION RECEIVER CR–6
SERIES C60600

AMALGAMATED WIRELESS (AUSTRALASIA) LIMITED
47 YORK STREET, SYDNEY

MODIFICATION BULLETIN No. 60600/1 for EQUIPMENT CR-6 Receiver series C60600 BOOK No. 60600R

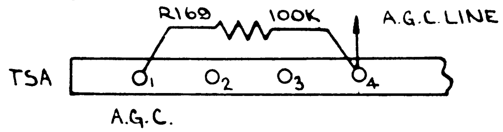
AUTHORITY AND DATE | DESCRIPTION OF MODIFICATION | DRG. No. | DRG. CHANGE

C/0 35063

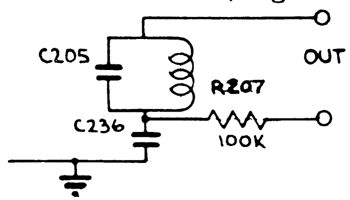
7/8/61

The following modifications have been made to the CR-6 Receiver series C60600 in order to improve the stability of the a.g.c. system.

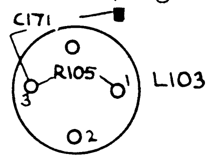
1. A resistor, R169 (100kΩ) is added in series with the a.g.c. line to the r.f. amplifier V1. The resistor is connected between tags 1 and 4 of TSA on the R.F. Coil Unit 1C or 2C60602, and the lead to V1 grid via R1 is now connected to tag 4. (Drg. 60602C1 and 60602C2)



2. A resistor, R207 (100kΩ) is inserted in the lead from C236 to the output of the 100 kc/s Filter Unit 1Q60603. (Drg. 60603C1)



3. A bypass capacitor, C171 (0.01μF) is connected to earth from the a.g.c. line at tag 3 of inductor L103. (Drg. 60600G4)



4. The following components should be added to the Component Schedule:-

C171	0.01μF	-0+100%, 500VW, ceramic tubular.	Ducon CTR.K6000
R169	100kΩ	±10%, 1/4W, composition, grade 2, insulated.	
R207	100kΩ	±10%, 1/4W, composition, grade 2, insulated.	

DRG. No.:
- 60602C1
- 60602C2
- 60603C1
- 60600G2
- 60600G4

Continued on Drg. D

MODIFICATION BULLETIN No. 60600/2 for EQUIPMENT 60600 BOOK No. 60600R

AUTHORITY AND DATE	DESCRIPTION OF MODIFICATION	DRG. No.	DRG. CHANGE
0 37201 /6/62	1. The following corrections should be made to TABLE A, page 10, Book 60600R. V1 Screen voltage: change to 50V (was 91) V1 Cathode voltage: change to 1.2V (was 3.6) V106 Screen voltage: change to 85V (was 105)		
/0 34732 /6/63	2. The following changes have been made to improve the range of the beat oscillator tuning and to optimise the tuning of i.f. transformer TR102.- Change.- C138 to 620 pF ±10%, 600VW, plastic film Ducon Styroseal C146 to 430 pF ±10%, 600VW, plastic film Ducon Styroseal	60600G2	6

Continued on Drg. D

INSTRUCTION BOOK No 60600R

AMENDMENT No 1

A SMALL MODIFICATION HAS BEEN MADE TO THE H.T. DECOUPLING IN THE R.F. COIL UNIT 2C60602 ON THE CR-6B RECEIVER TYPE 2C60600

1. THE DECOUPLING RESISTOR R106 DRG 60600G2 HAS BEEN REMOVED FROM THE +150V LINE TO TSA7 AND CONNECTED IN SERIES WITH THE +150V. LINE TO TSA3. THIS MODIFICATION APPLIES TO ALL RECEIVERS AND IS SHOWN IN FIG. 1.

2. A BYPASS CAPACITOR (C70, 0·1μF) IS CONNECTED FROM TSA3 TO EARTH ON R.F. COIL UNIT TYPE 2C60602. THIS CAPACITOR SHOULD BE ADDED TO DRG 60602C2 AS SHOWN IN FIG 2

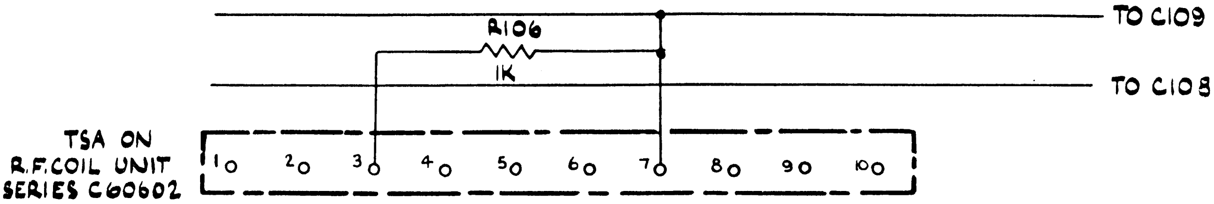


FIG. 1.

MODIFICATION TO DRG 6060062

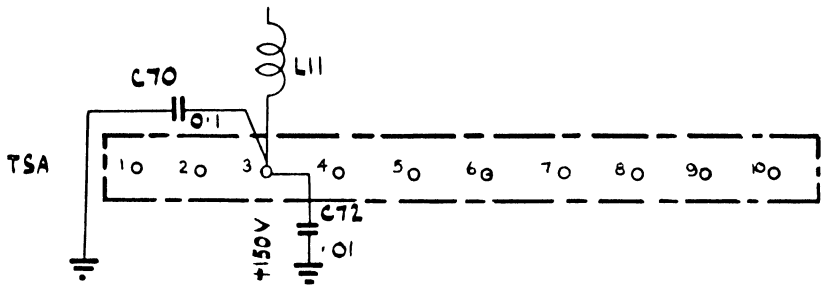


FIG 2

MODIFICATION TO DRG 60602C2

3. THE FOLLOWING CAPACITOR SHOULD BE ADDED TO THE COMPONENTS SCHEDULE FOR R.F. COIL UNIT 2C60602, SUB-SECTION 5·2

C70 0·1μF ± 10%, 400DCW, POLYESTER, TUBULAR. PHILIPS C296AC/A100K

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GENERAL PURPOSE COMMUNICATION RECEIVER CR-6

SERIES C60600

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010561

FOREWORD

The A.W.A. Receivers series CR-6 cover frequencies in the range 200 to 540 kc/s and 2 to 30 Mc/s.

Receiver type CR-6A gives continuous coverage from 2 to 30 Mc/s in six ranges, and this receiver is described in detail in this handbook.

Receiver type CR-6B is described in Supplement No. 1. It includes a low frequency range of 200 to 540 kc/s to cover the marine calling and emergency band and certain fixed frequency services. The high frequency range of 25 to 30 Mc/s is omitted from this receiver. The variations occur only in the R.F. Coil Unit series C60602, the calibrated dial scales and the range change switch. The circuitry of the main receiver chassis and the Crystal Oscillator Unit (when fitted) remain the same for all types.

The R.F. Coil Unit type 2C60602, used in Receiver CR-6B, is described in detail in Supplement No. 1 to the main handbook.

The types of receiver currently available are listed below.

Receiver	Type	R.F. Coil Unit	Frequency Coverage
CR-6A	1C60600	1C60602	2 Mc/s to 30 Mc/s.
CR-6B	2C60600	2C60602	200 kc/s to 540 kc/s, 2 Mc/s to 25 Mc/s.

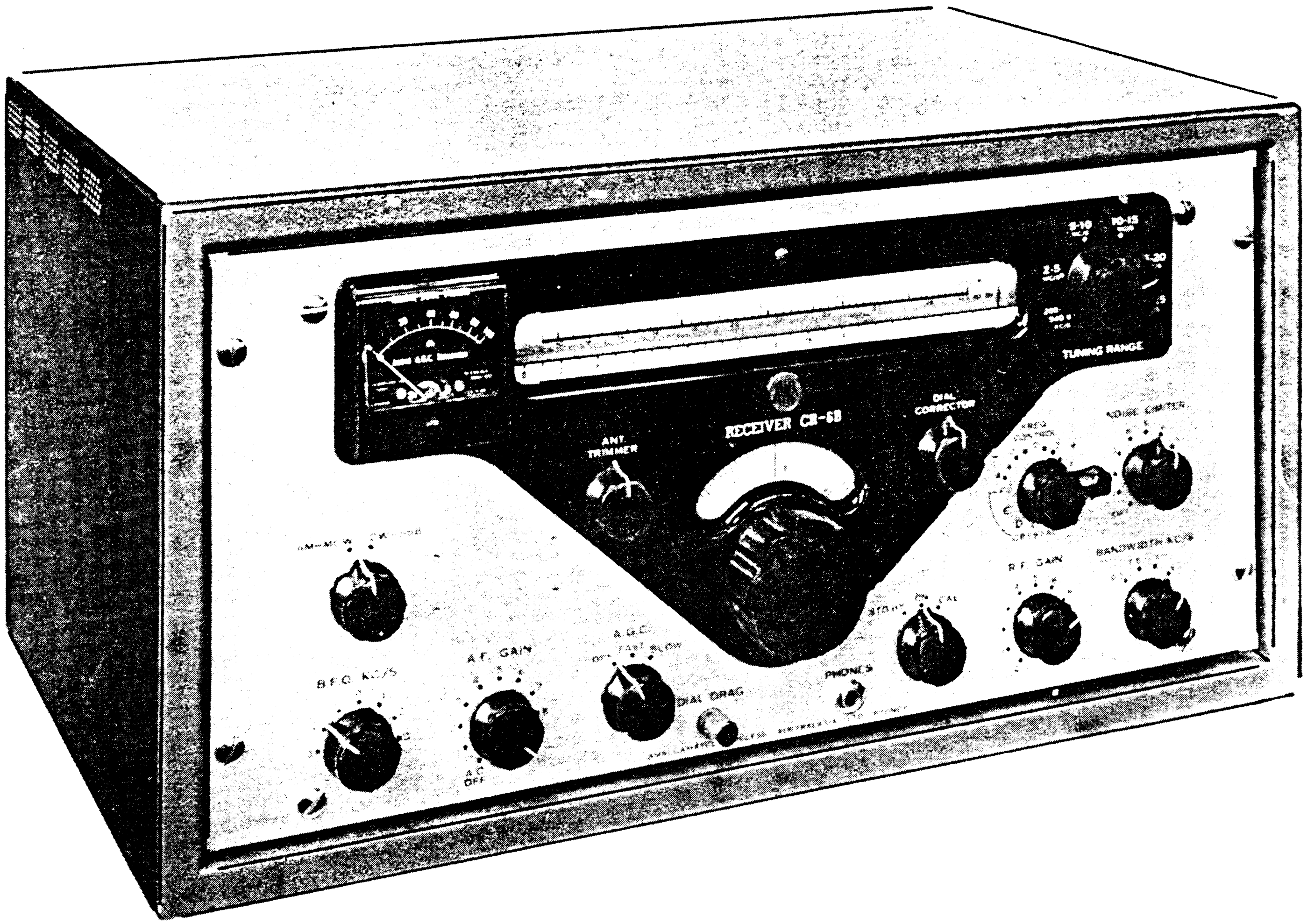

PLATE 1 RECEIVER CR–6 (Front View) IN CABINET P.V.—625-O

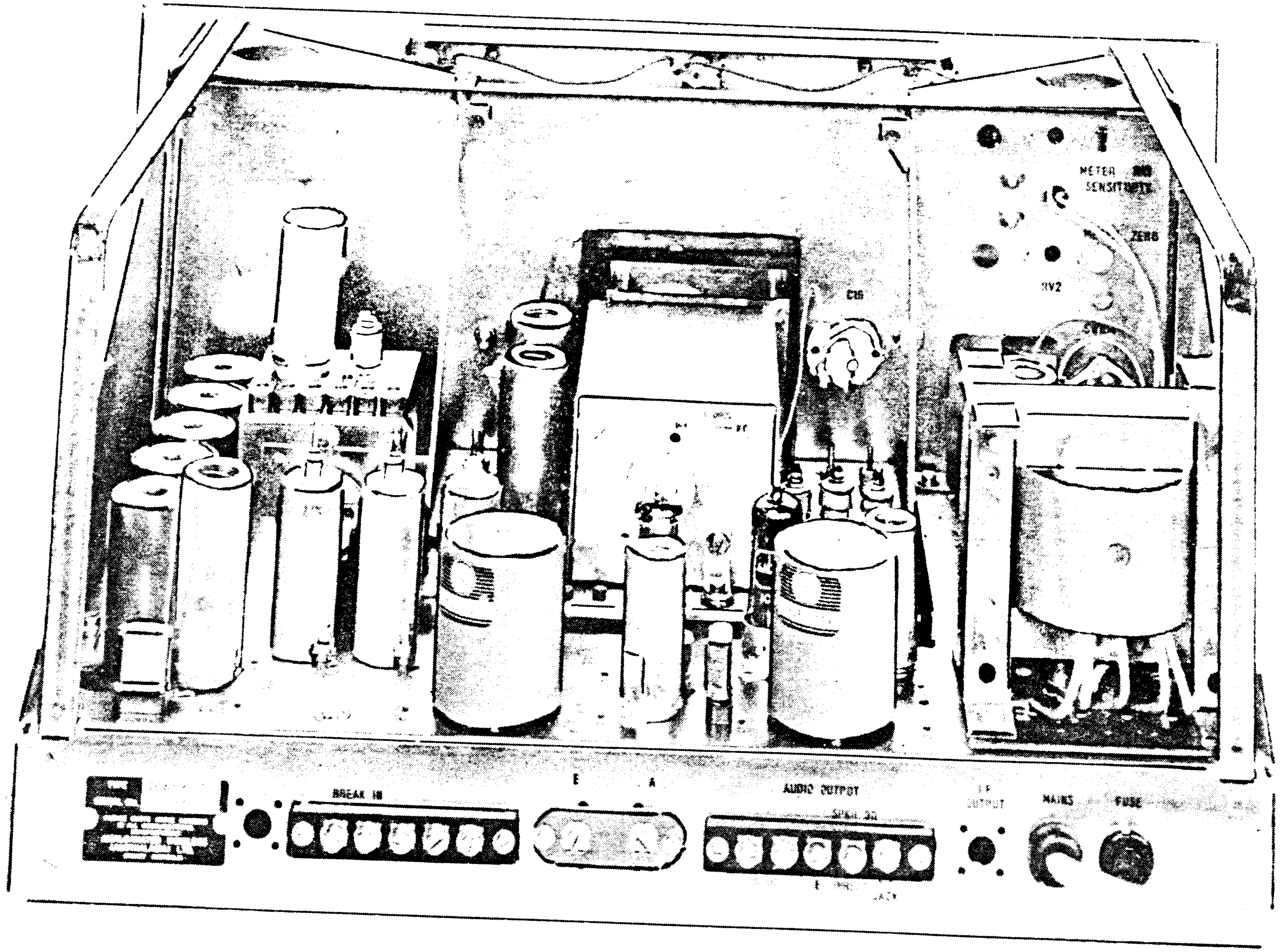

PLATE 2 RECEIVER CR–6 (Rear View)

P.V.–626.O

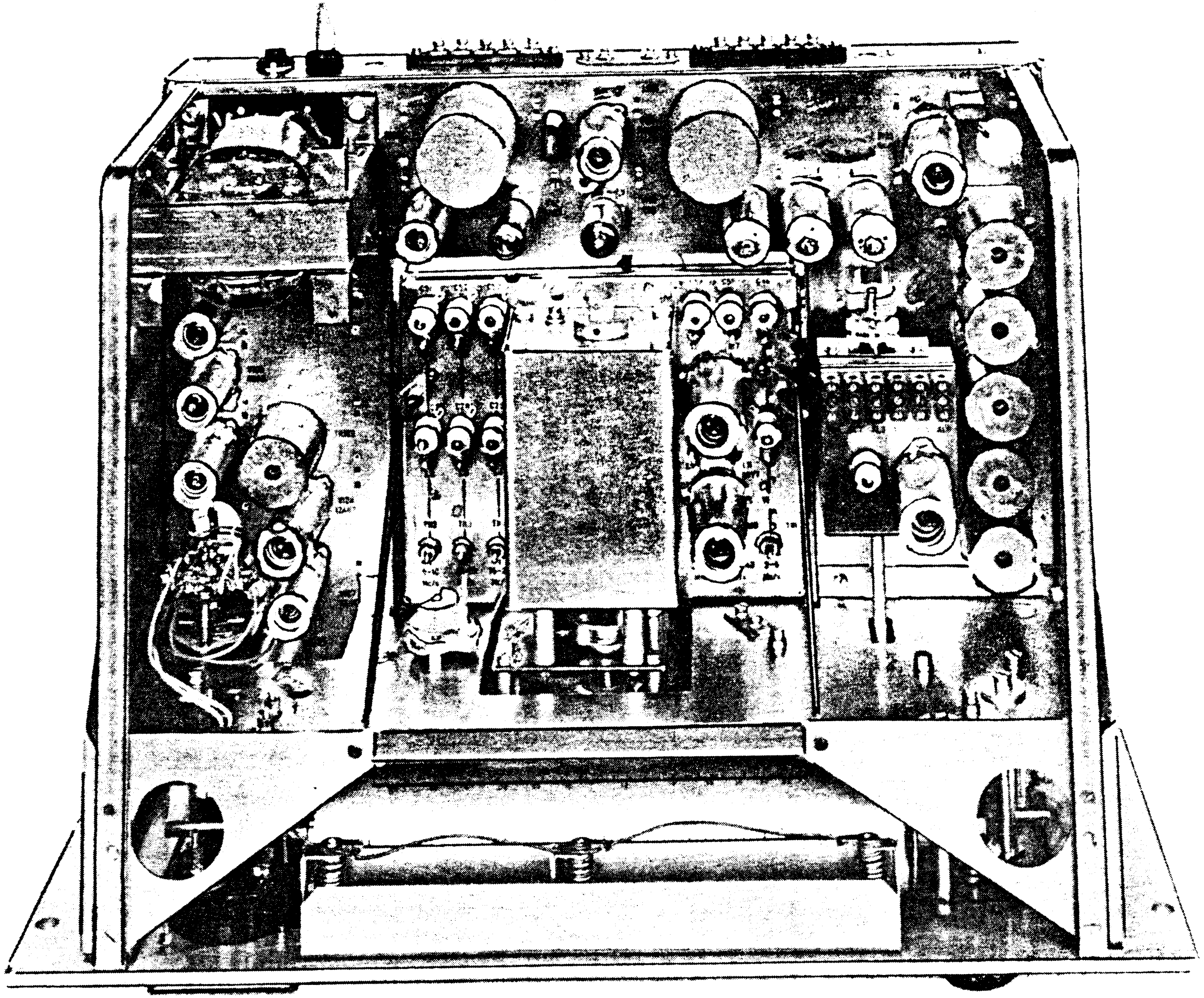

PLATE 3 RECEIVER CR-6 (Top View)

P.V.—627-0

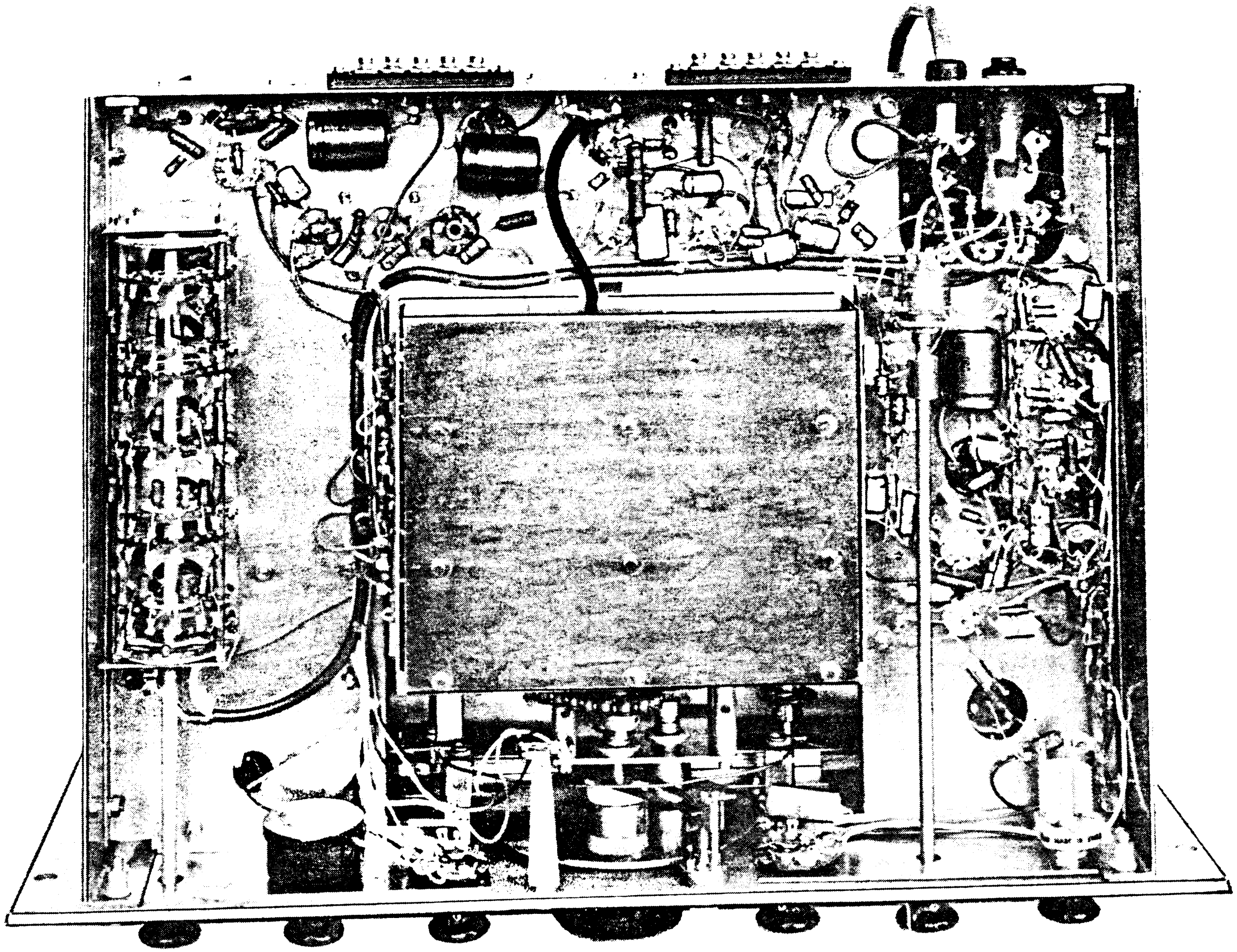

PLATE 4 RECEIVER CR–6 (Bottom View)

P.V.–628-0

SUPPLEMENT No. 1

TO

INSTRUCTION BOOK No. 60600R RECEIVER CR–6B

TYPE 2C60600

1.—BRIEF DESCRIPTION

1.1 Classification

The A.W.A. Receiver CR-6B, type 2C60600, is similar to the CR-6A, type 1C60600, but covers a different range of frequencies. The R.F. Coil Unit type 2C60602 is used in place of type 1C60602 to provide coverage of the low frequency band 200 to 540 kc/s in addition to five high frequency ranges giving continuous coverage from 2 to 25 Mc/s. The low frequency range includes the marine calling and emergency band and certain fixed frequency services such as radio navigational aids and maritime beacons.

The unit is built into a main receiver chassis identical with that used in the CR-6A Receiver, described in Instruction Book 60600R. The receiver, with the inclusion of R.F. Coil Unit type 2C60602, becomes a CR-6B Receiver type 2C60600. Other variations from the basic CR-6A receiver include a dial drum scale calibrated for the ranges used and a different front panel escutcheon, with the appropriate frequency ranges stencilled around the range change switch.

1.2 Performance Specification

Frequency Coverage	(i) 200 to 540 kc/s (ii) 2 to 5 Mc/s (iii) 5 to 10 Mc/s (iv) 10 to 15 Mc/s (v) 15 to 20 Mc/s (vi) 20 to 25 Mc/s
Sensitivity and Signal to Noise Ratio 200 to 540 kc/s	With an output of 500 mW. for an input of 10 μV. of a carrier modulated 30% at 1000 c/s, the signal to noise ratio is not less than 10 db.
2 to 25 Mc/s	With an output of 500 mW. for an input of 3 μV. of a carrier modulated 30% at 1000 c/s, the signal to noise ratio is not less than 10 db.

The other performance figures are as for the CR-6A receiver, as described in Instruction Book 60600R, sub-section 1.5.

1.3 R.F. Coil Unit Type 2C60602

The R.F. Coil Unit is very similar to that used in the CR-6A receiver. The differences are as follows:

(a) The new low frequency range is in position 1 of the range switch and all other ranges are moved up one position, the highest frequency range (25 to 30 Mc/s) being deleted.

(b) The anode load of the r.f. amplifier valve (V1) is a variable inductor (L11) and the first mixer grid inductor is replaced by a resistor (R11). Since L11 is in circuit on all ranges, it will be necessary to align the low frequency range 200 to 540 kc/s first, before proceeding with the alignment of the other ranges. (See sub-section 2.2.)

(c) On the low frequency range an extra resistor (R5) is switched into the cathode circuit of the r.f. valve (V1). This resistor is shorted out by the switch on the other ranges.

(d) The resistors in the voltage divider in the first mixer screen supply are of different values from those used in the CR-6A.

Apart from these variations, the coil unit is identical with that used in the CR-6A receiver. The remainder of the equipment is unchanged and the description of the receiver as a whole, as given in Instruction Book 60600R, applies equally to the CR-6B.

The component schedule for R.F. Coil Unit 2C60602 is included in the main handbook, sub-section 5.2.

2.—OPERATION AND MAINTENANCE

2.1 Operation

The low frequency (200 to 540 kc/s) range provides for the reception of radio navigational aids such as beacon transmitters, and the maritime emergency band between 490 and 510 kc/s.

The operation of the receiver is as described in sub-section 3.6 of the receiver handbook. Note, however, that only one calibration point (using the crystal calibrator) is available on the low frequency range, viz. 500 kc/s.

2.2 Maintenance

The care of the receiver and the maintenance and alignment procedures for the CR-6B receiver are identical with those given for the 6R-6A, with the following exception:

Paragraph 4.4.10 R.F. Alignment

The low frequency range (200 to 540 kc/s) must be aligned before proceeding with alignment of the other ranges. Since the ends of the band cannot be calibrated by means of the crystal calibrator, this range must be aligned with the signal generator only. The signal generator should first be calibrated as accurately as possible, and the output impedance built out (if necessary) to 100 ohms with a non-inductive resistor.

Check that the scale calibration marks at 200 and 540 kc/s coincide with 2 and 26 on the log scale with the DIAL CORRECTOR set to the centre of its range. Then align the ends of the range as follows:

Range kc/s	Alignment Frequencies	Adjustment Aerial	R.F.	Oscillator
200-540	200 and 540 kc/s	TR16, C16	L11, C32	TR17, C56

The other ranges are then aligned as in 4.4.10 in the receiver handbook.

INSTRUCTION BOOK No. 60600R

GENERAL PURPOSE COMMUNICATION RECEIVER CR–6A

TYPE 1C60600

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TABLE OF CONTENTS

1.—BRIEF DESCRIPTION

Classification

[illegible] CR-6A is a highly stable general purpose [illegible]ation receiver covering the frequency range [illegible] Mc/s. It is compact and self contained, except [illegible] loudspeaker, which is not supplied with the [illegible].

[illegible] unit is suitable for mounting in a standard [illegible] carrier rack and occupies 8¾ inches of panel [illegible] Alternatively it may be supplied with an [illegible] case for desk-mounting use.

[illegible]dspeaker styled to match the receiver in its [illegible] also available.

[illegible] receiver operates from a 220 to 250V., 50 [illegible]er supply. The facilities provided include the [illegible]:

- [illegible]tinuous frequency coverage from 2 to 30 [illegible] in six bands.
- [illegible]eption of CW, MCW, RT (AM) or SSB [illegible]nals.
- [illegible]t-in crystal calibrator and dial correcting [illegible]chanism.
- [illegible] oscillator for CW and SSB reception.
- [illegible]riable bandwidth of 0.7, 1.5, 3 or 6 kc/s.
- [illegible].C. off, fast or slow.
- [illegible]se limiter.
- [illegible]nal strength meter.
- [illegible]vision for up to six crystal-locked frequencies [illegible]hin the range of the receiver, using the [illegible]ional crystal oscillator unit described in the [illegible]pendix.

Composition and Type Numbers

Description	Type No.
[illegible] CR-6A, including the following [illegible]	1C60600
[illegible]ning Unit	1C60601
R.F. Coil Unit	1C60602
[illegible]0 kc/s Filter Unit	1Q60603
[illegible]se (when required)	1Z60605
[illegible]peaker Unit (supplied separately [illegible] required)	1D60608
[illegible] of working valves and crystals	

[illegible] crystal locked operation the following may be [illegible] separately to order:

Description	Type No.
[illegible] Oscillator Unit	1C60604
[illegible] as specified	Type D

Brief Description

[illegible] unit is a double conversion superheterodyne [illegible] the frequency range 2 to 30 Mc/s by means [illegible]ched coils and a three-gang variable capacitor. [illegible]prises an r.f. stage, a first mixer oscillator [illegible] converts the signal to 1.8 Mc/s and a bandpass [illegible] at the first intermediate frequency; a second [illegible] with a crystal controlled oscillator to convert [illegible]gnal to 100 kc/s and a variable bandpass filter centered on the second intermediate frequency. Three stages of i.f. amplification are used, followed by a diode detector for AM and MCW, or a product detector for CW or SSB signals.

A peak clipping noise limiter is provided. This limiter clips both positive and negative peaks and is effective on all types of reception.

A beat oscillator, tunable up to ±3 kc/s about 100 kc/s is included for use in CW or SSB reception.

The a.g.c. is derived from a diode rectifier and is applied to the r.f. and i.f. stages. The signal strength meter operates from one of the a.g.c. controlled stages and is only operative when the a.g.c. is switched on.

The audio frequency circuits consist of a pentode voltage amplifier, resistance-capacitance coupled to a pentode power output stage which is in turn transformer coupled to a 600-ohm line output or an external loudspeaker and headphones.

A crystal-locked calibration oscillator provides harmonics at 500 kc/s points over the range of the receiver, for accurate calibration.

The power supply comprises a full wave circuit using a silicon bridge rectifier with a conventional "pi" network filter, and a gaseous regulator valve to stabilise the h.t. supply to the oscillator of the first mixer and the noise limiter.

The crystal oscillator unit, when fitted, takes the place of the first mixer oscillator and provides up to six fixed frequencies by means of switched crystals. This unit may be fitted to the receiver by mounting it in the holes provided and making a few simple wiring changes. The crystal oscillator unit and the method of adding it to an existing receiver are described in the Appendix, Instruction Book No. 60604R.

1.4 Power Requirements

Number of Phases	One
Voltage	220 to 250V. r.m.s.
Frequency	50 c/s to 60 c/s
Power Consumption	50 watts

1.5 Performance Specifications

(a) **Frequency Range**

2 to 30 Mc/s, covered in six bands as follows:

(1) 2 to 5 Mc/s
(2) 5 to 10 Mc/s
(3) 10 to 15 Mc/s
(4) 15 to 20 Mc/s
(5) 20 to 25 Mc/s
(6) 25 to 30 Mc/s

Approximately 5% overlap is provided on all bands.

(b) **Types of Reception**

A.M. radiotelephony	A3
Modulated C.W.	A2
C.W. telegraphy	A1
Single sideband	A3a

(c) Sensitivity and Signal-to-noise Ratio
With an output of 500 mW. for an input of 3 μV. of any carrier modulated 30% at 1000 c/s, the signal-to-noise ratio is not less than 10 db.

(d) Selectivity
Four degrees of selectivity are provided by means of a switched 100 kc/s filter. The passbands are as follows:

Switch Pos'n.	6 db. Points	60 db. Points
0.7	700 c/s	3 kc/s
1.5	1500 c/s	6 kc/s
3	3000 c/s	10 kc/s
6	6000 c/s	18 kc/s

(e) Image Rejection
Better than 36 db. at 30 Mc/s. Better than 60 db. at 2 Mc/s.

(f) Audio Output and Distortion
With a 1000 μV. carrier modulated 30% at 1000 c/s an output of one watt is available with a distortion of not more than 15%.

(g) Overall Frequency Response
Variation in level over the band 300 c/s to 3000 c/s is not greater than 6 db. Outside this band the attenuation is rapid.

(h) A.G.C. Characteristic
The audio output does not vary by more than 6 db. when the input is increased from 5 μV. to 100 mV.

(i) Spurious Responses
All spurious responses other than images are at least 50 db. down.

(j) Input Impedance
Approximately 100 ohms unbalanced.

(k) Output Impedances
Two outputs are provided:
(1) 600 ohms for connecting to a standard telephone line or other equipment.
(2) 3 ohms for an external loudspeaker.
A jack for headphones is also provided.

1.6 Valve and Crystal Complement

(a) Valves and Semi-conductors

Circ. Ref.	Function	Type
V1	R.F. amplifier	6BY7
V2	1st mixer/oscillator	6AJ8
V101	Crystal calibrator	6AU6
V102	Voltage regulator	OB2
V103	2nd mixer/oscillator	6AJ8
V104	1st i.f. amplifier	6BA6
V105	2nd i.f. amplifier	6BA6
V106	3rd i.f. amplifier	6AU6
V107	B.F.O.	6AU6
V108	Product detector	12AU7
V109	Audio driver	6AU6
V110	Output amplifier	6AQ5
MR101 to MR104	H.T. rectifiers	1N1169
MR105	A.G.C. delay	OA202
MR106	A.G.C. rectifier	OA202
MR107	A.M. detector	OA202
MR108 & MR109	Noise limiters	OA202

(b) Total Valve and Semi-conductor Complement

Type	Quantity	Type	Quantity
6AJ8	2	12AU7	1
6AQ5	1	OB2	1
6AU6	4	OA202	5
6BA6	2	IN1169	4
6BY7	1		

(c) Crystals

Circ. Ref.	Function	Description
XL101	Crystal calibrator	Type D, 500 kc/s ±0.005% at 35°C. Adjusted for 30 μμF. shunt capacitance.
XL102	Local oscillator (2nd mixer)	Type D, 1700 kc/s ±0.01% between +10° C. and +60° C. Adjusted for 30μμF. shunt capacitance.

1.7 Mechanical Construction and Dimensions

The receiver comprises two main sections, the R.F. Coil Unit and the main chassis. The R.F. Coil Unit is a self-contained, rigid assembly, and includes the three-gang variable tuning capacitor, the tuning mechanism and the six sets of tuning inductors together with the associated trimmer capacitors and the range change switch.

The main chassis is bolted to the front panel, the assembly being stiffened by side members. The R.F. unit is mounted in a cut-out in the chassis and rigidly secured to both chassis and front panel.

The main chassis, the R.F. coil assembly and the mounting brackets are of mild steel, cadmium-plated to resist corrosion. The front panel is of cadmium-plated steel and a black acrylic escutcheon surrounds the dial and main tuning controls.

All preset controls and adjustments are accessible from the top of the chassis and the layout is designed to facilitate servicing and maintenance.

The valves, i.f. filter inductors and transformers are mounted above the chassis, and the wiring and other components underneath. The tuning capacitor is protected by a clip-on dust cover and removable screens and cover plates are provided to isolate the r.f. stages.

All input and output connections are on the rear of the chassis and are as follows, from left to right, viewed from the rear: Break-in connections, ... Aerial, Line and Speaker output, 100 kc/s i.f. ... (when used), Mains Input Cable and Mains ...

The dimensions of the receiver without the case are as follows:

Height: 8¾in.
Width: 19in.
Depth (excluding controls): 12½in.

The case which is supplied when the receiver is used for desk mounting is of fabricated sheet steel with vents for air circulation at the top of the sides and back. A cut-out is provided for access to the input and output connectors at the rear.

The dimensions of the case are as follows:

Height: 10½in.
Width: 20½in.
Depth: 13in.

1.8 External Finish

The front panel of the receiver is finished in silver Hammertone enamel, with black engraved designations for the controls. The cases for the receiver and the speaker are finished in mid-blue Hammertone enamel.

2.—TECHNICAL DESCRIPTION

2.1 Tuning System

(a) Drive

The tuning elements consist of a high-grade three-gang variable capacitor and six sets of high-stability permeability-tuned inductors, the required set being selected by a six-position range change switch.

The tuning capacitor is driven through a gearbox assembly integral with the capacitor, and is adjusted by means of a heavy knob which also serves as a flywheel. The gearbox is a two-stage unit and gives a ratio of approximately 50 to 1. All three spindles in the gearbox are carried on ball bearings.

Backlash is practically eliminated by the use of spring-loaded double gear wheels and spring-loaded conical pivots on the spindles. A positive stop is provided at each end of the range to prevent damage to the tuning system by misuse of the tuning control.

As a further protection a friction clutch is incorporated in the main driving spindle. This takes the form of a flat spring disc, which is compressed just sufficiently to give a positive drive from the main tuning knob, but is still free enough to slip when the tuning mechanism is hard up against the end stops, or when the dial drag is fully locked.

The dial drag consists of a flat spring of phosphor bronze, adjusted by a lead screw to exert a variable pressure on a felt braking pad on the main driving spindle. When the lead screw is turned fully clockwise by the DIAL DRAG knob, the vernier dial scale is gripped between the lead screw carriage and the back of the dial drag mounting block and securely locked.

(b) Tuning Dial

The tuning dial consists of two parts; a drum which carries the six straight-line f.equency calibration scales for the six bands, and which is operated by the range change switch to show the band in use, and a circular dial calibrated in 100 scale divisions. The circular scale is attached to the main tuning spindle and each scale division represents approximately 2 kc/s. The main scales carry special markings showing the frequency increment per vernier scale division at different points on the band. A fixed scale calibrated in 28 main divisions is also provided for logging as described below in sub-section 3.5 (a).

(c) Bandspread

Six sets of inductors are used in the bandspread system in this receiver, and a virtually constant tuning rate from 2 to 30 Mc/s is achieved. Each band is 5 Mc/s wide with the exception of the lowest band (2 to 5 Mc/s) which is 3 Mc/s wide, and the ease of tuning remains practically constant at all frequencies.

This system of bandspread has the great advantage that the stability of the receiver is automatically improved by the use of small, constant width increments of band coverage. Moreover, temperature compensation in the oscillator circuits becomes easier with a constant tuning rate, as compared with a constant frequency ratio between bands. This system also provides less variation of gain and selectivity throughout the bands, simplifies tracking problems, and has a more constant input impedance.

2.2 R.F. Amplifier

The r.f. amplifier consists of a single type 6BY7 pentode stage with tuned grid circuits. A small variable capacitor designated ANT. TRIMMER is in circuit on all bands and is used to trim the input tuning. The anode of the r.f. valve is shunt fed via L8 and capacitively coupled to the r.f. tuned circuits L1 to L7, which are slug-tuned inductors with individual trimmer capacitors for each band. Individual padder capacitors are also used on bands 2 to 6 to achieve the bandspread characteristics mentioned in 2.1 above.

The first mixer oscillator is a type 6AJ8 valve with the oscillator operating on the high side of the signal frequency on bands 1, 2 and 3, and on the low side on bands 4, 5 and 6. The anode of the oscillator (triode) section is shunt fed via L9 and capacitively coupled to the oscillator transformers TR8 to TR14 whose tuned secondaries are also provided with tuning slugs and individual trimmers. Each tuned circuit is connected by a separate padder to the oscillator section of the main tuning capacitor.

In all cases, inductors adjacent to those in use are short-circuited by the range switch. An additional refinement involves switching different values of resistance in the voltage divider feeding the first mixer screen grid, to provide constant sensitivity over the full range of the receiver.

The output from the first mixer is at 1.8 Mc/s, and this is applied to the block filter in the input to the main receiver unit, as shown in Drg. 60600G2.

For crystal-locked fixed frequency application a Crystal Unit type 1C60604 (supplied separately as required) may be wired into the oscillator circuit. The crystal unit and the method of fitting it to the receiver are described in the Appendix, Instruction Book 60604R.

2.3 Second Mixer Stage and 100 kc/s Filter

The second mixer oscillator stage also uses a type 6AJ8 valve (V103). The input from the R.F. Coil Unit passes through a 1.8 Mc/s bandpass filter, which has a pass band of approximately 8 kc/s at the 3 db. points. The second oscillator (triode section of V103) is crystal controlled by XL102 (1.7 Mc/s) to give a second intermediate frequency of 100 kc/s. The signal is then fed to a 100 kc/s filter with a variable passband, as shown in Drg. 60603C1. This unit is a four-section filter with switched capacitors in both series and shunt elements, giving a choice of four different bandwidths of 0.7, 1.5, 3 and 6 kc/s, centred in each case on 100 kc/s.

2.4 I.F. Amplifiers

The i.f. amplifier comprises three stages of aperiodic amplification, with resistance-capacitance coupling, and is extremely stable. It will be noted that the functions of selectivity and gain are

...ated and valve variations will not affect the ...ity characteristic.

The first two stages use type 6BA6 valves (V104, ...) with a.g.c. applied, the second stage being ...ed by a voltage divider for the screen supply. ...rd stage is a type 6AU6 (V106) transformer ... to the detector circuits. Negative feedback ...ed over the third stage (V106) to lower the ... impedance and broaden the response of TR102.

2.5 Detector Circuits

Two different detector circuits are used, a diode ...er for AM-MCW and a "product detector" for ...SSB.

For AM and MCW the diode MR107 rectifies the ...-going signal pulses via the i.f. filter C154, ...162 and the diode load R149. Switch SWB ...s the output to the noise limiter circuit. For ... SSB reception a beat oscillator is used. This ... 6AU6 (V107), tunable to 3 kc/s above and ... 100 kc/s. The output is mixed with the 100 ... signal in the product detector V108 (type ...) and the resultant is the difference frequency ... the local "carrier" and the modulated i.f. ... This method of detection provides far better ...on of CW or SSB signals than that obtained ... a diode detector.

Switch SWB connects the detector output to the ...miter circuit and allows the beat oscillator to ... by removing the earth connection from the ...ator screen supply when set to the CW-SSB ...

2.6 Noise Limiter

The noise limiter is common to both detector ..., and may be switched in or out of circuit as ... by a switch on the NOISE LIMITER control ... 1SWC. The limiter is of the shunt type and ...th positive and negative peaks to a value ...ned by the setting of the noise limiter control. ...ntrol in turn derives a bias from the average ...e of the modulation, and limiting is thus ...ically adjusted for different modulation levels. ...eration is as follows.

With the noise limiter switched on, a positive bias, ... from the full diode load (R148, R149) is ... to the junction of diodes MR108 and MR109 ... NOISE LIMITER control RV102 and resistors ... and R154. This rectified voltage is smoothed by ... Since R154 is a common impedance in both ...ircuits, a.f. voltages across R152 will also ... across R157. Positive-going signals will be ... by the positive bias at the diode anodes and ... will cease conducting when the signal voltage ... the bias voltage. The negative-going signals ... limited by earth potential. The signal is thus ... to values between the threshold level as set ... noise limiter and earth or zero potential.

During CW or SSB reception the noise limiter ... is switched by SWB to a fixed positive bias ... from voltage divided R141, R146. The bias ... to the diodes, and hence the degree of limit- ...epends on the setting of the noise limiter ...

When the noise limiter is switched out of circuit ...SWC the threshold voltage is raised to a high, ...alue derived from the stabilised h.t. supply.

2.7 A.G.C. and Signal Meter Circuits

The a.g.c. voltage is derived from the anode circuit of the third i.f. amplifier (V106) via C148. The diode MR105 is connected to a point on the voltage divider R142, R143, RV2, R147, to provide a delay bias of approximately +15V. Diode MR106 prevents the application of positive voltage to the a.g.c. line. When the signal exceeds a value of 15V. the positive-going peaks are clamped at +15V. by the diode MR105 and the average value of the rectified signal becomes negative, causing a negative a.g.c. voltage to be developed across R151 and applied to the r.f. stage and the first two i.f. stages.

The signal meter M101 is connected between a small positive voltage on the same voltage divider and the cathode of the second i.f. amplifier (V105), which is a.g.c. controlled. The voltage at the positive side of the meter is adjusted by RV2 to be equal to the cathode voltage of V105 at the threshold of a.g.c. operation. This control thus acts as a zero adjustment for the meter. The sensitivity of the meter is adjusted by RV1, which alters the effective series resistance. The procedure for setting up these two adjustments is given in the section on Maintenance, 4.4.15.

As the received signal rises above the threshold level, the a.g.c. voltage increases, biasing V105 negatively and causing the cathode current and hence the cathode potential to fall. The meter then gives a reading proportional to signal strength.

2.8 Crystal Calibrator

The calibrator circuit consists of a crystal controlled oscillator V101 (type 6AU6) operating on 500 kc/s. The circuit is untuned and is rich in harmonics which may be used to calibrate the dial accurately to any 500 kc/s point in the frequency range. The oscillator is energised by connecting the cathode to earth via the STD. BY/ON/CAL switch SWA in the CAL position. The output is fed to the receiver aerial by a 1μμF. capacitor C106. A preset trimmer capacitor is provided to allow the calibrator to be adjusted against a frequency standard.

2.9 Beat Oscillator

The beat oscillator is a variable frequency oscillator tuned by the B.F.O. control C137. The output is coupled to the product detector V108, which is also fed from the signal circuit at the output of TR102. The b.f.o. is disabled during AM or MCW reception by earthing the screen grid of V107 via switch SWB. For CW or SSB reception the switch opens the earth connection and allows h.t. to be applied to the screen. The oscillator then operates and the output mixes with the signal in the product detector, as described above in sub-section 2.5. The b.f.o. frequency is variable over ±3 kc/s about the centre frequency of 100 kc/s, so that the beat note (CW) or the sideband (SSB) may be tuned for best intelligibility and minimum interference.

2.10 Audio Amplifier

The audio circuit consists of voltage amplifier V109 with an A.F. GAIN control (RV103) in the input circuit, and a power amplifier V110 feeding the loudspeaker or a 600 ohm line via step-down transformer TR103.

The first stage is a pentode amplifier type 6AU6, resistance-capacitance coupled to the power amplifier type 6AQ5, which is also pentode connected. Overall negative feedback is applied from the low impedance secondary winding on the output transformer to the cathode circuit of the input stage (V109).

The loudspeaker may be connected directly across TSC4,3 or via the headphone jack JKA from TSC4,5. With this latter connection the loudspeaker circuit is broken when headphones are plugged into the PHONES jack on the front panel.

2.11 Power Supply

The unit is powered from the 220 to 250V. 50-60 c/s mains supply by transformer TR101 and the silicon diode rectifiers MR101 to MR104 arranged in a full-wave bridge circuit. The 150V. h.t. supply is filtered by C108, L106, C109, and an additional supply of 105V. is provided by the gaseous regulator valve V102, type OB2, for the noise limiter and the triode oscillator of the first mixer (V2) in the R.F. Coil Unit. An additional winding on TR101 provides 6.3V. a.c. for the valve heaters and the dial lamps.

The mains input is switched by SWD, which is ganged to the A.F. GAIN control so that reducing the gain to minimum switches off the receiver. A mains fuse (FS1) is provided in the active line and this fuse is accessible at the rear of the chassis.

3.—INSTALLATION AND OPERATION

Unpacking and Installing the Receiver

equipment should be carefully unpacked and checked against the packing slip. The case should be removed; if the unit is intended for mounting, defer the installation until the checks have been made.

Make a thorough inspection of the equipment for mechanical damage and check the operation of all controls and switches, and in particular the operation of the main tuning dial and the range switch.

Clean thoroughly of all dust and packing material.

Check the mains fuse for presence and correct rating (0.5A, slow blow).

Replace all valves (if removed for packing) and check for correct types against the stencilled markings on the chassis.

Plug the crystals in the correct sockets.

Check the mains transformer tappings and adjust if necessary to suit the local mains supply voltage.

Connections

Input and output connections are on the rear of the chassis. Reading from left to right, from the rear, these are as follows:

- BREAK-IN connections. These tags should be bridged unless wired to a break-in relay or key in an associated transmitter.
- Connect to the main station earth bus by a suitable earth lead (7/22 V.I.R. or equivalent).
- Connect the aerial lead-in from an unbalanced aerial.
- Connect to 600 ohm line (if used).
- Connect an external 3 ohm loudspeaker to TSC4 (active) and TSC3 (earth) if a permanent connection is desired.
- Connect the loudspeaker to TSC5 (active) and TSC3 (earth) if it is desired that the loudspeaker be silenced when headphones are used. NOTE: For correct matching of TR103, either a 600 or a 3-ohm load should be used, but not both.
- ...PUT — Coaxial connector for 100 kc/s output (when used).
- ...ble — Connect to the 220 to 250V. mains supply, maintaining the correct polarity as shown by the colours of the connectors.
  - Red—Active
  - Black—Neutral
  - Green—Earth
- Glass cartridge type 0.5A. slow blow.

3.3 Aerial

The aerial may be of any suitable type with an unbalanced feed. NOTE: Neither the STD.BY switch nor the BREAK-IN circuit provides any protection for the input circuits. If the receiver aerial is also used for transmitting, special arrangements must be made to prevent excessive voltages at the receiver input.

3.4 Preliminary Tests

The following preliminary test may now be carried out:

(a) Switch on and allow the receiver to warm up for approximately 20 minutes. Check that the gaseous regulator valve is operating correctly, as indicated by the characteristic mauve glow.

(b) Tune in a station of known frequency and check the operation of the controls.

(c) Set the AM-MCW/CW-SSB switch to AM-MCW. Short-circuit the aerial to earth and adjust the ZERO ADJUST control (RV2) on the signal strength meter for zero reading.

(d) The meter sensitivity has been preset by the manufacturer and will not normally require adjustment. For instructions on setting up the meter sensitivity refer to the chapter on Maintenance, paragraph 4.4.15.

3.5 Operating Controls

(a) Front Panel Controls.

Main Tuning Control

This control tunes the three-gang variable capacitor and is used on all bands. In addition to the frequency scales, changed by the TUNING RANGE switch, a fixed scale is fitted to the dial. This scale has 28 main divisions and each main division corresponds to 100 divisions on the circular vernier scale. Thus, any station may be logged by means of a four-digit reference number in conjunction with the frequency band.

ANT. TRIMMER

This control is effective on all bands and is used to peak the input circuits after the main tuning dial has been adjusted for the received frequency.

DIAL CORRECTOR

This control moves the scale drum to the right or the left over a small range to enable the dial to be set for exact calibration at any position in the range.

TUNING RANGE MC/S

Switches the required sets of inductors into circuit to cover the range indicated, and at the same time turns the dial drum to show the appropriate frequency scale.

AM-MCW/CW-SSB

In the AM-MCW position this switch connects the diode second detector into circuit and disables the b.f.o.

In the CW-SSB position it connects the product detector into circuit and energises the b.f.o.

NOISE LIMITER

In the OFF position (extreme counter clockwise) a switch disables the noise limiter circuit by raising the bias on the limiting diodes to a high, fixed value. When the control is rotated clockwise the switch connects the d.c. component of the detected signal to the limiter diodes for AM reception. The control then adjusts the limiting to be effective at a threshold value proportional to rotation of the control.

B.F.O. KC/S

This control tunes the b.f.o. frequency over approximately ±3 kc/s about 100 kc/s, as shown on the calibrated scale.

A.C. OFF/A.F. GAIN

In the extreme counterclockwise position a switch opens the mains supply circuit. A small clockwise movement switches on the a.c. supply and the control then acts as an audio level control.

A.G.C. Switch OFF/FAST/SLOW

In the OFF position the a.g.c. line is earthed.
In the FAST position connects the a.g.c. into circuit with a normal (fast) time constant.
In the SLOW position a large capacitor (C153) is connected across the a.g.c. diode load to give a slow time constant.

DIAL DRAG

This control adjusts the friction on the main tuning dial. When the control is slackened, a fast, free-running action is obtained, owing to the flywheel action of the heavy tuning knob. For careful searching, the friction may be increased by turning the control clockwise; when fully tightened, the control locks the dial.

PHONES

This is a single circuit phone jack, with auxiliary contacts to open-circuit the speaker line when the phone plug is inserted.

STD.BY/ON/CAL

In the STD.BY position the switch opens the cathode circuits of the r.f. and the 1st i.f. amplifiers, and also disables the calibration oscillator by opening its cathode circuit.
In the ON position the switch connects the r.f. and 1st i.f. amplifier cathodes to earth via the R.F. GAIN control, but keeps the calibration oscillator inoperative.
In the CAL position the calibration oscillator cathode circuit is completed.

R.F. GAIN

This control varies the cathode resistance of the r.f. and 1st i.f. amplifiers, and hence their sensitivity.

BANDWIDTH

Switches the various sets of capacitors in the 100 kc/s bandpass filter to provide the four bandwidths indicated.

(b) **Crystal Oscillator**

The controls for fixed frequency operation are part of the Crystal Oscillator Unit type 1C60604. This unit (described in the Appendix) is fitted only when required. However, the controls are described here for the sake of completeness.

FREQ. CONTROL

Operates a trimmer capacitor to provide fine control of crystal oscillator frequency. The trimmer is common to all crystal positions.

CRYSTAL

A lever (concentric with the FREQ. CONTROL knob) sets the receiver for manual operation or to any one of the six crystal-locked frequencies.

(c) **Signal Strength Meter**

The two preset controls for adjustment of the signal strength meter are mounted on a panel behind the meter.

ZERO ADJUST

This control is used to set the electrical zero as described in paragraph 4.4.15.

SENSITIVITY

This control adjusts the meter sensitivity as described in paragraph 4.4.15.

3.6 Operation

3.6.1. Calibration of Receiver

1. Switch the receiver on, select the range required and allow the receiver to warm up.
2. Set the controls as follows:
   AM-MCW/CW-SSB to CW-SSB, B.F.O. KC/S to 0, STD.BY/ON/CAL to CAL, A.G.C. to FAST, R.F. GAIN near maximum, A.F. GAIN to maximum, BANDWIDTH to 3 KC/S and FREQ. CONTROL (if fitted) to MANUAL.
3. Tune the receiver to the calibration point (500 kc/s) nearest to the frequency of the transmission to be received, and adjust the tuning for zero beat.
4. Using the DIAL CORRECTOR, adjust the frequency scale until the calibration point on the dial scale is exactly underneath the pointer. The dial is now accurately calibrated in the vicinity of the desired signal.

3.6.2. Red Markings on Frequency Scales

Although all frequency ranges except the lowest one have the same frequency coverage, there is some variation in the tuning rate from end to end of each band. To facilitate setting to a frequency, or for measuring an unknown frequency, a KC/S PER DIVISION marking is given at a number of points over each scale. These markings are in red and indicate approximately the kc/s per vernier dial scale division in the frequency range indicated.

3.6.3 AM-MCW Signals

1. Set the TUNING RANGE to the correct range and set the other controls as follows:
   STD.BY/ON/CAL to ON, AM-MCW/CW-SSB to AM-MCW, R.F. GAIN to maximum, A.G.C. to FAST, NOISE LIMITER to OFF and BANDWIDTH to 6 kc/s.
2. If necessary, calibrate the dial as described in 3.6.1 above, in the vicinity of the desired signal frequency.

3. Tune in the signal, adjusting the main tuning control for maximum reading on the signal strength meter.
4. Adjust the ANT. TRIMMER also for maximum reading on the signal strength meter.
5. Adjust the A.F. GAIN as required.
6. For MCW, decrease BANDWIDTH as required for minimum noise.

CW Signals

1. Set the TUNING RANGE as required.
2. Set the AM-MCW/CW-SSB switch to CW-SSB and the other controls as follows:

   STD.BY/ON/CAL to ON, R.F. GAIN to maximum, A.G.C. to SLOW, B.F.O. to 0 and BANDWIDTH to 6 kc/s.
3. Tune in the signal and peak the main tuning and the ANT. TRIMMER as described above for maximum signal strength meter reading.
4. Adjust the pitch of the beat note by the B.F.O. control.
5. Reduce the BANDWIDTH to the minimum value sufficient to provide a useful signal.
6. Adjust the NOISE LIMITER according to prevalent noise.
7. Adjust the A.F. GAIN control for a suitable output level.

SSB Signals

The receiver may be used to receive single sideband suppressed carrier (SSBSC) using either upper or lower sideband. The controls are set up for the reception of CW signals. However, because of the necessity for maintaining the locally-inserted carrier (B.F.O.) within ±50 c/s of the original suppressed carrier, tuning must be carried out very carefully. With tuning errors greater than 50 c/s the signal will become unintelligible.

The recommended tuning procedure is as follows:

1. Set the BANDWIDTH to 3 kc/s.
2. Set the AM-MCW/CW-SSB switch to CW-SSB.
3. Set the STD.BY/ON/CAL switch to ON and the A.G.C. to SLOW.
4. Set the B.F.O. to 1.5, clockwise or anti-clockwise depending on whether the transmitter is using lower or upper sideband.
5. Tune very carefully with the main dial through the signal and adjust the R.F. GAIN control so that the signal strength meter just starts to kick on signal peaks. Adjust the A.F. GAIN control as required.
6. Final tuning should be done with the B.F.O. to obtain maximum intelligibility. It is important, however, that the control be still in the vicinity of 1.5. If it is necessary to shift this control well away from 1.5 for intelligibility, set the B.F.O. back to 1.5 and readjust the main dial.
7. Should the signals appear distinct in quality but unintelligible it is probable that the other sideband is being used. In this case, set the B.F.O. to 1.5 kc/s on the other side of centre zero and repeat the tuning procedure.

   If it is known which sideband is being received, the correct sense of the B.F.O. setting can be determined as follows:

Tuning Range Mc/s	B.F.O. Position Upper Sideband	B.F.O. Position Lower Sideband
2 - 5	1.5 clockwise	1.5 anti-clockwise
5 - 10	1.5 clockwise	1.5 anti-clockwise
10 - 15	1.5 clockwise	1.5 anti-clockwise
15 - 20	1.5 anti-clockwise	1.5 clockwise
20 - 25	1.5 anti-clockwise	1.5 clockwise
25 - 30	1.5 anti-clockwise	1.5 clockwise

9. If a different bandwidth to 3 kc/s is used the B.F.O. setting will need to be changed from 1.5. The setting of this control will always be one half the bandwidth used. For example, with 6 kc/s bandwidth, set the B.F.O. to 3 kc/s.
10. If the Crystal Oscillator Unit 1C60604 is used for reception of SSB signals, the B.F.O. should be set to the correct position as described in steps (8) and (9) above, and fine 'uning carried out with the crystal vernier control on the crystal unit.

NOTE: See Appendix 1, Book 60604R, for details of crystals required for SSB reception.

4.—MAINTENANCE

4.1 General

The CR-6A receiver has been carefully aligned and tested during manufacture, and the circuits and components have been chosen to ensure a high degree of stability and reliability. Indiscriminate adjustments to the preset controls and tuning adjustments should be avoided. If trouble occurs a proper testing routine should be undertaken to isolate the faulty circuit or component. After replacement of any frequency-determining component, re-adjustment of the stage concerned is normally quite sufficient. The complete alignment procedure is given in later sub-sections, and the procedure for adjustment of any particular stage may be extracted from it.

4.2 Valve Replacement

Care should be exercised in handling miniature glass-based valves. Do not attempt to force a valve into its socket as this may result in bent pins or fracture of the glass envelope. Similarly, when removing a valve, ease it out carefully without excessive side movement. A combined tool is available for straightening bent pins and easing tight sockets.

4.3 Voltage Analysis

The readings given in the tabulation below are typical values and are intended mainly as a guide to correct operation. Actual values may vary due to commercial tolerances in valves and components, but should normally be within ±25% of the figures shown.

The meter readings were taken with respect to earth (chassis) using a Voltohmyst with the controls set as in sub-section 4.4 and the receiver tuned to 7 Mc/s but with no input.

Valve socket pin numbers are shown in brackets.

TABLE A

Valve	Type	Anode	Screen	Cathode	Grid
V1	6BY7	150 (7)	91 (8)	3.6 (3)	
V2	6AJ8	182 (6) 106 (8)	91 (1)*	4.3 (3)	 −6.8 (9) Osc. grid
V101§	6AU6	43 (5)	83 (6)	0 (7)	−11.4 (1)
V102	OB2	107 (1 or 5)	—	0 (2)	
V103	6AJ8	152 (6) 45 (8)	38 (1)	1.3 (3)	 −12 (9) Osc. grid
V104	6BA6	130 (5)	68 (6)	3.9 (7)	
V105	6BA6	64 (5)	47 (6)	1.7 (7)	
V106	6AU6	141 (5)	105 (6)	1.3 (7)	
V107‡	6AU6	16 (5)	33 (6)	0 (7)	−4.6 (1)
V108‡	12AU7	75 (1) 142 (6)	—	5.3 (3 or 8)	
V109	6AU6	44 (5)	47 (6)	1.1 (7)	
V110	6AQ5	182 (5)	152 (6)	6.0 (2)	

Junction of R142/R143 15V. (A.G.C. Delay)
Junction of MR108/MR109 15V. (Noise Limiter OFF)
* This voltage varies between 50 and 100 depending on the range in use.
§ STD.BY/ON/CAL Switch in CAL position.
‡ AM-MCW/CW-SSB Switch in CW-SSB position.

4.4 General Alignment of Receiver

Unless otherwise stated, the alignment procedure should be carried out with the controls in the following positions:

AM-MCW/CW-SSB	to	AM-MCW
A.F. GAIN	to	maximum
R.F. GAIN	to	maximum
A.G.C.	to	OFF
STD.BY/ON/CAL	to	ON
BANDWIDTH	to	3 kc/s
B.F.O.	to	0
NOISE LIMITER	to	OFF
DIAL CORRECTOR	to	centre of range
ANT. TRIMMER	to	centre of range

Test Equipment Required

The following items of test equipment will be required for the complete alignment procedure.

(a) Signal Generator covering the r.f. ranges (2 to 30 Mc/s).
(b) Signal Generator covering the ranges 100 kc/s ± 15 kc/s and 1.8 Mc/s.
(c) Output Meter, 600 ohms.
(d) Voltohmyst or V.T.V.M.
(e) Microammeter, 0-100 μA., 1000 ohms internal resistance.
(f) Low Distortion Audio Oscillator.
(g) Cathode Ray Oscilloscope.
(h) Noise and Distortion Meter.
(i) Harmonic Generator.

Item (d) may be used in place of Item (c) provided the output is properly terminated.

Items (e) to (i) are not absolutely essential, but will assist in accurate measurements and should be ... if available.

Typical Stage Gain Levels

The following table is given for ready reference and will be of assistance in locating weak or defective ...es. The figures given were taken on a typical receiver with the controls set as in 4.4 above.

TABLE B

Input Point	Frequency	Input Level	Output
Aerial (all ranges)		Less than 2 μV.	3.5V. across C154
Aerial (CR-6B only)	0.2 to 0.54 Mc/s	Less than 10 μV.	3.5V. across C154
V1 grid (2)	7 Mc/s	2.8 μV.	3.5V. across C154
V2 grid (2)	7 Mc/s	62 μV.	3.5V. across C154
V2 grid (2)	1.8 Mc/s	35 μV.	3.5V. across C154
V103 grid (2)	1.8 Mc/s	250 μV.	3.5V. across C154
V103 grid (2)	100 kc/s	200 μV.	3.5V. across C154
V104 grid (1)	100 kc/s	380 μV.	3.5V. across C154
V105 grid (1)	100 kc/s	8 mV.	3.5V. across C154
V106 grid (1)	100 kc/s	85 mV.	3.5V. across C154
Across C162	1000 c/s	0.08V.	500 mW. in 600Ω } TSC 1,2
V109 grid (1)	1000 c/s	0.075V.	500 mW. in 600Ω } TSC 1,2
V110 grid (1,7)	1000 c/s	1.6V.	500 mW. in 600Ω } TSC 1,2

Typical Oscillator Voltages

...en operating correctly, the oscillator voltages ... be approximately as shown in the table. The ...es were measured with a Voltohmyst, using the ... probe.

TABLE C

...ring Point	Conditions	Voltage
... grid (1)	Oscillating at 500 kc/s	7.5
... grid (9)	Oscillating at 1700 kc/s	10
... grid (1)	Oscillating at 100 kc/s	6
... grid (2)	Injection at 100 kc/s	2.3

Audio Tests

...ridge terminals TSB4 and 5 and connect the 600Ω ...tput meter to terminals TSC1 and 2. If using a ...ltmeter, load the output by a 600Ω resistor.

...OTE: The output transformer is properly termin...ed when loaded by 600 ohms at the line terminals, ...r by 3 ohms at the speaker terminals, **but not both.**

...et the audio oscillator to 1000 c/s and check the ...dio gain according to Table B.

...rn up the A.F. GAIN control and check that an ...tput of one watt (24.5V.) can be obtained across ...e 600Ω load.

...emove the 600Ω load and connect a 3Ω resistor ...cross terminals TSC3 and 4. Check that the full output of one watt (1.73V.) can be obtained across the speaker terminals.

5. Connect the 3Ω load across terminals TSC3 and 5. Check for output as in step 4. Then plug a pair of headphones into the PHONE jack and check that the speaker circuit is broken and that the audio output is heard in the phones.

4.4.5 Second I.F. Alignment

1. Set the signal generator to 100 kc/s, unmodulated and connect it via a capacitor of 0.1 μF. to V106 grid (pin 1).
2. Connect the v.t.v.m. across the diode load (C154) and adjust the input level for a reading of 3.5V. on the meter.
3. Tune the slug of TR102 for maximum output, reducing the input level as required. The tuning will be reasonably broad.
4. Check the gain of the i.f. stages. These should be as follows:

Input to	Input for 3.5V. at Diode Load
V106 grid (1)	85 mV.
V105 grid (1)	8 mV.
V104 grid (1)	380 μV.

4.4.6 B.F.O. Adjustment

1. Set the AM-MCW/CW-SSB switch to CW-SSB.

2. Connect the loudspeaker or plug in the headphones and connect a c.r.o. (or audio frequency meter if available) across the output.
3. Apply an accurate 100 kc/s signal (using the harmonic generator if available) to V106 grid (pin 1).
4. Set the B.F.O. control to 0 and adjust the slug in L105 for zero beat in the output.
5. Turn the B.F.O. control to +3 and check that the beat note is approximately 3 kc/s, using the frequency meter or the c.r.o. and audio oscillator.
6. Repeat step 5 for the −3 position of the B.F.O. control. If the beat notes are not equal, check that the variable capacitor (C137) is at half-mesh when the control is at 0.
7. The output should be approximately 1 W. at the ±3 kc/s points for an input of 100 mV. to V106 grid.

4.4.7 **100 kc/s Filter Alignment**

1. Connect the signal generator to V103 grid and set the frequency as accurately as possible to 100 kc/s.
2. Set the BANDWIDTH switch to 0.7 kc/s and adjust the input level for a voltage of 3.5 across the diode load.
3. Tune the slugs of inductors L205, L204, L203, L202 and L201 in that order for maximum output as indicated on the v.t.v.m., reducing the input level as required.
4. Set the BANDWIDTH switch to 3 KC/S and check the stage gain. The input at V103 grid for 3.5V. at the diode load should be approximately 200 μV.
5. Check the bandwidth as follows:
   (a) Set the BANDWIDTH to 6 KC/S and adjust the input level (at 100 kc/s) for an output of 3.5V. Note the exact input level.
   (b) Increase the input level by 6 db. (twice the voltage), and detune above and below the centre frequency to obtain the same output. The total bandwidth should be as shown in the table below.
   (c) Increase the input level by 60 db. (1000 times voltage) and detune as before for centre frequency output.
   (d) Repeat these tests at the 3, 1.5 and 0.7 positions of the BANDWIDTH switch.

BAND-WIDTH Switch	Bandwidth at 6 db. Points	Bandwith at 60 db. Points
6	6 kc/s	18 kc/s
3	3 kc/s	10 kc/s
1.5	1.5 kc/s	6 kc/s
0.7	0.7 kc/s	3 kc/s

4.4.8 **1.8 Mc/s Filter Alignment**

1. Set the signal generator to 1.8 Mc/s (unmodulated) and connect to V2 grid (pin 2). Adjust the input level for an output of 3.5V. at the diode load.
2. Tune the slugs of inductors L103, L102, and L101 in that order for maximum output, reducing the input level as required.
3. Check the stage gain. The input required for an output of 3.5V. at the diode load should be approximately 35 μV.

4.4.9 **Crystal Calibrator Alignment**

1. Set the STD.BY/ON/CAL switch to CAL., AM-MCW/CW-SSB to CW-SSB and B.F.O. to 0.
2. Inject a signal into the aerial from a reliable frequency standard such as a harmonic generator or a standard frequency transmission (WWV). Keep the signal at a low level.
3. Tune the receiver to the standard frequency until a beat note is heard in the audio output.
4. Adjust capacitor C105 (concentric trimmer near crystal XL101) until zero beat is obtained in the audio output.

4.4.10 **R.F. Alignment**

1. Set the DIAL CORRECTOR in the centre of its range. Check that the ends of the bands (2 and 5, 5 and 10 etc.) correspond to 2 and 26 on the log scale.
2. Switch the controls to CW-SSB and CAL.
3. Connect the signal generator through a non-inductive series resistor (if necessary) so that it looks like a 100-ohm source.
4. Set the ANT. TRIMMER to the centre of its range and the B.F.O. to 0.
5. Connect the v.t.v.m. across the diode load.
6. Switch off the generator and calibrate the receiver by using the in-built crystal calibrator and adjusting the oscillator slugs (TR8 to TR14) at the low frequency ends of the bands and the trimmer capacitors (C49 to C56) at the high frequency ends, as shown in Table D.
7. Switch the STD.BY/ON/CAL switch to ON, the AM-MCW/CW-SSB switch to AM-MCW, and use the signal generator for adjustment of the r.f. and aerial circuits, aligning the low frequency ends of the bands by means of the slugs in the inductors and transformers, and the trimmer capacitors at the high frequency ends.
8. Repeat the complete alignment procedure until no further improvement is possible. It may be necessary to go over the alignment several times, as the adjustments are inter-dependent.

TABLE D

Range Mc/s	Alignment Frequencies	Adjustment					
		Aerial		R.F.		Oscillator	
2- 5	2 and 5 Mc/s	TR1	C16	L1	C26	TR 8	C49
5-10	5 and 10	TR2	C16	L2	C27	TR 9	C51
10-15	10 and 15	TR3	C16	L3	C28	TR11	C52
15-20	15 and 20	TR4	C16	L4	C29	TR12	C53
20-25	20 and 25	TR6	C16	L6	C31	TR13	C54
25-30	25 and 30	TR7	C16	L7	C32	TR14	C56

4.4.11 R.F. Sensitivity and Signal-to-Noise Ratio

1. Inject into the aerial a signal of 3 μV., modulated 30% at 1000 c/s at the test frequencies and adjust the A.F. GAIN control for an audio output of 500 mW. (17.3V. in 600Ω).
2. Check the signal-to-noise ratio by switching off the modulation. The output should drop by at least 10 db., i.e., to 50 mW. or 5.5V. in 600Ω.
3. Increase the A.F. GAIN. An input of 3 μV., modulated 30% at 1000 c/s should produce an output of 1W. at all frequencies.

4.4.12 Rated Output and Distortion

1. Switch on the a.g.c. With an input signal of 1000 μV. modulated 30% at 1000 c/s adjust the output to 1 watt.
2. The overall distortion should be less than 15%.

4.4.13 First Mixer-oscillator Injection

Plug the 0-100 μA. meter into TJA (pin jacks at the rear of the R.F. Coil Unit) and check that the meter reading over each range is reasonably constant. Typical readings are as follows:

Range Mc/s	Meter Reading (Meter resistance 1000Ω)
0.2 to 0.54	15 μA.
2 to 5	20 μA.
5 to 10	30 μA.
10 to 15	35 μA.
15 to 20	40 μA.
20 to 25	35 μA.
25 to 30	30 μA.

4.4.14 A.G.C. Test

1. Set the A.G.C. switch to FAST.
2. Inject a signal of 5 μV. at 7 Mc/s, modulated 30% at 1000 c/s and tune the receiver.
3. Adjust the A.F. GAIN for an output of 60 mW. (6.0V. in 600Ω).
4. Increase the input from 5 μV. to 100 mV. The output should not increase more than 6 db. (twice the voltage).

4.4.15 Adjustment of Signal Strength Meter

1. Set the A.G.C. switch to FAST and the R.F. GAIN to maximum.
2. With no signal input adjust the preset control RV2 (the lower one of the pair at the back of the meter) for zero reading on the meter.
3. Inject a signal into the aerial at 7 Mc/s and carefully tune the receiver.
4. Adjust the input level until the pointer just starts to lift from the zero mark. This indicates the threshold of a.g.c., and will normally occur at an input of approximately 1 μV.
5. Increase the input by 100 db. or 100,000 times voltage.
6. Adjust the upper preset control RV1 for a reading of 100 db. on the meter.
7. Check the intermediate calibration points on the meter.

4.4.16 Noise Limiter

1. Feed a weak modulated signal into the receiver and connect a c.r.o. across the output. Set the BANDWIDTH switch to 6 kc/s.
2. Loosely couple a buzzer into the receiver and adjust the c.r.o. until the noise spikes can be seen.
3. Switch on the NOISE LIMITER and check that the noise spikes are clipped by the limiter action.

4.5 Care of Rotary Switches

Wafer type rotary switches should be cleaned and lubricated at approximately six-monthly intervals, or when noisy or uncertain operation is evident. The recommended solution for combined cleaning and lubrication consists of two ounces of pure lanoline dissolved in ten fluid ounces of dichlorethylene. The solution should be applied sparingly, with a fine-pointed soft brush to the contacts only: rotate the switch while the solvent evaporates to spread the lubricant evenly. Do not allow the solution to fall onto the wiring or other parts of the switch.

If the movement becomes stiff a drop of light machine oil may be applied to the spindle bearing and the clicker plate, taking care that the oil does not reach the contacts or wiring.

Care should be exercised when cleaning switches not to bend or otherwise damage the contacts. Attempts to straighten or re-align contacts on this type of switch are rarely successful and the preferred action when damaged contacts are discovered is to replace the complete wafer.

4.6 Pilot Lamps and Fuse

The pilot lamps are mounted on brackets below the dial, at the rear of the front panel, and are accessible from the underside. To replace, remove the receiver from the case or the rack. The lamp holders may then be pulled clear of the brackets and new lamps inserted.

The fuse is carried in a screw-in holder at the rear of the chassis. Before replacing a blown fuse, investigate the cause. When the trouble is cleared, replace with a fuse of the correct rating (0.5A., slow blow).

4.7 Dial Cord Replacement (Ref. Drg. 60600C1)

To replace the dial cord it will be necessary to remove the knobs, cover panel, front panel and the vernier dial scale. Remove these in the following order:

(a) **Knobs.** These are each secured by two 4 BA Allen type screws, except for the range switch knob, where two 2 BA Allen type screws are used.

(b) **Meter.** Unsolder the leads and unscrew the four holding nuts from the rear.

(c) **Escutcheon.** Release the screw at the centre top.

(d) **Dial Drag.** Release the split pin; the spindle may then be withdrawn by unscrewing.

(e) **Phone Jack.** Unscrew the mounting nut at the front.

(f) **Cover Panel.** Release the four 1/4in. screws at the corners of the panel. The cover panel may now be removed.

(g) **Front Panel.** Withdraw the top three pilot lamp holders from the brackets. The front panel, complete with the log scale, may now be removed.

(h) **Vernier Dial Scale.** This is secured by two 4 BA Allen type screws.

To replace the dial cord, follow the procedure given below and illustrated in the Dial Cord Diagram, Drg. 60600C1.

1. Set the DIAL CORRECTOR to the centre of its range.
2. Temporarily insert a pin in the 3/64-inch hole in the pointer slide bar and adjust the bar so that the pointer is over the special setting-up mark on the high frequency end of the lowest range, with the pointer bracket hard up against the pin. If the special setting-up mark is not on the scale, carefully measure 5/8in. from the outer edge of the high frequency calibration mark and adjust the bar to set the pointer over this mark.
3. Turn the main tuning spindle fully clockwise until it is checked by the stop in the gear box. Check that the drive pulley has a clearance of 1/32in. from the gear box and that the slot is in line with the lower edge of the main tuning spindle.
4. Tie the cord in the eye of the pointer, pass it one half turn around the jockey pulley ("E" in the diagram), over the top of the inner groove of the drive pulley "C" and wind 4⅜ turns in the grooves. Then pass the cord through the slot and bring it up over the pulley (about ⅜ turn) and then around the second jockey pulley "F."
5. Keeping the cord taut, fit the spring into the eye of the pointer, loop the cord through the other end of the spring, pull the cord until the spring is extended to approximately twice its free length and then tie the cord.
6. Finally, DO NOT NEGLECT TO REMOVE THE PIN FROM THE SLIDE BAR.
7. Replace the vernier dial scale and adjust it so that when the main tuning spindle is turned to the extreme clockwise position the vernier scale reads six divisions. Then turn to the extreme anti-clockwise position and check that the vernier scale reads 94. If not, adjust the vernier scale so that the over-run is equal at both ends of the range.

   NOTE: When replacing the vernier dial, press it forward against the spring in the friction clutch. The spring must be compressed sufficiently to give a positive drive from the main tuning knob, but should be free enough to allow the knob to turn when the tuning mechanism is hard up against the stop at the end of its travel.
8. Check the calibration over the range and then replace the front panel, cover panel and other parts removed.
9. Replace the knobs, using the following procedure:

   (a) **Switches.** Adjust the knobs so that the pointer is correctly aligned with the designations. This is best done by first turning the switch to the extreme anti-clockwise position and then setting the pointer to the appropriate designation.

   (b) **Variable Resistors.** Set the controls to maximum anti-clockwise and then set the pointer to the anti-clockwise calibration point.

   (c) **Variable Capacitors.**

   (i) **B.F.O.** Set the pointer to –3 (9 o'clock) with the capacitor fully in mesh.

   (ii) **ANT. TRIMMER.** Set the pointer to anti-clockwise horizontal position (9 o'clock) with the capacitor fully in mesh.

   (iii) **FREQ. CONTROL** (when fitted). Set the pointer to F on the CRYSTAL range with the capacitor fully in mesh.

   (d) **DIAL CORRECTOR.** Set the dial corrector to the centre of its range and set the pointer to the vertical position.

4.8 Lubrication

When necessary. the mechanical moving parts should be lubricated as follows:

1. **Spindle Bearings.** Use instrument oil or very light machine oil.
2. **Gears and Clicker Plates.** Apply a small quantity of light anti-freeze grease.
3. **Rotary Switches.** Clean and lubricate as described in sub-section 4.5.
4. **Range Switch Chain.** Brush lightly with the lubricant used for rotary switches (See 4.5).

5.—COMPONENT SCHEDULE

When ordering replacement parts, please quote ALL details given below for a particular component, TOGETHER WITH the unit type No. and the Circuit Ref. No. of component.

The component supplied against the order may not be identical with the original item in the equipment, but will be a satisfactory replacement differing in only minor mechanical or electrical details; such differences will not impair the operation of the equipment.

NOTE: Resistors described as "Composition Grade 1" and "Composition Grade 2" are made by various manufacturers to RCS standards. "Vitreous enamelled" resistors are completely identified by the "RWV" type number given, and also produced by several manufacturers to a common specification.

Acceptable manufacturers of these resistors are listed below.

Wattage ratings are quoted at 71°C.

Composition Grade 1	Manufacture and Type
1/8W insulated	Erie 109
1/4W insulated	Erie 108
1/4W non-insulated	I.R.C. type DCC Welwyn C21 Painton 72
1/2W insulated	Erie 100
3/4W non-insulated	I.R.C. type DCE Welwyn C23 Painton 74
1W non-insulated	I.R.C. type DCG Welwyn C24 Painton 75
Composition Grade 2	
1/4W insulated	I.R.C. type BTS
1/2W insulated	I.R.C. type BTA
1/2W non-insulated	Morganite T
1W insulated	I.R.C. type BTB
1W non-insulated	Morganite R
Vitreous Enamelled	
Description according to type number	I.R.C. Reco Ducon

5.1 R.F. Coil Unit 1C60602 (For CR-6A Receiver)

COMPONENTS	DESCRIPTION	A.W.A. PART No. Unless otherwise stated
(a) Capacitors		
C1	Not used.	
C2	47$\mu\mu$F ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C3	100$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C4	150$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C5	Not used.	
C6	150$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C7	200$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C8	Not used.	
C9	Not used.	
C10	Not used.	
C11	470$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C12	290$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C13	180$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C14	150$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C15	Not used.	

COMPONENTS	DESCRIPTION	A.W.A. PART No. Unless otherwise stated
C16	3-50$\mu\mu$F, variable, miniature, air dielectric	Plessey CVA50
C17	Variable, 3-gang	60602X17
C18	Not used.	
C19	15$\mu\mu$F ±1$\mu\mu$F, 500VW, cer., tub.	Ducon CTR. NPO
C20	Not used.	
C21	68$\mu\mu$F ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C22	110$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C23	100$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C24	150$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C25	Not used.	
C26	4-25$\mu\mu$F, variable, miniature, air dielectric	Philips 82755/25E
C27	4-25$\mu\mu$F, variable, miniature, air dielectric	Philips 82755/25E
C28	4-25$\mu\mu$F, variable, miniature, air dielectric	Philips 82755/25E
C29	4-25$\mu\mu$F, variable, miniature, air dielectric	Philips 82755/25E
C30	Not used.	
C31	4-25$\mu\mu$F, variable, miniature, air dielectric	Philips 82755/25E
C32	4-25$\mu\mu$F, variable, miniature, air dielectric	Philips 82755/25E
C33	Not used.	
C34	Not used.	
C35	Not used.	
C36	470$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C37	290$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C38	180$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C39	150$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C40	Not used.	
C41	33$\mu\mu$F ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C42	15$\mu\mu$F ±1$\mu\mu$F, 500VW, cer., tub.	Ducon CTR. NPO
C43	15$\mu\mu$F ±1$\mu\mu$F, 500VW, cer., tub.	Ducon CTR. NPO
C44	47$\mu\mu$F ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C45	Not used.	
C46	68$\mu\mu$F ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C47	82$\mu\mu$F ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C48	120$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C49	4-25$\mu\mu$F, variable, miniature, air dielectric	Philips 82755/25E
C50	Not used.	
C51	4-25$\mu\mu$F, variable, miniature, air dielectric	Philips 82755/25E
C52	4-25$\mu\mu$F, variable, miniature, air dielectric	Philips 82755/25E
C53	4-25$\mu\mu$F, variable, miniature, air dielectric	Philips 82755/25E
C54	4-25$\mu\mu$F, variable, miniature, air dielectric	Philips 82755/25E
C55	Not used.	
C56	4-25$\mu\mu$F, variable, miniature, air dielectric	Philips 82755/25E
C57	420$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C58	1200$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C59	390$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C60	Not used.	

COMPONENTS	DESCRIPTION	A.W.A. PART No. Unless otherwise stated
C61	270$\mu\mu$F, ±5%, 600VW, plastic film	Ducon Styroseal
C62	220$\mu\mu$F, ±5%, 600VW, plastic film	Ducon Styroseal
C63	180$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C64	Not used.	
C65	Not used.	
C66	33$\mu\mu$F ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C67	100$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C68	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
C69	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
C70	Not used.	
C71	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
C72	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
C73	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
C74	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
C75	Not used.	
C76	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
C77	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
C78	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
C79	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
C80	Not used.	
C81	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
C82	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
C83	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
C84	100$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal

(b) Inductors

L1		462V57962
L2		461V57962
L3		460V57962
L4		459V57962
L5	Not used.	
L6		458V57962
L7		457V57962
L8		5V57973
L9		5V57973

(c) Resistors

R1	100kΩ ±10%, 1/4W, comp., grade 2, ins.
R2	330Ω ±10%, 1/4W, comp., grade 2, ins.
R3	100kΩ ±10%, 1/4W, comp., grade 2, ins.
R4	100kΩ ±10%, 1W, comp., grade 2, ins.
R5	Not used.
R6	10kΩ ±10%, 1/4W, comp., grade 2, ins.
R7	330Ω ±10%, 1/4, comp., grade 2, ins.
R8	1kΩ ±10%, 1/4W, comp., grade 2, ins.
R9	47kΩ ±10%, 1/4W, comp., grade 2, ins.
R10	Not used.

COMPONENTS	DESCRIPTION	A.W.A. PART No. Unless otherwise stated
R11	Not used.	
R12	5.6kΩ ±10%, 1/2W, comp., grade 2, ins.	
R13	10kΩ ±10%, 1/2W, comp., grade 2, ins.	
R14	12kΩ ±10%, 1/2W, comp., grade 2, ins.	
R15	Not used.	
R16	22kΩ ±10%, 1/2W, comp., grade 2, ins.	
R17	27kΩ ±10%, 1/2W, comp., grade 2, ins.	
R18	100Ω ±10%, 1/4W, comp., grade 2, ins.	

(d) **Transformers**

TR1		456V57962
TR2		455V57962
TR3		454V57962
TR4		453V57962
TR5	Not used.	
TR6		452V57962
TR7		451V57962
TR8		468V57962
TR9		467V57962
TR10	Not used.	
TR11		466V57962
TR12		465V57962
TR13		464V57962
TR14		463V57962

(e) **Miscellaneous**

V1	Valveholder, 9 pin, miniature P.T.F.E.	Clix VH499/902 CPS
V2	Valveholder, 9 pin, miniature P.T.F.E.	Clix VH499/902 CPS
SWA	Oak H type	60602V64

5.2 **R.F. Coil Unit 2C60602** (For CR-6B Receiver)

The component schedule is the same as for R.F. Coil Unit 1C60602 with the following exceptions:

(a) **Capacitors**

C14	Not used.	
C24	Not used.	
C39	Not used.	
C48	100μμF ±5%, 600VW, plastic film	Ducon Styroseal
C63	100μμF ±5%, 600VW, plastic film	Ducon Styroseal

(b) **Inductors**

L7	Not used.	
L8	Not used.	
L10	Not used.	
L11		21V57963

(c) **Resistors**

R5	22kΩ ±10%, 1/4W, comp., grade 2, ins.	
R11	100kΩ ±10%, 1/4W, comp., grade 2, ins.	
R12	6.8kΩ ±10%, 1/2W, comp., grade 2, ins.	
R13	8.2kΩ ±10%, 1/2W, comp., grade 2, ins.	
R14	18kΩ ±10%, 1/2W, comp., grade 2, ins.	
R17	100kΩ ±10%, 1/4W, comp., grade 2, ins.	

MPONENTS	DESCRIPTION	A.W.A. PART No. Unless otherwise stated
Transformers		
7	Not used.	
14	Not used.	
16		20V57963
17		22V57963

Receiver CR-6 Series C60600

The components in this section are the same for the CR-6A and CR-6B Receivers.

Capacitors		
1	Not used.	
2	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
3	100μμF ±5%, 500VW, cer., tub.	Ducon CTR. NPO
4	47μμF ±5%, 500VW, cer., tub.	Ducon CTR. NPO
5	4-25μμF, variable, miniature, air dielectric	Philips 82755/25E
6	1μμF ±½μμF, 500VW, cer., bead	Ducon CBA. NPO
7	Not used.	
8	24μF −20+50%, 300VW, electro, tub., met. case	Ducon ET
9	24μF −20+50%, 300VW, electro, tub., met. case	Ducon ET
0	Not used.	
1	Not used.	
2	Not used.	
3	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
4	100μμF ±10%, 600VW, plastic film	Ducon Styroseal
5	Not used.	
6	100μμF ±10%, 600VW, plastic film	Ducon Styroseal
7	100μμF ±10%, 600VW, plastic film	Ducon Styroseal
8	2.2μμF ±5%, 500VW, cer. bead	Ducon CBA. NPO
9	2.2μμF ±5%, 500VW, cer. bead	Ducon CBA. NPO
[illegible]	Not used.	
1	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
2	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
3	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
4	0.1 μF ±10%, 125VW, polyester, tub.	Philips C296AA/A
5	Not used.	
6	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
7	47μμF ±5%, 500VW, cer., tub.	Ducon CTR. NPO
8	47μμF ±5%, 500VW, cer., tub.	Ducon CTR. NPO
9	0.1 μF ±10%, 125VW, polyester, tub.	Philips C296AA/A
0	Not used.	
1	0.1 μF ±10%, 125VW, polyester, tub.	Philips C296AA/A
2	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
3	100μμF ±10%, 500VW, cer. tub.	Ducon CTR. N750
4	0.1 μF ±10%, 125VW, polyester, tub.	Philips C296AA/A
5	Not used.	

COMPONENTS	DESCRIPTION	A.W.A. PART No. Unless otherwise stated
C136	0.1 μF ±10%, 125VW, polyester, tub.	Philips C296AA/A
C137	5-100$\mu\mu$F, variable, miniature, air dielectric	Polar C8-04
C138	680$\mu\mu$F ±10%, 600VW, plastic film	Ducon Styroseal
C139	100$\mu\mu$F ±10%, 600VW, plastic film	Ducon Styroseal
C140	Not used.	
C141	0.1 μF ±10%, 125VW, polyester, tub.	Philips C296AA/A
C142	100$\mu\mu$F ±10%, 500VW, cer. tub.	Ducon CTR. N750
C143	100$\mu\mu$F ±10%, 500VW, cer. tub.	Ducon CTR. N750
C144	0.1 μF ±10%, 125VW, polyester, tub.	Philips C296AA/A
C145	0.1 μF ±10%, 125VW, polyester, tub.	Philips C296AA/A
C146	330$\mu\mu$F ±5%, 400VW, plastic film	Ducon Styroseal
C147	0.01μF ±10%, 400VW, plastic film	Ducon Styroseal
C148	100$\mu\mu$F ±10%, 500VW, cer. tub.	Ducon CTR. N750
C149	24μF −20+50%, 300VW, electro, tub. met. case	Ducon ET
C150	Not used.	
C151	470$\mu\mu$F ±10%, 400VW, plastic film	Ducon Styroseal
C152	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
C153	0.47μF ±10%, 125VW, polyester, tub.	Philips C296AA/A
C154	470$\mu\mu$F ±10%, 400VW, plastic film	Ducon Styroseal
C155	Not used.	
C156	100$\mu\mu$F ±5%, 600VW, plastic film	Ducon Styroseal
C157	47$\mu\mu$F ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C158	Not used.	
C159	4700$\mu\mu$F ±10%, 400VW, plastic film	Ducon Styroseal
C160	Not used.	
C161	0.01μF ±10%, 400VW, plastic film	Ducon Styroseal
C162	1000$\mu\mu$F ±10%, 400VW, polyester, tub.	Philips C296AC/A
C163	0.1μF ±10%, 125VW, polyester, tub.	Philips C296AA/A
C164	0.01μF ±10%, 400VW, plastic film	Ducon Styroseal
C165	Not used.	
C166	25μF, 6VW, electrolytic, subminiature, tub. met. case	Ducon ES604
C167	0.01μF ±10%, 400VW, plastic film	Ducon Styroseal
C168	20 μF 10VW, electro., miniature, tub. met. case	Ducon ET1X
C169	0.1 μF ±10%, 125VW, polyester, tub.	Philips C296AA/A
C170	4700$\mu\mu$F ±10%, 400VW, plastic film	Ducon Styroseal

(b) **Inductors**

L101		202V57970
L102		202V57970
L103		202V57970
L104	Not used.	
L105		3V57964
L106		1LE61077

(c) **Rectifiers**

MR101	Silicon type	Westinghouse 1N1169
MR102	Silicon type	Westinghouse 1N1169
MR103	Silicon type	Westinghouse 1N1169
MR104	Silicon type	Westinghouse 1N1169
MR105	Silicon type	Philips OA202

COMPONENTS	DESCRIPTION	A.W.A. PART No. Unless otherwise stated
MR106	Silicon type	Philips OA202
MR107	Silicon type	Philips OA202
MR108	Silicon type	Philips OA202
MR109	Silicon type	Philips OA202

(d) **Resistors**

R101	Not used.	
R102	470kΩ ±10%, 1/4W, comp., grade 2, ins.	
R103	220kΩ ±10%, 1/4W, comp., grade 2, ins.	
R104	100kΩ ±10%, 1/4W, comp., grade 2, ins.	
R105	100kΩ ±10%, 1/4W, comp., grade 2, ins.	
R106	1kΩ ±10%, 1/4W, comp., grade 2, ins.	
R107	Not used.	
R108	2.2kΩ ±10%, 1W, comp.,, grade 2, ins.	
R109	1kΩ ±10%, 1/4W, comp., grade 2, ins.	
R110	1kΩ ±10%, 1/4W, comp., grade 2, ins.	
R111	1kΩ ±10%, 1/4W, comp., grade 2, ins.	
R112	100kΩ ±10%, 1/4W, comp., grade 2, ins.	
R113	470Ω ±10%, 1/4W, comp., grade 2, ins.	
R114	47kΩ ±10%, 1/4W, comp., grade 2, ins.	
R115	Not used.	
R116	100kΩ ±10%, 1/4W, comp., grade 2, ins	
R117	330Ω ±10%, 1/4W, comp., grade 2, ins.	
R118	100kΩ ±10%, 1/4W, comp., grade 2, ins.	
R119	10kΩ ±10%, 1/4W, comp., grade 2, ins.	
R120	1kΩ ±10%, 1/4W, comp., grade 2, ins.	
R121	100kΩ ±10%, 1/4W, comp., grade 2, ins.	
R122	330Ω ±10%, 1/4W, comp., grade 2, ins.	
R123	47kΩ ±10%, 1/4W, comp., grade 2, ins.	
R124	100kΩ ±10%, 1/4W, comp., grade 2, ins.	
R125	47kΩ ±10%, 1/4W, comp., grade 2, ins.	
R126	47kΩ ±10%, 1/4W, comp., grade 2, ins.	
R127	33kΩ ±10%, 1/4W, comp., grade 2, ins.	
R128	15kΩ ±10%, 1/4W, comp., grade 2, ins.	
R129	100kΩ ±10%, 1/4W, comp., grade 2, ins.	
R130	1MΩ ±10%, 1/4W, comp., grade 2, ins.	
R131	100kΩ ±10%, 1/4W, comp., grade 2, ins.	
R132	330Ω ±10%, 1/4W, comp., grade 2, ins.	
R133	47kΩ ±10%, 1/4W, comp., grade 2, ins.	
R134	820Ω ±10%, 1/4W, comp., grade 2, ins.	
R135	1MΩ ±10%, 1/4W, comp., grade 2, ins.	
R136	100kΩ ±10%, 1/4W, comp., grade 2, ins.	
R137	100kΩ ±10%, 1/4W, comp., grade 2, ins.	
R138	33kΩ ±10%, 1/4W, comp., grade 2, ins.	
R139	1kΩ ±10%, 1/4W, comp., grade 2, ins.	
R140	10kΩ ±10%, 1/4W, comp., grade 2, ins.	
R141	100kΩ ±10%, 1/4W, comp., grade 2, ins.	
R142	47kΩ ±10%, 1/4W, comp., grade 2, ins.	
R143	4.7kΩ ±10%, 1/4W, comp., grade 2, ins.	
R144	150kΩ ±10%, 1/4W, comp., grade 2, ins.	
R145	Not used.	

COMPONENTS	DESCRIPTION	A.W.A. PART No. Unless otherwise stated
R146	33kΩ ±10%, 1/4W, comp., grade 2, ins.	
R147	330Ω ±10%, 1/4W, comp., grade 2, ins.	
R148	22kΩ ±10%, 1/4W, comp., grade 2, ins.	
R149	47kΩ ±10%, 1/4W, comp., grade 2, ins.	
R150	Not used.	
R151	1MΩ ±10%, 1/4W, comp., grade 2, ins.	
R152	220kΩ ±10%, 1/4W, comp., grade 2, ins.	
R153	47kΩ ±10%, 1/4W, comp., grade 2, ins.	
R154	220kΩ ±10%, 1/4W, comp., grade 2, ins.	
R155	Not used.	
R156	680kΩ ±10%, 1/4W, comp., grade 2, ins.	
R157	470kΩ ±10%, 1/4W, comp., grade 2, ins.	
R158	220kΩ ±10%, 1/4W, comp., grade 2, ins.	
R159	1.5kΩ ±10%, 1/4W, comp., grade 2, ins.	
R160	Not used.	
R161	1kΩ ±10%, 1/4W, comp., grade 2, ins.	
R162	470kΩ ±10%, 1/4W, comp., grade 2, ins.	
R163	470kΩ ±10%, 1/4W, comp., grade 2, ins.	
R164	220Ω ±10%, 1/4W, comp., grade 2, ins.	
R165	Not used.	
R166	100kΩ ±10%, 1/4W, comp., grade 2, ins.	
R167	100Ω ±10%, 1/4W, comp., grade 2 ,ins.	
R168	1kΩ ±10%, 1/4W, comp., grade 2, ins.	
RV1	500Ω, variable, 1/16W, comp., log. law	Ducon PTU
RV2	500Ω, variable, 1/16W, comp., log. law	Ducon PTU
RV101	2.5kΩ variable, 1W, wire wound, linear law	Colvern CLR4201/22F
RV102	500kΩ, variable, 1/2W, comp., linear law, includes switch 1SWC	Ducon PSU
RV103	500kΩ, variable, 1/4W, comp., log. law, includes switch 1SWD	Ducon PSU
(e) Sockets		
V101	7 pin, miniature, P.T.F.E.	Clix VH337/702 CPS
V102	7 pin, miniature, P.T.F.E.	Clix VH337/702 CPS
V103	9 pin, miniature, P.T.F.E.	Clix VH499/902 CPS
V104	7 pin, miniature, P.T.F.E.	Clix VH337/702 CPS
V105	7 pin, miniature, P.T.F.E.	Clix VH337/702 CPS
V106	7 pin, miniature, P.T.F.E.	Clix VH337/702 CPS
V107	7 pin, miniature, P.T.F.E.	Clix VH337/702 CPS
V108	9 pin, miniature, P.T.F.E.	Clix VH499/902 CPS
V109	7 pin, miniautre, P.T.F.E.	Clix VH337/702 CPS
V110	7 pin, miniature, P.T.F.E.	Clix VH337/702 CPS
XL101	2 pin, miniature, bakelite	McMurdo type D
XL102	2 pin, miniature, bakelite	McMurdo type D
(f) Switches		
SWA	Refer 5.1	
SWB	Oak, H type	60602V41
1SWA	Oak, H type	60600V72
1SWB	Oak, H type	60600V72
1SWC	S.P.D.T., part of RV102	
1SWD	D.P.S.T., part of RV103	

COMPONENTS	DESCRIPTION	A.W.A. PART No. Unless otherwise stated
(g) Transformers		
TR101		1TJ61122
TR102		4V57964
TR103		1LE61123
(h) Miscellaneous		
FILT.	100 kc/s, filter (refer 5.4)	1Q60603
FS1	Fuse, glass cartridge type, 0.5 A	Alert Anti-surge
JKA	Jack, panel type	Bulgin J18
1LP101 to 1LP105	Pilot lamps, 6.3V 0.15 A, M.E.S. base, tubular	
M101	Meter, moving coil, 1mA movement, 100 ohm. res., calib. in air, range 0-100 db.	60600V81

5.4 100 kc/s Filter Unit 1Q60603

(a) Capacitors

C201	1400μμF ±5%, 200VW, plastic film	Ducon Styroseal
C202	2800μμF ±5%, 200VW, plastic film	Ducon Styroseal
C203	2800μμF ±5%, 200VW, plastic film	Ducon Styroseal
C204	2800μμF ±5%, 200VW, plastic film	Ducon Styroseal
C205	1400μμF ±5%, 200VW, plastic film	Ducon Styroseal
C206	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
C207	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
C208	15μμF ±1μμF, 500VW, cer., tub.	Ducon CTR. NPO
C209	22μμF ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C210	47μμF ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C211	10μμF ±1μμF, 500VW, cer., tub.	Ducon CTR. NPO
C212	47μμF ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C213	22μμF ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C214	15μμF ±1μμF, 500VW, cer., tub.	Ducon CTR. NPO
C215	15μμF ±1μμF, 500VW, cer., tub.	Ducon CTR. NPO
C216	22μμF ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C217	47μμF ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C218	10μμF ±1μμF, 500VW, cer., tub.	Ducon CTR. NPO
C219	47μμF ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C220	22μμF ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C221	15μμF ±1μμF, 500VW, cer., tub.	Ducon CTR. NPO
C222	15μμF ±1μμF, 500VW, cer., tub.	Ducon CTR. NPO
C223	22μμF ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C224	47μμF ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C225	10μμF ±1μμF, 500VW, cer., tub.	Ducon CTR. NPO
C226	47μμF ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C227	22μμF ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C228	15μμF ±1μμF, 500VW, cer., tub.	Ducon CTR. NPO
C229	15μμF ±1μμF, 500VW, cer., tub.	Ducon CTR. NPO
C230	22μμF ±5%, 500VW, cer., tub.	Ducon CTR. NPO

COMPONENTS	DESCRIPTION	A.W.A. PART No. Unless otherwise stated
C231	47$\mu\mu$F ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C232	10$\mu\mu$F ±1$\mu\mu$F, 500VW, cer., tub.	Ducon CTR. NPO
C233	47$\mu\mu$F ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C234	22$\mu\mu$F ±5%, 500VW, cer., tub.	Ducon CTR. NPO
C235	15$\mu\mu$F ±1$\mu\mu$F, 500VW, cer., tub.	Ducon CTR. NPO
C236	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000
C237	0.01μF −0+100%, 500VW, cer., tub.	Ducon CTR. K6000

(b) **Inductors**

L201		2V57964
L202		1V57964
L203		1V57964
L204		1V57964
L205		2V57964

(c) **Resistors**

R201	120kΩ ±10%, 1/4W, comp., grade 2, ins.
R202	120kΩ ±10%, 1/4W, comp., grade 2, ins.
R203	120kΩ ±10%, 1/4W, comp., grade 2, ins.
R204	120kΩ ±10%, 1/4W, comp., grade 2, ins.
R205	120kΩ ±10%, 1/4W, comp., grade 2, ins.
R206	120kΩ ±10%, 1/4W, comp., grade 2, ins.

CIRCUIT DIRECTORY

Capacitors

C101	—
C102	F4
C103	E5
C104	E4
C105	E4
C106	F2
C107	—
C108	C16
C109	C16
C110	—
C111	—
C112	—
C113	C2
C114	C1
C115	—
C116	C2
C117	C2
C118	D2
C119	D2
C120	—
C121	C3
C122	C3
C123	B5
C124	C4
C125	—
C126	D5
C127	C5
C128	C5
C129	C7
C130	—
C131	D7
C132	B7
C133	D8
C134	C8
C135	—
C136	D9
C137	E6
C138	E7
C139	F8
C140	—
C141	F9
C142	F9
C143	D9
C144	C10
C145	D10
C146	D11
C147	C11
C148	D11
C149	D12
C150	—
C151	F11
C152	C12
C153	C14
C154	C13
C155	—
C156	F15
C157	F11
C158	—
C159	F12
C160	—
C161	E14
C162	E14
C163	D14
C164	E15
C165	—
C166	E16
C167	F17
C168	E17
C169	F16
C170	F17

Inductors

L101	C2
L102	C2
L103	C3
L104	—
L105	E7
L106	C16

Rectifiers

MR101	D17
MR102	C17
MR103	C17
MR104	D17
MR105	C10
MR106	B13
MR107	D12
MR108	E14
MR109	E15

Resistors

R101	—
R102	E3
R103	F4
R104	F5
R105	C3
R106	A11
R107	—
R108	C15
R109	B4
R110	C1
R111	B4
R112	C3
R113	C4
R114	C4
R115	—
R116	C5
R117	C6
R118	C7
R119	C7
R120	B7
R121	C8
R122	C8
R123	F8
R124	F9
R125	C9
R126	C9
R127	C9
R128	F9
R129	F10
R130	D9
R131	C9
R132	C10
R133	F10
R134	E10
R135	C10
R136	E11
R137	C11
R138	D10
R139	C12
R140	C12
R141	C12
R142	C9
R143	C9
R144	E12
R145	—
R146	C13
R147	B9
R148	D13
R149	D13
R150	—
R151	B14
R152	E14
R153	D14
R154	E14
R155	—
R156	C14
R157	E15
R158	F16
R159	E16
R160	—
R161	E16
R162	E16
R163	E17
R164	E17
R165	—
R166	E15
R167	E16
R168	D17

Var. Resistors

RV1	B8
RV2	B10
RV101	C6
RV102	D14
RV103	E15

Switches

SWB	E13
1SWA	E2/C6
1SWB	C13/C14
1SWC	D14
1SWD	D18

Transformers

TR101	C18
TR102	D11
TR103	F18

Valves

V101	F3
V102	C15
V103	D4
V104	D7
V105	D8
V106	D10
V107	F8
V108	F10
V109	F16
V110	F17

Miscellaneous

FS1	C18
JKA	D17
M101	B9
1TSA	F1
1TSB	A6
1TSC	D18
XL101	F5
XL102	D5

TO BE READ IN CONJUNCTION WITH DRG. 60600G2

DRG. 60600D1

LAYOUT DIRECTORY

Capacitors

C1	—
C2	C10
C3	C14
C4	C14
C5	—
C6	C14
C7	C11
C8	—
C9	—
C10	—
C11	C13
C12	C13
C13	C13
C14	C12
C15	—
C16	ANT.
C17	TUN.
C18	—
C19	D10
C20	—
C21	D14
C22	D14
C23	D14
C24	D11
C25	—
C26	*
C27	*
C28	*
C29	*
C30	—
C31	*
C32	*
C33	—
C34	—
C35	—
C36	D13
C37	D13
C38	D13
C39	D12
C40	—
C41	D13
C42	F12
C43	F10
C44	F14
C45	—
C46	F14
C47	F14
C48	F11
C49	*
C50	—
C51	*
C52	*
C53	*
C54	*
C55	—
C56	*
C57	F12
C58	F12
C59	F13
C60	—
C61	F13
C62	F13
C63	F12
C64	—
C65	—
C66	F13
C67	C11
C68	D10
C69	C10
C70	—
C71	D10
C72	D10
C73	D12
C74	E12
C75	—
C76	D12
C77	D10
C78	E11
C79	E10
C80	—
C81	E10
C82	E10
C83	E12
C84	E11
C101	—
C102	F5
C103	F6
C104	F6
C105	F5
C106	F5
C107	—
C108	F4
C109	F3
C110	—
C111	—
C112	—
C113	E4
C114	E4
C115	—
C116	E3
C117	E3
C118	E4
C119	E3
C120	—
C121	E3
C122	F2
C123	F2
C124	F3
C125	—
C126	F2
C127	F2
C128	F1
C129	D9
C130	—
C131	D9
C132	E8
C133	D9
C134	D9
C135	—
C136	D9
C137	A9
C138	A9
C139	B8
C140	—
C141	B8
C142	B8
C143	D9
C144	C9
C145	C9
C146	C8
C147	C8
C148	C9
C149	D8
C150	—
C151	C8
C152	B9
C153	A7
C154	B10
C155	—
C156	F7
C157	C8
C158	—
C159	B8
C160	—
C161	C7
C162	C7
C163	D7
C164	D7
C165	—
C166	E7
C167	E6
C168	E6
C169	E7
C170	F6
C201	E2
C202	D2
C203	D2
C204	C2
C205	B2
C206	E1
C207	B1
C208	E1
C209	E1
C210	D1
C211	E1
C212	E2
C213	E2
C214	D2
C215	D1
C216	D1
C217	D1
C218	D1
C219	D2
C220	D2
C221	D2
C222	C1
C223	C1
C224	C1
C225	C1
C226	C2
C227	C2
C228	C2
C229	C1
C230	C1
C231	C1
C232	C1
C233	C2
C234	C2
C235	C2
C236	B2
C237	E2

Inductors

L1	D11
L2	D10
L3	D14
L4	D14
L5	—
L6	D14
L7	D11
L8	D11
L9	E10
L101	F4
L102	F3
L103	F3
L104	—
L105	A9
L106	F4
L201	E3
L202	D3
L203	D3
L204	C3
L205	B3

Rectifiers

MR101	E9
MR102	E8
MR103	E8
MR104	E9
MR105	B9
MR106	A7
MR107	C8
MR108	C7
MR109	D7

Resistors

R1	C10
R2	D10
R3	D11
R4	F12
R5	—
R6	E10
R7	E11
R8	F12
R9	E11
R10	—
R11	—
R12	E12
R13	E12
R14	E13
R15	—
R16	E13
R17	E13
R18	E11
R101	—
R102	F5
R103	F5
R104	F5
R105	E3
R106	D10
R107	—
R108	F5
R109	F2
R110	E4
R111	F1
R112	F2
R113	F2
R114	E2
R115	—
R116	F2
R117	E9
R118	D9
R119	D9
R120	D8
R121	D9
R122	D9
R123	B8
R124	B8
R125	D9
R126	D9
R127	D9
R128	B9
R129	B8
R130	C9
R131	C9
R132	C9
R133	C8
R134	C8
R135	B9
R136	C8
R137	B9
R138	C9
R139	D8
R140	B9
R141	B9
R142	B9
R143	B9
R144	B8
R145	—
R146	B10
R147	A8
R148	B10
R149	B10
R150	—
R151	B1
R152	C7
R153	A1
R154	D7
R155	—
R156	E5
R157	D7
R158	E6
R159	E7
R160	—
R161	F7
R162	E6
R163	E6
R164	E6
R165	—
R166	E7
R167	E7
R201	E2
R202	E2
R203	E2
R204	B2
R205	B2
R206	B2
RV1	A8
RV2	A8
RV101	A3
RV102	A2
RV103	E8

Switches

SWA/1	C12
SWA/2	C12
SWA/3	D12
SWA/4	E12
SWA/5	E12
SWA/6	F12
SWB	B10
1SWA	A4
1SWB	A7
1SWC	A2
1SWD	E8
2SWA/1	B1
2SWA/3	C1
2SWA/5	D1
2SWA/7	E1

Transformers

TR1	C11
TR2	C10
TR3	C14
TR4	C14
TR5	—
TR6	C14
TR7	C11
TR8	F11
TR9	E10
TR10	—
TR11	E14
TR12	E14
TR13	E14
TR14	E11
TR101	F8
TR102	C8
TR103	F6

Valves

V1	D11
V2	E11
V101	F5
V102	E5
V103	F2
V104	E9
V105	D9
V106	C9
V107	B9
V108	C9
V109	E7
V110	E6

Miscellaneous

FS1	F9
JKA	A5
TJA	F12
TSA	F10
1TSA	F5
1TSB	F4
1TSC	F6
XL101	F6
XL102	F1

*—Trimmer capacitors mounted above chassis.

TO BE READ IN CONJUNCTION WITH DRG. 60600G4

DRG. 60600D2