THE KW VICEROY

The K.W. 'Viceroy' (Mark III)

A Superb SSB transmitter for Amateur and Commercial* use

FEATURES

- 180 watts P.E.P. input.
- Unwanted Sideband suppression 40 db down at 2 Kc., or better.
- Optional extra half lattice filter, 50 db sideband suppression.
- Carrier suppression 45 db down or better.
- 5 Bands, 10-80 metres, Pi Output.
- T.V.I. precautions taken.
- All crystals included.
- Automatic Level Control.
- Rugged Construction.
- Full Voice Control System.
- Upper Sideband output on 14, 21, 28 mc/s. LSB on 7 and 3.5 mc/s to comply with International regulations.

* The Commercial K.W. "Viceroy." The design and quality of this equipment make it a fine SSB transmitter for commercial use. It is available upon special order for operation on 5 bands of 1 mc/s each within the range 3-30 mc/s. Submit specific requirements for proposal and price.

THE K.W. "Viceroy" SSB transmitter Mark II and III is the result of over three solid years of design and development by professional engineers who are themselves Radio Amateurs and know the discriminating requirements for such equipment. The best designs and features have been incorporated in this transmitter normally associated with much more expensive equipment. All operational controls are located on the front panel including a geared precision dial. Ease of operation, dependability and finest performance are special features about the K.W. "Viceroy".

The K.W. 'Viceroy' has been in Production for two years and can be heard operating from all parts of the world—now in use in nearly 40 countries—proof of dependability and success—Truly "tried and tested."

KW ELECTRONICS LTD

VANGUARD WORKS · HEATH STREET · DARTFORD · KENT · ENGLAND

THE K W VICEROY

The K.W. "Viceroy" Mark II can be supplied without Power Supply or with a matching unit which also includes power and function switches. The Mark III is completely self-contained with power supply in one cabinet.

CIRCUIT DESCRIPTION

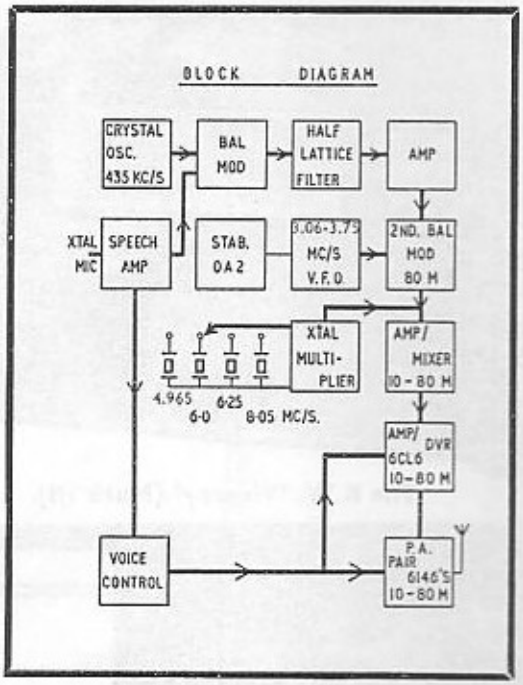
In the adjacent block diagram, the heavy lines indicate the flow of signal through the transmitter.

SSB GENERATOR

The SSB exciter employs a crystal filter. A 12AU7 is used as a 435 kc/s crystal oscillator and phase splitter to drive the balanced modulator at low impedance. The balanced modulator consists of a matched pair of crystal diodes into which audio is fed at low impedance. The modulated signal is then passed through a half lattice filter* which rejects the unwanted sideband and provides a passband flat within 4db between 250 and 2800 c.p.s. Four crystals, vacuum mounted in B7G valve envelopes, are employed (two in the half lattice filter*, one carrier oscillator and one series rejector at carrier frequency). The lower sideband generated is amplified and fed to the grids of a second balanced modulator (or 1st mixer). The output of the VFO is balanced out in the anode circuit of this balanced modulator. The resultant 80 metre output is available for amplification and being lower sideband is suitable for operation on this band.

V.F.O.

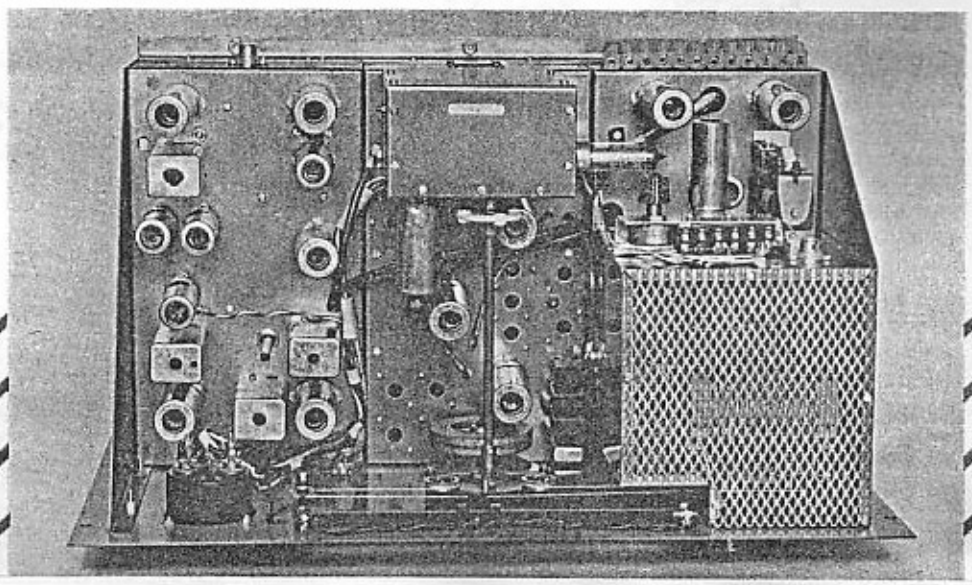
The VFO unit employs a Clapp circuit, with temperature compensation, and is extremely stable in operation. A cathode follower circuit isolates the VFO from the



VFO amplifier which feeds into the 2nd balanced modulator. Rugged construction and stabilised H.T. for the VFO also assist towards VFO stability. The Tuning range of the VFO is 3.065-3.765 kc/s.

2nd MIXER

For operation on bands other than 80 metres a crystal oscillator/frequency multiplier is switched in automatically by means of the wavechange switch. The output of the oscillator is fed into the 2nd mixer. By selecting suitable mixer crystals, correct sideband output is obtained to meet international requirements, i.e. lower sideband on 3.5 and 7 mc/s, upper sideband 14, 21 and 28 mc/s.



** An additional half-latti*
an option

SSB TRANSMITTER

DRIVER

After the 2nd Mixer, the signal is applied to the driver amplifier operating in Class 'A' and provides a signal level sufficient to drive the two final amplifier valves.

FINAL AMPLIFIER

The Power Amplifier is operated under Class AB1 conditions running at approximately 180 watts P.E.P. input and employs a switched Pi-output circuit. The stage is fully neutralised and is completely screened as a TVI precaution.

AUTOMATIC LEVEL CONTROL

A portion of the output of the final amplifier passes to the ALC circuit where it is rectified and used to provide bias to control the gain of the 435 kc/s. amplifier in crystal filter. In this manner an action is provided similar to the AVC in a receiver which results in increased 'Talk Power.' Overloading and frequency splatter are eliminated.

VOICE OPERATED RELAY

A signal from the microphone passing through the audio amplifier is applied to the voice operated relay circuit and causes the VOX relay to close, shorting out a negative bias to the 2nd Balanced Modulator. Also available on the relay are two other sets of contacts for operating external circuitry (e.g. Aerial change-over Relay, Receiver mute, etc.). One set of contacts close on transmit and the second set is a change-over combination.

The VOX control is also equipped with an anti-trip circuit. When receiving, sound from the station receiver's loudspeaker may operate the VOX relay. This is eliminated by the anti-trip circuit which takes part of the audio output from the receiver and applies it in a manner as to oppose the action of the voice operated relay.

C.W. OPERATION

A blocked-grid system of keying is employed operating in the 2nd Balanced Modulator grid circuit. Carrier is provided by inserting a small amount of feedback in the crystal filter which is controlled by the "Carrier Insertion" knob on the front panel. A form of BK Keying is provided —CW transmission commences as soon as the Key is pressed. Relays remain at 'transmit' until there is a pause in transmission. The time constant may be varied by adjusting the VOX threshold control. Ideal CW Keying characteristic is obtained due to the very stable VFO and to the crystal controlled 2nd mixer.

A.M. OPERATION

A.M. transmission is permissible by inserting a small amount of carrier and adjusting the audio gain. Under this condition the P.A. operates at about 90 watts input.

POWER SUPPLY UNIT

The power supply for the K.W. 'Viceroy' Mark II is housed in a separate cabinet. This allows the transmitter to run cooler, due to less watts being dissipated in the cabinet and also permits the use of power supplies already existing at some stations. The details of the K.W. 'Viceroy' Power Supply are given in the specification overleaf. The values given should be closely adhered to and must be of good stability and regulation. The 750V H.T. supply may be of a lower value but should never be exceeded.

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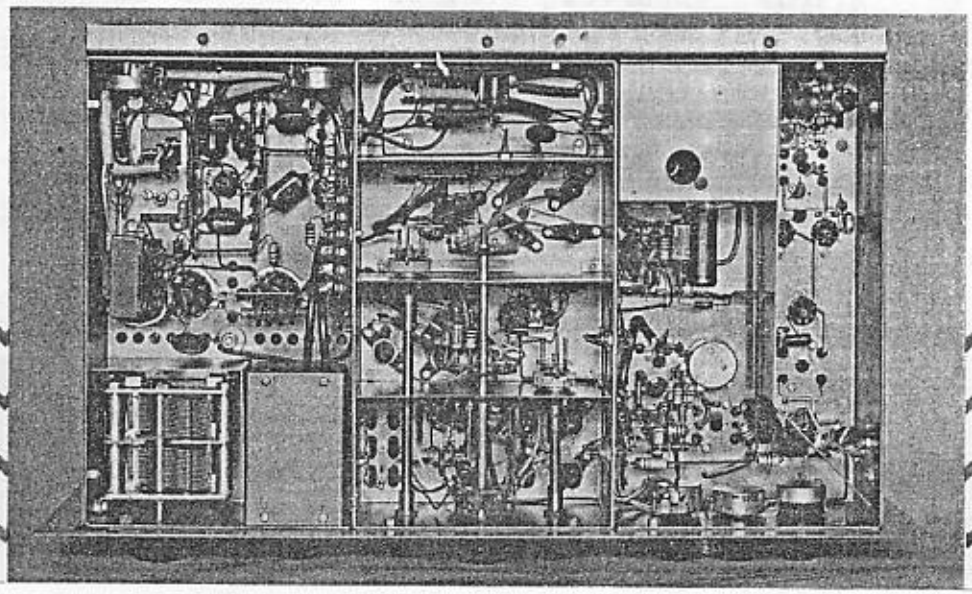


THE K W VICEROY SPECIFICATION

THE K W "VICEROY" SSB TRANSMITTER & POWER SUPPLY (Mk II)

Power Requirements (For Transmitter only)

700v. at 250 m/a; 250v. at 175 m/a;—150v. at 25 m/a.

—60/90 v. variable at 50 m/a; 2 x 6.5v. A.C. 4 A.

Bands Covered	3.5, 7, 14, 21 and 28 mc/s.
Frequency Ranges	3.5-4.0 mc/s; 7-7.4 mc/s; 14-14.4 mc/s; 21-21.45 mc/s; 28-28.7 mc/s.
Mic Input	High Impedance.
Output Impedance	50-80 ohms.
Power	180 watts P.E.P. imput; 150 watts C.W. 90 watts AM.
V.F.O. Stability	Better than 100 cycles after warm up.
Power Supply	200-250 volts, 45-65 cycles, 350 watts. 105-125 volts input, to order.
Meter	PA Anode Current Calibrated 0-300 m/a. PA Grid 0-1 m/a, RF output.
Front Panel Controls (Transmitter)	Tuning, Waveband, Meter Switch, Audio gain, Net and Carrier Insertion, Mixer Input, Driver, PA Bandswitch, PA Tune, Aerial Coupling. (Mk. III) Function Switch.
(Power Supply)	(Mk. II) P.A. H.T. Off-250v.-750v., Power on-off.
Rear Panel (Transmitter)	Power Socket, Connector for external circuits, VOX Sensitivity, VOX Threshold, Antenna Socket, ALC adjust, Anti-trip.
(Power Supply)	P.A. bias adjust.
Function Switch	Switch-CW/SSB/VOX/Tune/Manual, Send/Receive (to operate external Aerial change-over Relay).
Tube Complement (Transmitter)	**12AU7** Carrier Osc. and phase splitter **2 x OA 79** Crystal diodes—Bal. Mod. **12AX7** Audio Amp. and Cathode follower. **EF89 (6AD6)** 435 kcs. Amp. **12AU7** 1st Mixer (2nd Bal. Mod.) **12AT7** VFO and cathode follower **EF80 (6BX6)** VFO Amp. **6CL6** 2nd Mixer. **6870** Crystal osc./multiplier. **6CL6** Driver. **6146** Final Amp. **6146** Final Amp. **6AL5** ALC. **GD5** Crystal diode—Rf meter. **OA2** Voltage Regulator. **12AU7** VOX amp. and Audio Cathode follower. **6AL5** VOX and Anti trip diode. **12AU7** Anti-trip amp. and D.C. amp. **(Mk. III) 8 Silicon Diodes.**
Tube Complement (Power Supply)	**5R4GY** High Voltage Rectifier. **GZ32 (5V4G)** Low Voltage Rectifier.
Dimensions	Transmitter. (Mk. II) 21½" x 11" x 11" (54.5 x 27.8 x 27.8 cm.) Weight. 35 lbs. (approx 16 Kg.). Shipping weight. 80 lbs. (approx 36 Kg.) in wooden case. Power Supply (Mk. II) 9" x 11" x 11" (22.8 x 27.8 27.8 cm). Weight 38 lbs. (approx 18 Kg.). Shipping weight. 80 lbs. (approx 36 Kg) in wooden case. Transmitter (Mk. III) 21½" x 11" x 16" (54.5 x 27.8 x 41.2 cm.) Weight 70 lbs. (approx 32 Kg.) Shipping weight 120 lbs. (approx 56 Kg.) in wooden case.

Shipping weights are reduced for Airfreight by packing equipment in cardboard cartons.

manufactured by :—

K.W. ELECTRONICS LTD.
VANGUARD WORKS
1 HEATH STREET, DARTFORD, KENT, ENGLAND

CABLES:- KAYDUBLEW DARTFORD
TELEPHONE:- DARTFORD 25574

The KW "VICEROY" (MARK III) SSB Transmitter

WARNING CERTAIN VOLTAGES IN THIS EQUIPMENT ARE DANGEROUS TO HUMAN LIFE AND EVERY CARE SHOULD BE EXERCISED TO AVOID CONTACT PARTICULARLY WHEN THE TRANSMITTER AND POWER SUPPLY ARE REMOVED FROM THE CABINET. A BLEEDER RESISTANCE IS USED IN THE HIGH VOLTAGE SUPPLY TO DISCHARGE THE CONDENSERS, BUT OWING TO THE LARGE CAPACITY EMPLOYED IT MAY BE OVER TWO MINUTES BEFORE COMPLETE DISCHARGE HAS TAKEN PLACE.

SECTION 1

The KW "VICEROY" SSB Transmitter is complete with its own Power Supply. The standard model is for Mains supply voltage 200-250 V. A.C. 45 - 65 cycles. An alternative Power Unit for supply voltage 100-125 V. AC. 45 - 65 cycles is available. When it is intended to use a 'home-built' Power Unit the power requirements must be closely met. It is important that the H.T. supplies and 60 - 80 V. negative voltage supply be well regulated and have a low source impedance.

The I.O. socket at the rear of the Transmitter is provided for external connections to the Transmitter (except Key and Microphone). These connections are indicated in fig. 1.

If an Aerial c/o Relay with an A.C. coil (6 v.) is used, power for the coil may be taken from Pin 8 or the I.O. socket, otherwise an appropriate supply must be provided. It is recommended that an Aerial c/o relay be used which 'grounds' the 'receive' contact when on transmit.

Care must be taken in tuning the Transmitter. The tuning of the 'Mixer Input' is quite critical and to facilitate this an indicated scale is provided. It is very important that the P.A. be resonated with the Function switch in the 'tune' position, otherwise damage to the P.A. valves may result.

An antenna with a low S.W.R. should always be used with this Transmitter.

The V.F.O. has temperature compensation and the Transmitter heaters should be switched on at least ten minutes before operating.

PLEASE READ CAREFULLY THE INSTRUCTIONS GIVEN IN THIS LEAFLET BEFORE SWITCHING ON

SECTION 2

2-1 Ventilation.

The Transmitter must be situated with due consideration for ventilation. Nothing must impede the flow of air from under the transmitter cabinet, through the transmitter and out through the top gauze. There should be at least 3 inches clearance behind the transmitter.

2-2 Initial Setting Up.

The initial setting up of the KW "Viceroy III" should be carried out as follows:

Power Supply (located in rear of transmitter as a plug-in unit)

(1) Remove rear panel of cabinet.
(2) Adjust the mains voltage selector panels at the rear of the Power Supply, to the correct Mains voltage.

Transmitter

(1) Anti Trip connectors: Connect a length of twin cable from pins 4 and 7 on the I.O. socket to the loud speaker terminals (3 ohms) on the station receiver. Should one side of the 3 ohm winding be connected to 'earth' pin 4 must go to the LIVE side.
(2) Receiver Muting connections: Connect a length of twin cable from pins 1 & 2 (if HT muting is used) or 2 & 3 (if AVC bias muting is used) to the station receiver muting socket.
(3) Antenna change over connections: Pins 5 & 6 are used for switching an external Antenna change-over relay. If a relay with a 6 v. AC coil is used, power can be taken from Pin 8 (6.3 v. AC).
(4) Plug a crystal microphone into the co-axial socket marked MIC on the front of the transmitter.
(5) Plug the Antenna from the Antenna change-over relay into the co-axial socket marked ANTENNA on the top left hand of the transmitter looking at the rear. It will be necessary to remove the back of the cabinet.
(6) Set the Transmitter controls to the following positions:

AUDIO GAIN	Fully anti-clockwise
NET & CARRIER INSERTION	" " "
OUTPUT COUPLING	Fully clockwise
PA TUNE	Nine o'clock
METER SWITCH	Grid Current
FUNCTION SWITCH	Power Off

SECTION 3

Adjustment of Pre-Set Controls

3-1 There are three pre-set controls in the transmitter and one in the Power Supply that may require initial adjustment. These controls have been adjusted at the Works for average operating conditions.
The controls are:
R 28 (VOX time delay)
ANTI TRIP
VOX SENSITIVITY
P.A. BIAS (rear of the Power Supply)
The procedure for adjusting these controls is as follows:

3-2 Set up the Transmitter and Power Supply as in Section 2.
Switch on the station receiver.
Turn the Function switch to 'Standby', allow a few minutes for the equipment to warm up.

(1) VOX SENSITIVITY

To adjust the sensitivity of the VOX circuit, turn the Function switch to VOX, speak close into the microphone at a normal speaking level, adjust VOX SENSIVITY until the relays operate cleanly (this control is entirely independent of the audio gain control at the front panel).

(2) R. 28 VOX TIME DELAY

To vary the time delay of the Transmitter relay switching from 'Transmit' to 'Receive', speak close into the microphone while adjusting R.28. Turning this control clockwise shortens the time delay, and turning anti-clockwise lengthens the delay. The setting of the VOX Sensitivity control also has a slight effect upon the delay and the best combination of the two controls should be found to suit the operator.

(3) ANTI-TRIP

To adjust the sensitivity of the Anti-Trip circuit first tune in a signal on the station receiver, and adjust the gain controls for normal listening level. Hold the microphone in the normal operating position. Should the VOX relay in the transmitter be operated by the audio from the loudspeaker, turn ANTI-TRIP control clockwise until relay ceases to operate.
Note: If too much Receiver gain is used with the ANTI-TRIP control turned fully clockwise, it may be impossible to operate the VOX circuit.
There will be a slight interaction between the controls for VOX SENSITIVITY, R.28 and ANTI-TRIP, and it may be necessary to re-check each control to ensure smooth operation

3-2 (cont.)

(4) P.A. BIAS

To adjust the Bias voltage to the P.A. stage, first check that the NET & CARRIER INSERTION control is fully anti-clockwise. Switch the meter switch to ANODE current and the WAVEBAND switch to 80.

Rotate the Function switch to MOX, and switch the SEND RECEIVE switch to SEND. A standing anode current of 50 mA should be noted. If 50 mA is not indicated, adjust the PA BIAS control at the rear of the Power Supply.

SECTION 4

Operating Instructions

4-1 Check that all the controls and conditions are as in 2-2 (Power Supply (2)) and Transmitter (6)). Switch the Transmitter Function switch to 'Standby' and allow a few minutes to warm up.

4-2 S.S.B. Operation.

(1) Switch the WAVEBAND and P.A. BAND switch to the required band. Switch the METER SWITCH to GRID CURRENT. Set the V.F.O. to the required operating frequency. Turn MIXER INPUT control to approximate operating frequency. Turn NET & CARRIER INSERTION control clockwise until a reading is obtained, adjust MIXER INPUT and DRIVER controls for peak GRID CURRENT indication. Back-off NET & CARRIER INSERTION control to keep GRID CURRENT at less than full scale reading (meter FSD 1 mA on GRID CURRENT, 300 mA on ANODE CURRENT).

(2) After the MIXER INPUT and DRIVER controls have been 'peaked', turn NET & CARRIER INSERTION control off.

(3) Rotate the Function switch to TUNE. This switches on the 750 v. H.T. supply, operates the VOX relay, and reduces the 6146 screen voltage (for tune-up only).

(4) Turn the meter switch to P.A. ANODE current (0 - 300mA). Re-insert carrier for max. anode current (170-180 mA).

(5) Turn the aerial loading control OUTPUT COUPLING fully clockwise and bring PA TUNE control to resonance (minimum reading). The correct resonant point should coincide approximately with the following knob positions:

4-2 (cont.)
(5) (cont.)

10 metres 9-10 o'clock; 15 metres 10-11 o'clock; 20 metres 11-12 o'clock; 40 metres 12-1 o'clock; 80 metres (3.5 - 3.7 mc/s) outer 80 position on P.A. coil 1-3 o'clock, (3.7 - 4.0 mc/s) inner 80 position 12-3 o'clock.

Should resonance occur at any other position, e.g. on 80 metres with PA TUNE to 9-10, re-check driver stages and make sure that MIXER INPUT knob is turned to correct frequency on small dial.

(6) Adjust OUTPUT COUPLING in anti-clockwise direction in small steps while maintaining P.A. resonance with the PA TUNE control until a current of 140-150 mA is obtained. (off resonance, the reading will be approx. 170-180 mA)

(7) Turn NET & CARRIER INSERTION control fully anti-clockwise (carrier off).

(8) Speak into microphone and advance AUDIO GAIN control until speech peaks are registering 60-70 mA. (This will coincide with approx. 250-300 uA GRID CURRENT on TUNE).

(9) Turn function switch to VOX or MOX as desired. (for adjustments to VOX see Section 3). When operating MOX the SEND-RECEIVE switch on the front panel should be used. The PA Anode current on VOX or MOX should never exceed 150 mA on voice peaks, otherwise severe distortion will occur. The average anode current should be 100 mA.

(10) To reduce power output of the transmitter (e.g. local contacts) do not alter the P.A. loading; simply turn the AUDIO GAIN anti-clockwise until speech peaks on the ANODE CURRENT meter indicate, say 80-100 mA.

4-3 C.W. Operation.

(1) On CW the transmitter may be operated either break in or normal CW.

(2) For BK CW, tune the transmitter as for SSB but only load PA to 130 mA.

(3) Leave the carrier inserted so that grid current is about $\frac{1}{4}$ scale on meter.

4-3 (cont.)

(4) Turn the Function switch to CW and the S/R switch to RECEIVE, press the key and note that the anode current does not go above 200 mA. (200 mA @ 750v=150w) The relay will drop out after a short time if the key is kept down. Under this condition with the relay open and the key closed, the transmitter can be netted on to the required frequency without radiating a signal.

(5) For normal CW operation tune the transmitter for BK CW and put the S/R switch to SEND, this closes the VOX relay, and the transmitter is then keyed in the normal manner, taking care not to hold the key down for more than 1 second at a time, as this may damage the PA valves.

4-4 A.M. Operation.

(1) Closely follow the instructions for S.S.B. operation 4-2 (paras. (1) to (5) ONLY).

(2) With the Function switch to TUNE adjust OUTPUT COUPLING in anti-clockwise direction in small steps while maintaining P.A. resonance with the P.A. TUNE until a current of 75 mA is obtained.

(3) Turn Function switch to MOX S/R switch to SEND and with Meter Switch at GRID CURRENT adjust NET & CARRIER INSERTION control until grid current is just at zero.

(4) Advance AUDIO GAIN control until speech peaks indicate a slight upward kick on the grid current meter. This should coincide with approx. 90-100 mA Anode current. (The anode current should not be allowed to exceed 100 mA under A.M. conditions).

(5) It is recommended that the transmission be monitored on the station receiver with the R.f. gain turned well back, using headphones, while adjustments are being made. The AUDIO GAIN and CARRIER INSERTION controls should be adjusted for clear A.M. speech.

4-5 Netting

(1) In S.S.B. operation, it is important that the transmitter frequency be aligned precisely to that of the station to be called. The transmitter should be tuned to approximately the required frequency by following instructions (S.S.B. operation paras. 1-9).

4-5 (cont.)

(2) Netting can be accomplished on STANDBY and VOX, or on CW by holding the key down until the VOX relay drops out, with the key still held down. Insert carrier and zero beat on to required frequency. When netting is completed return NET & CARRIER INSERTION control to Off position except on CW or AM.

4-6 Changing Frequency

(1) It is most important when changing bands or frequency by more than 50 kcs. to check the PA grid and anode current, and re-resonate MIXER INPUT DRIVER and PA TUNE controls.

4-7 Automatic Linearity Control A.L.C.

(1) The A.L.C. Unit is incorporated in the KW "Viceroy" mounted on the outside rear of the P.A. screening box. This device limits P.A. grid current to a level determined by a potentiometer R 81 mounted on the A.L.C. Unit, thus enabling more average grid drive without resulting in overdriving the P.A.

(2) The A.L.C. may be made inoperative by turning the potentiometer R 81 fully anti-clockwise.
In operation with or without A.L.C. the P.A. grid current should only "kick-up" to half scale on speech peaks and the AUDIO GAIN control should be adjusted to meet this condition.

(3) The optimum adjustment can only be found by observing the Transmitter output on an oscilloscope, this being done at the Works before despatch.
With the control set at half-way a good average control will usually be obtained on most frequency bands.

4-8 R.F. OUTPUT indication

(1) This is provided by rectifying a very small part of the voltage appearing at the output of the P.A. Pi filter. The R.f. output indication is available by turning the meter switch to Rf OUTPUT. If the co-axial feeder is correctly matched to the antenna it may be assumed that an increased reading on the meter coincides with an increased power into the feeder. With a high S.W.R. or a load higher in impedance than 50 - 80 ohms the reading may be slightly misleading and in this case it is advisable to use an S.W.R. indicator in the feeder. The Rf indication may vary from band to band and in general a higher indication will be available on the higher frequency bands.

SECTION 5

Service & Fault Finding

5-1 Removing Chassis

(1) To remove chassis from cabinet, unscrew three fixing bolts under cabinet at rear. Remove screws from around edge of front panel and withdraw by placing fingers behind both sides of front panel. The power supply is held to the cabinet by four 4BA set screws (Mk III only).

(2) DO NOT TOUCH the potentiometers on top of the crystal filter chassis as these are set up at the Works and should not require further adjustment.

5-2 Voltage Measurements AVO 8

No Audio, No Carrier, Bandswitch 14 mcs.
Function Switch MOX, Send Receive Switch Send.

		1	2	3	4	5	6	7	8	9
V1	12AX7 Audio	160	0	1.5	0	0	210	0	1.5	6.3
V2	EF89 435 Amp.	0	0	1.2	0	6.3	0	250	95	0
V3	12AT7 1st Mix.	240	0	5.6	6.3	6.3	240	0	7.5	0
V4	EF80 2nd Mix.	4.5	0	4.5	6.3	0	0	250	180	0
V5	6CL6 Driver	3	0	140	0	6.3	250	0	140	0
V6-7	6146 P.A.	0	6.3	250	0	-70	0	0	0	T/C 750
V8	12AU7 Car. Osc.	150	120	150	6.3	6.3	40	-.3	0	0
V9	12AT7 VFO	150	1.5	2.5	6.3	6.3	150	0	2.4	0
V10	EF80 VFO Amp.	5	0	5	6.3	0	0	250	220	0
V11	0A2	150	0	-	0	150	-	0		
V12	EF80 Crystal Osc.	.5	0	.5	6.3	6.3	0	250	250	0
V13	6AL5 ALC	6	0	0	6.3	6	0	0		
V14	12AU7 VOX Amp.	140	0	5	6.3	6.3	250	0	22	0
V15	6AL5 VOX Diode	0	0	6.3	0	.1	0	-.1		
V16	12AU7 Rly Valve Anti Trip Amp.	100	0	1.6	0	0	45	0	1	6.3

5-3

Resistance measurements AVO 8
Power Off Supply plugged in
Net and Carrier insert F.C.C.
Wave Band 14 Mcs.
R.28 F.C.C.
ALC FC anti Trip F.C.C. Vox Sens F.C. Audio Gain F.C.C.

		1	2	3	4	5	6	7	8	9
V1	12AX7 Audio	100k	1meg	2.2k	0	0	40k	100	1k	0
V2	EF89 435 Amp	0	80k	100	0	0	0	5.5k	60k	0
V3	12AT7 1st Mix.	20k	70k	6k	0	0	20k	70k	6k	0
V4	EF80 2nd Mix.	680	10	680	0	0	0	3k	60k	0
V5	6CL6 Driver	100	0	35k	0	0	4.5k	0	35k	0
V6-7	6146 P.A.	0	0	Inf.	0	5.5k	0	0	0	TC 4.5k
V8	12AU7 Car. Osc.	100k	Inf	Inf.	0	0	60k	330k	0	0
V9	12AT7 VFO	14k	106k	6.8k	0	0	14k	47k	680	0
V10	EF80 VFO Amp.	1k	47k	1k	0	0	0	6k	50k	0
V11	0A2	12k	0	-	0	12k	-	0		
V12	EF80 Crystal Osc.	30	100k	30	0	0	0	3k	8k	0
V13	6AL5 ALC	50k	35k	0	0	50k	0	35k		
V14	12AU7 VOX amp.	60k	220k	2.2k	0	0	130k	1m	Inf	0
V15	6AL5 Vox Diode	100k	100k	0	0	6 meg	0	10.4 meg		
V16	12AU7 Rly Valve /Anti Trip	25k	8.2 meg	2.2k	0	0	100k	100	470	0

Notes:

F.C. = Fully Clockwise
F.C.C. = Fully Counter Clockwise

All measurements are given in ohms unless otherwise specified.

SECTION 6

Alignment of KW Viceroy Filter Chassis (This is aligned in the equipment at the Works and should not require further adjustment). Only to be undertaken by an experienced engineer.

6-1 Equipment required:-

Valve Voltmeter with R.F. probe
Audio Generator

6-2 Setting up transmitter.

(1)

Knob. Function	Nominal Position
Meter Switch	Grid Current
Audio Gain	F.C.C.(fully counter clockwise)
Net & Carrier Insertion	F.C.C.
Mixer Input	3700 Kcs.
Waveband	3.5 mcs.
Driver	12 o'clock
Output Coupling	F.C. (fully clockwise)
PA Tune	9 o'clock
PA Bandswitch	3.5 mcs.
VFO Tune	3700 Kcs.
Function Switch	Power Off

(2) Short circuit R.69 15K 2 watt resistor to chassis on the transmitter side. Take care not to short in on the power plug side, as this will damage the Bias supply.
R.69 is located in the P.A. Chassis. This operation is to remove the bias from the 1st mixer valve.

(3) Short the centre Tap of IFT 3 to earth to disable the V.F.O. injection.

6-3 Alignment Procedure

(1) Switch the Transmitter Function switch to 'Standby' and allow 30 mins. to warm up.

(2) Connect valve voltmeter with R.F. probe to pin 3 of Balanced Modulator Diodes.

(3) With a non-metallic trimming tool adjust core of IFT 5 for a reading of 0.8 volt on the valve voltmeter.

6-4 Audio Sensitivity

(1) Plug output of audio generator with 600 ohm output impedance into transmitter MIC INPUT socket. Adjust generator output to 1 volt at 500 cs.
(2) Switch Valve Voltmeter to read A.C.
(3) Connect Valve Voltmeter to junction of R.9 and R.10.
(4) Advance Audio Gain control to Maximum.
(5) A reading of 1 volt AC should be obtained on the valve voltmeter. This indicates the audio amplifier is working correctly.

6-5 Filter Bandwidth

(1) Connect Valve Voltmeter with R.F. probe to pin 6 of 1st mixer valve base.
(2) Reduce output of Audio Generator to 4 MV @ 500 cs.
(3) Adjust top and bottom iron-dust core of IFT 1 for maximum reading.
(4) Set Audio Generator to 2000 cs.
(5) Adjust bottom core of IFT 2 for maximum reading.
(6) Set Audio Generator to 3000 cs.
(7) Adjust top core of IFT 2 also top and bottom core of IFT 3 for maximum reading.

This completes the alignment of the filter.

6-6 Alternative filter alignment procedure.

If a BC 221 is used for alignment of the Filter take out the 435 30 pf carrier crystal and plug the BC 221 into the crystal holder. (B7G socket pins 1 & 5)

Tune the BC 221 to 434.5 kc. and peak top and bottom core of IFT 1 for maximum output as measured under 6-5 above. Tune BC 221 to 433 Kc and tune bottom core of IFT 2. Tune BC 221 to 432 Kc and tune top core of IFT 2 top and bottom core of IFT 3. All iron dust cores should be adjusted for maximum output at the appropriate frequency indicated above.

SECTION 7

Alignment of KW Viceroy VFO

7-1 Equipment required:

Valve Voltmeter with RF probe
Receiver covering 3500 Kc - 4100 Kc calibrated every 100 Kc.

7-2 Tracking procedure.

Set Transmitter up as in 6-2(1), 6-2(2) and 6-3(1)

7-3 (1) Remove the short from centre tap of IFT 3
(2) Insert carrier
(3) Move VFO to 3500 kc on dial
(4) Listen on station receiver at 3500 Kc. for heterodyne, if heterodyne not heard adjust core of L.12 for zero beat.
(5) Check tracking up to 4100 Kc (28000 Kc. on dial)
(6) If over tracking, reduce capacity of C.63 (Philips Trimmer) and move back to 3500 kc. on dial, readjust core for zero beat. Repeat until tracking correct.
(7) If undertracking, increase capacity of C.63 and readjust as in 7-2(6).

7-4 Checking output of VFO

(1) Connect valve voltmeter with RF probe to centre tap of IFT 3
(2) Turn net and carrier insertion fully counter clockwise
(3) Move VFO to 4200 Kc. on dial.
(4) A reading of approximately 1.5 volts should be obtained.

7-5 If a fault exists in the mixer chassis the tracking of the VFO will have to be left until the fault is rectified.

SECTION 8

Alignment of the KW Viceroy Mixer Chassis

8-1 Equipment required:
Valve voltmeter with RF probe
'udio Generator
80 ohm dummy load

8-2 Set Transmitter up as in 6-2(1) 6-2(2), 6-3(1) and 7-3(1)

8-3 Output of filter chassis 80 metres

(1) Connect valve voltmeter with RF probe to grid of 2nd mixer.
(2) Connect audio generator to Mic input socket. Adjust Generator output to 4 mv @ 2000 cs.
(3) Advance audio gain to Max.
(4) Adjust both cores of IFT 4 and IFT 6 for max. reading on valve voltmeter.

8-4 Output of filter chassis 40 metres

(1) To obtain lower sideband output on 40 metres, IFT 4 and IFT 6 are tuned to the difference in frequency, of the filter and VFO. On allother bands they are tuned to the product.

(2) With equipment set up as 8-2 and 8-3 (1,2,3,) turn band-switch to 40 m. Adjust C.28, C.33 and C.34 for maximum indication on valve voltmeter. Check that correct output has been obtained, by turning audio gain to min., voltage should drop to a low level, if it does not, re-adjust C.28, C.33 and C.34 with audio gain to Max.

5.2V o/p all OK low level = 0.33V

8-5 Mixer C.O.

(1) Connect valve voltmeter with RF probe to low-impedance output of C.O. cathode of V4 PIN1

C38 across R92 set to centre otherwise OK

(2) Turn audio gain to Min.

(3) Adjust core of L4 for max. reading on valve voltmeter on 10 m. Adjust Philips trimmers on 15, 20 and 40 m.

10m = 4.7V 15m = 12V 20m = 10.2V 40m = 5.6V

8-6 2nd Mixer

(1) Connect valve voltmeter with RF probe to low-impedance output of 2nd mixer. L2 coils

80 = 2.8V 40 = 4.8 20 = 8.9 15 = 11.0 10 = 7.8

(2) Advance audio gain to Max.

(3) Disable VOX circuit by removing VOX amp valve V14

(4) Check that the transmitter is on 3700 kc. and that the mixer input condenser is three quarters mesh, with the variable vanes facing the filter chassis. Pointer on control knob should be at 3700 kcs.

(5) Check that driver condensers are half mesh with variable vanes facing PA chassis. Pointer on control knob should be at 12 o'clock.

(6) With transmitter on 80 metres 3700 kcs. re-adjust core of IFT 6 for max. reading on valve voltmeter.

(7) Adjust core of L1-80 for max. reading on valve voltmeter.

(8) Switch to 40 metres (7100 kc) and adjust core of L1-40 for max. reading. Re-peak C.34

L1/40 Joke of the week

(9) Switch to other bands and adjust associated core for max. indication on valve voltmeter.
Check that the correct tuning point has been obtained on each band, by reducing audio gain to min, the indication on valve voltmeter should drop to a low level, but will only drop to zero on 80 metres.

8-7 Driver

(1) Remove valve voltmeter.

(2) Turn meter switch to grid current.

(3) With audio gain to max, adjust cores of L3 on each band, using grid current as indication of resonance, turn audio gain down as meter reaches full scale deflection.

Volts on 6 75m = 80 = 6.0 40 = 8.6 20 = 12.4 15 = 12.4 10 = 11.1

SECTION 9

Adjustment of 28250 kc. trap, 1st Mixer, Balanced Modulator and Neutralising the P.A.

9-1 Two unwanted products exist in the KW Viceroy, they are both on 10 metres:

(1) One is the product of the 3rd harmonic of the 10 metre crystal and the output of the filter chassis at 4100 kc. and is known as the 3rd harmonic

(2) The other unwanted product is the difference of the 4th harmonic, of the 10 metre crystal and the VFO frequency, when the transmitter is on 28100 kc. This is known as the 4th harmonic

9-2 Rejection of 3rd harmonic

(1) Set the transmitter up on 28100 kcs. with the Function switch to Standby and an 80 ohm dummy load plugged into the Ant. socket.
(2) Short R.69 to earth as in 6-2(2)
(3) Insert carrier by turning the net and carrier insertion control fully clockwise.
(4) Listen on the station receiver at 28250 kc.
(5) Adjust L.10 for min. reading on S Meter, it is possible to get the level 45 db. below the carrier level at 28100 kc.

9-3 Rejection of 4th Harmonic

(1) Set up as 9-2 (1-2)
(2) Turn net and carrier insertion control fully counter clockwise.
(3) Listen on the station receiver at 28535 Kc.
(4) Adjust R.22 2K pot. (located on top of the filter chassis) together with C.27 (located close to IFT 4) until the S Meter reading drops to a level which is 50 db. below the carrier level at 28100 kc (carrier inserted).

9-4 Balancing the Balanced Modulator

Equipment required:
Valve voltmeter with RF probe

(1) Set the Transmitter up as in 6-2(1-2), 6-3(1)
(2) Make sure the net and carrier insertion control is fully counter clockwise and the audio gain is fully counter clockwise. Short Pin 7 of balanced modulator base to earth.
(3) Connect valve voltmeter with RF probe to grids of 6146's.
(4) With a non-metallic trimming tool adjust C.60 (3-30 pf. Philips Trimmer on grid of carrier oscillator) for min. reading on valve voltmeter. Remove short from Pin 7.

9-4 (cont.)

(5) Take out 435 Kc. S.R. crystal. If the balanced modulator is unbalanced, the reading on the valve voltmeter will go to a high level.

(6) Adjust C.8 and R.12 1K pot. (located close to the balanced modulator diodes) in turn until the valve voltmeter reading is .2 volt or lower.

OK VVM = 0

(7) Plug in 435 Kc. S.R. crystal, the valve voltmeter reading should stay the same or a lower reading should be obtained

(8) If it is not possible to get a lowreading on the valve voltmeter check that the transmitter is on 80 metres and that the 1st mixer is balanced (see 9-3) a check can be made to see if the 1st mixer is balanced by shorting the 435 Kc. 30 pf (carrier crystal) to earth. The valve voltmeter reading should drop to .2 volt or lower.

(9) Carrier suppression of 45 db. or better should be obtained, check by noting reading on valve voltmeter with net and carrier insertion fully counter clockwise and fully clockwise with control fully clockwise a reading of 70 v. should be obtained.

(10) If a valve voltmeter is not available, carry out the same balancing procedure, but use the station receiver S Meter as the indicating device. This system is not recommended as it is difficult to obtain the correct balancing point of R.12 and C.8.

carrier suppression 80 S9 plus 40 = -58db 20 - 58db 15 = -56db 10 = -56db

9-5 Neutralising the P.A.

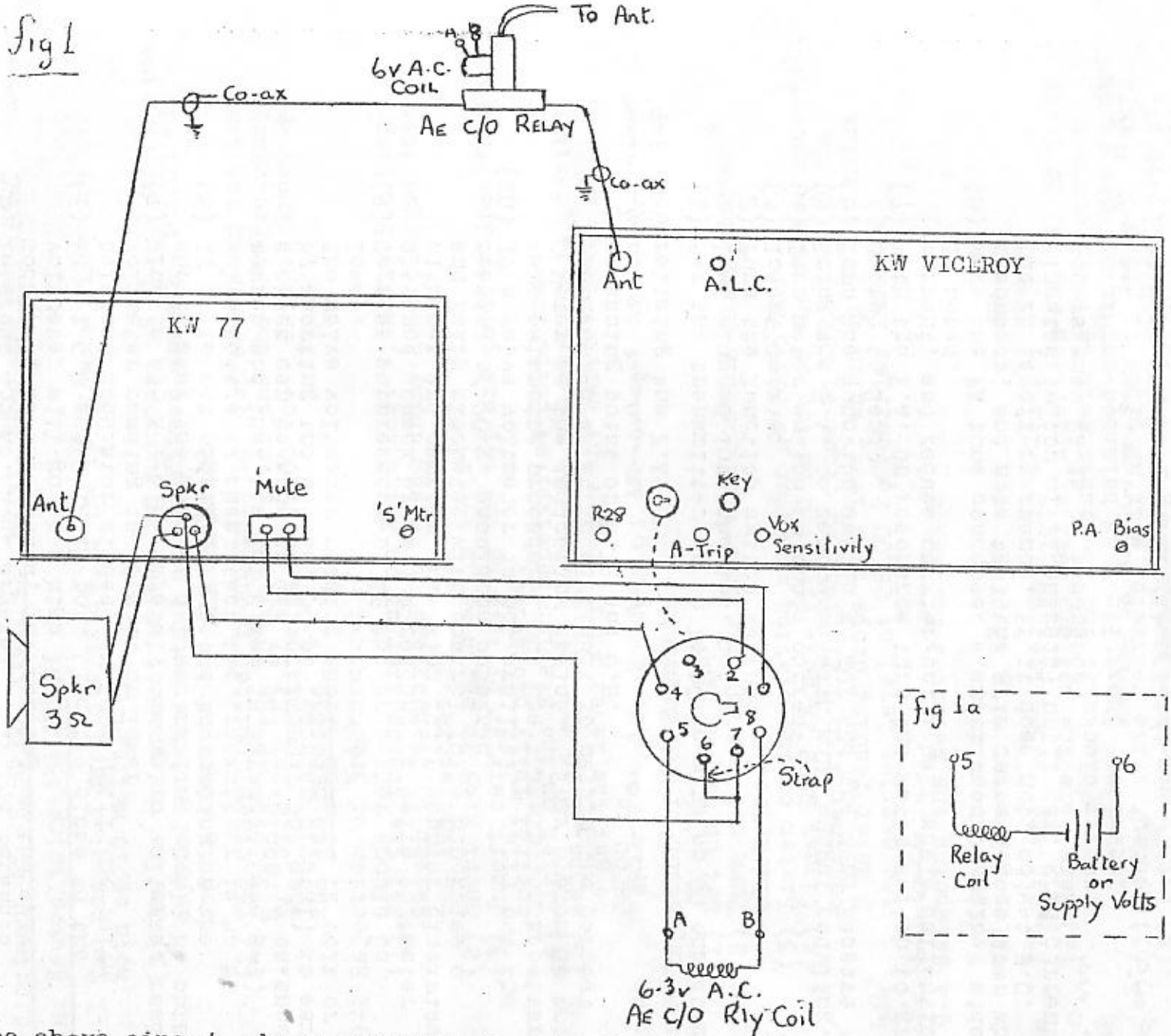
(1) Set the transmitter up on 14300 kc. with an 80 ohm dummy load plugged into the Ant. socket.
(2) Turn the Function switch to Tune
(3) Insert Carrier
(4) Turn meter switch to anode current.
(5) Bring the P.A. to resonance with min. output coupling.
(6) Turn the Function switch to MOX and the Send Receive switch to Send.
(7) With the P.A. on resonance turn the meter switch to grid current, and reduce carrier until half scale deflection is noted.
(8) Move the PA tune condenser a small amount, either side of resonance, and note that the grid current goes down when the PA is off resonance, if it does not, adjust N.C. (located in top of PA chassis) until max. grid current occurs when PA is on resonance.

10M = 32.4mc at -23db
15M = 25mc
20M = 18.4mc
40M = 10mc

Note there are carriers on output as follows but no mod!

6.11.62.

Fig 1



The above circuit shows connections using Dow Key DK.60G co-axial Relay with 6 v. A.C. coil. When using an alternative Relay and external Power Supply for the relay, use pins 5 & 6 connected as shown in fig. 1a