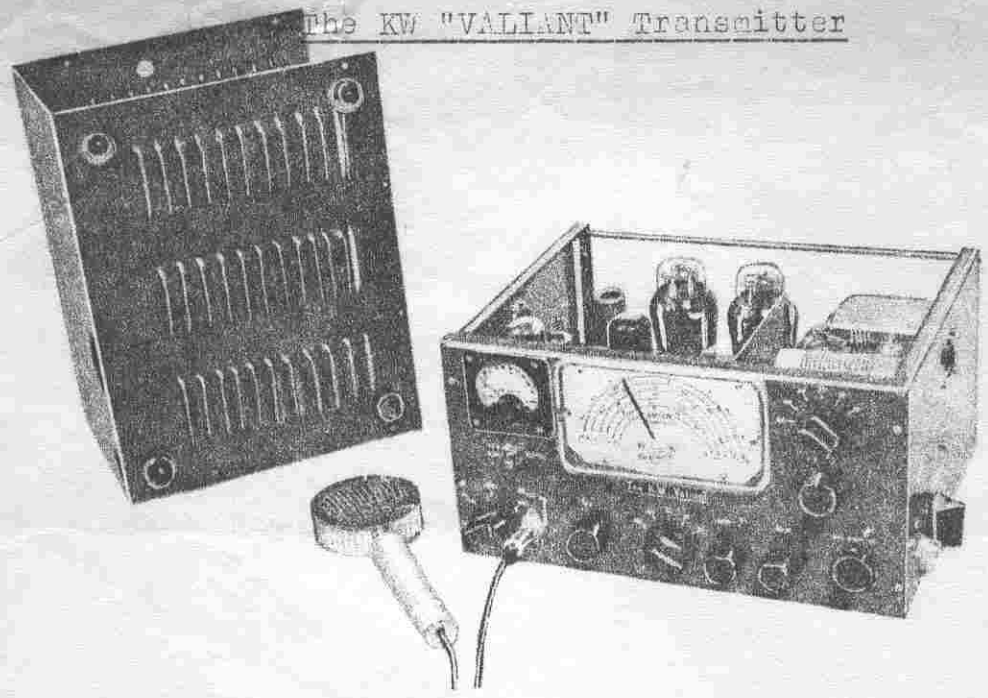


The KW "VALIANT" Transmitter



The KW "VALIANT" Transmitter is designed for mobile or home station operation. The compact layout makes it particularly suitable for under dash mounting in a vehicle and for portable station use; it will also give performance as a home station which can be favourably compared with much larger equipment.

The Transmitter has been designed around the Gelo V.F.O. Unit Model 4/102 which nicely bandspreads all bands over the entire scale. The 6L46 P.A. has a Pi output stage which provides a wide range impedance feed for an aerial system. The speech amplifier, modulator and mod. transformer are exactly the same as those used in the famous KW "VANGUARD" Transmitter.

The wiring of the heaters in two balanced systems allows the set to be run from 6 volt or 12 volt supply. Almost any H.T. supply between 300 and 500 volts may be used. Two separate H.T. supplies may be used, one for the modulator and speech amplifier, the other for the V.F.O. and P.A. Keying is carried out in the cathode of the P.A. stage.

In the Kit Transmitter, the Gelo V.F.O. Unit is supplied ready wired.

Technical Details

- Frequency Coverage: (1.8-2.0 mc/s optional); 3.5-4.0 mcs; 7.0-7.4 mcs; 14.0-14.4 mcs; 21.0-21.6; 28.0-29.9 mcs.
- Power Input to P.A: Up to 65 watts, according to H.T. supply used.
- Phone Operation: Plate & screen modulation.
- Microphone Input: High Impedance for crystal mic.
- Metering: P.A. Grid Current, P.A. Plate Current & % Mod.
- "Netting" switch provided.
- Calibrated scale approx. 4 1/2" x 2 3/4".
- Valve line up: 9 valves.

1 6J5GT Oscillator	5 VR150 Stabilavolt for VFO
2 6AU6 Buffer/doubler	6 6ER7 Speech Amplifier
3 6V6GT Driver (dblr/trplr)	7 12AX7 Amp. & phase inverter
4 6L46 Power Amplifier	8 6L6G } Class AB1 Modulator
	9 6L6G }
- PSU Requirements: Heaters 2 1/4 amps at 12 V; 4 1/2 amps at 6 V. H.T. R.f.(approx) 450 V. @ 150 m/a. H.T. Mod 400 V. @ 120 m/a.
- Dimensions: 12" x 9 1/2" x 6 1/4" high
- Panel Size: 12" x 6 1/4"
- Total Weight: 16 1/2 lbs.

KIT 'A' c/w valves & cabinet 10-80 m.	£32.10.0d.
KIT 'B' c/w valves & cabinet 10-160m.	£35.10.0d.
Ready wired & tested 10-80 m.	£40.10.0d.
Ready wired & tested 10-160m.	£43.15.0d.

Terms available * * * * * Carriage extra.

Provisional Assembly Instructions

IMPORTANT: PLEASE READ THROUGH THESE INSTRUCTIONS BEFORE
COMMENCING ASSEMBLY -

1. Check all components against Parts List.
Make sure you allocate the correct rating Resistors and Condensers to the right circuit.
2. Mount components on the chassis in the following order:-
Valveholders (make sure each V.H. Key is in correct position and has solder-tag on fixing screw - see Val.3.)
Mount the Modulator Valveholders (V8 & V9) on sub-chassis spaced below chassis by means of 4 spacers provided.
3. Mount the Mod. gain control (R5), Meter rectifier, power socket, key jack, bracket for R.I. choke, 2 way, 4 way and 5 way tagstrips.
4. Mount all resistors and condensers on the two 16 way tagstrips and fit to chassis by means of self tapping (PK) screws.
5. Connect six coloured wires each 16" long to the meter switch. The leads will have to be tailored later when connecting up.
6. Mount V.F.O. Unit under chassis but do not, at this stage, tighten securing screws. (Fixing screw at rear requires 4BA solder tag for R12). Note: It is necessary to trim front of V.F.O. chassis to allow clearance for Mic. socket.
7. Mount trimmer C20a on brackets and secure to chassis with 2 PK screws.
8. Fit 2 rubber grommets - one near power socket and other near position of meter switch.
9. Mount the following on front panel:-
Meter 'V.F.O. TUNE' toggle switch, Mic. socket, drive control 'P.A. TUNE' condenser, panel bush for 'GRID P.A.' control and meter switch with wires. Add two more wires to connect meter.
10. Connect wires of suitable length to 'V.F.O. TUNE' switch.
11. Mount Front Panel and side panels to chassis by means of PK screws.
12. Connect the two sections of C29 together and mount condenser on panel by two 4BA Round Head screws. It may be necessary to trim earth tag on Gang condenser to allow clearance from the 'drive' control potentiometer.
13. Mount screen between V.F.O. tuning condenser and P.A. valve on top of chassis. Secure screen to Front Panel. (6BA counter-sunk head screw).
The position of the V.F.O. Unit should be adjusted to allow clearance between drive drum and screen. V.F.O. tuning condenser spindle should be centrally positioned to hole in Front Panel. Tighten the four V.F.O. chassis fixing screws.
14. Mount the modulation transformer and pass the terminating wires above chassis through grommet to below.
15. Should the Kit include the 160 metre modification, next mount all the associated components. The 160 m. V.F.O. inductance should be fitted between 'DRIVE' extension spindle and the V.F.O. Unit and not in the position shown in the photograph. A 3/8" PK screw through one hole of coil former and C20a bracket will secure coil.
16. Before mounting the P.A. Pi coil check that it has been modified. For 160 m. modification see VAL.2. To check the coil assembly for 10-80 m. operation, the first tap nearest to end of wide-spaced section of coil should be connected to positions 1 and 2 on the switch. The 11 metre tap on the coil (second tap from end of coil, wide-spaced end) should be cut out. Join tag 2 on switch (previously connected to 11 metre tap) to tag 1. Position 2 is then used for 10 metres and corresponds to the marking on the Front Panel.
Connect end wire provided on coil to tag on P.A. TUNE condenser (See VAL.3.) and mount Coil assembly on Front Panel.
17. Commence wiring by putting in all 'earth' connections between valve pins and chassis. Connect all heater wiring. Keep in mind when laying several parallel wires that a much neater finish will be achieved if most of these wires can be laced together/

K.W. "VALIANT" - Provisional Assembly Instructions (contd.)

together with cord at the end of the assembly, after testing out. This means that these wires should be left long enough to be laced into position. It will be found helpful to cross off each wire on the wiring diagram as it is wired into the chassis.

When wiring-in non-insulated type resistors, care must be taken to ensure sufficient clearance from chassis and other components.

18. Push the wires already connected to Switch S3 through rubber grommet below and connect as in VAL.3.
19. Continue wiring as shown in VAL.3. It is suggested that wiring be done in the following order.
P.A. valve base, VR150, V.F.O. Unit, R10, 6BR7, 12AX7, meter rectifier, modulators, mod. transformer, P.A. output stage, key socket, power socket.
20. A short length of screened wire should be used between microphone socket and R20, also between the mod. gain control slider and pin 2 of 12AX7. R20 and C30 should be connected with the shortest possible wires.
21. Fit dial, pointer and escutcheon. Pointer should be position at '0' degrees with V.F.O. tuning condenser full in.
22. Fit knobs. Round knobs for 'V.F.O.', 'GRID P.A.' and 'DRIVE'. Pointer knobs to 'Meter Switch', V.F.O. wavechange, Pi Coil, 'P.A. TUNE' and 'ANT. COUPLING'.
'P.A. TUNE' knob should point to 9 o'clock with condenser vanes full out of mesh.
'ANT. COUPLING' should point to 12 o'clock with vanes fully in mesh.
23. Carefully check over all wiring before connecting to power supply and testing out.

1. General considerations

No two installations being similar, the individual owner of the "Valiant" will vary his installation according to space and operating requirements. Regardless of these variations, there are two essentials that must be observed, a) convenient location for operation, including ease of observation, b) Rigid mechanical mounting.

2. Mounting methods

The construction of the cabinet is such that it is readily adaptable to a hanging mount from the lower edge of the car dashboard; or fixed bottom bracket to the floor of the car. A brace to the foot board will help to make a more rigid construction. Wherever possible, use rubber shock absorbers or rubber bushes. Vibration of the equipment should be kept to a minimum. Rubber feet may be fitted in holes provided under the cabinet if convenient. These should always be fitted for Base station use to allow good ventilation under the cabinet.

3. Antenna

The KW "Valiant" will perform most efficiently when coupled to an aerial resonated to the desired operating frequency. Standard practises should be used for antenna relay control. The co-ax connector on the right side of the Transmitter serves as an output terminal for transmission line. It may be more convenient to instal the aerial changeover relay inside the Transmitter and a space for this purpose is provided under the chassis near the modulation transformer. With this arrangement it will be necessary to provide an additional co-axial outlet to the receiver aerial input. The following types of aeriels can be directly fed from the "Valiant".

Centre fed half-wave dipole; folded dipole (half-wave), Parasitic Beams; Vertical quarter-wave, ground plane, Base, centre loaded or continuously loaded whip. Any antenna fed with low impedance untuned line.

It may be necessary to provide an aerial tuning circuit for 160 m. operation (see VAL.2.)

4. T.V.I. Precautions

Under normal operating conditions, a Low Pass Filter in the low impedance transmission line will have maximum effect in reducing T.V.I. caused by harmonic radiation. Should this have no effect, try a High Pass Filter in the aerial feed to the television receiver as the interference may be caused by 'shock excitation'.

Disc ceramic condensers, each of 1000 pf. 1 kV. wkg. can be tried between each of the pins of the power socket and chassis, particularly between pin 4 and chassis. It is important to have a good, efficient earth to the "Valiant" cabinet.

A Mains Filter in the power supply will possibly help to eliminate mains-borne type of interference.

5. Power Supply Requirements

For maximum flexibility the "Valiant" power input is arranged for one or two H.T. supplies. The power connections and the range of H.T. voltage requirements can be obtained from drawing VAL.1. When a single H.T. supply is to be used pins 4 and 5 must be jointed together.

For A.C. mains operation, an ideal arrangement is to use two power supplies similar to those used in the "Vanguard" Transmitter, i.e. for the modulator 425 V. @ 150 m/a and for the R.f. side 470 V. @ 200 m/a. Heater supply requires 6.3 V. at 4½ amps or 12.6 V. @ 2¼ amps. For 12 V. operation, connect supply to Pin 1 (earth) and Pin 3. For 6 V. operation, join Pin 3 to Pin 1, connect supply to Pin 1 (earth) and Pin 2.

It is usual to have a single H.T. supply for mobile operation, also, when this is a requirement for an A.C. mains supply, the ideal rating is 425 V. when fully loaded at approx. 250 m/a. When smaller supplies only are available, the power input to the P.A.

Installation Notes for
The KW "Valiant" (continued)

is of course reduced. For example, with a 300 volt supply 20-25 watts input may be obtained, depending upon the current rating of the supply. It may be necessary to adjust P.A. screen volts and H.T. to driver stages, as indicated in the table on VAL.1.

6. Netting

In order to provide a 'netting' signal in the receiver, the V.F.O. is switched on by operating the NORMAL/V.F.O. TUNE switch. To make this arrangement functional, it is necessary to connect Pin 6 of the power socket to a 200-250 V. D.C. supply. As only a few milliamps are required, it is usually quite convenient to connect this to the receiver power supply. Should the harmonic 'pick-up' in the receiver be weak on the higher frequency bands, a 'probe' can be wired into the Transmitter. A short length of insulated wire should be connected between Pin 6 of the 6F5GT base (no pin connection in valve) and a stand-off tag, which can be fitted on the earthing tag in the V.F.O. unit near the middle switch wafer. The insulated wire should pass between V.F.O. coils L2 and L3. From the stand off tag, run a length of light-weight co-ax cable to the 'Receive' contact of the Aerial change-over relay. This is, of course, most convenient when the aerial relay is installed within the "Valiant" chassis. It is advisable to secure the insulated wire to a coil former with polystyrene cement to prevent the wire vibrating and causing F.M. under mobile conditions.

7. L.T. & H.T. Switching

A send/receive switch is usually installed externally to the "Valiant" to suit individual requirements, e.g. floor switch for mobile operation or microphone pressel switch for a Base station. The H.T. switch is usually wired to a relay installed in the Power Supply Unit.

It will be noted from the circuit diagram that a separate switch contact is provided on S3 (NORMAL/TUNE) switch which is connected to Pin 7 of the Power Socket. This can be used for switching H.T. in the centre tap of the secondary of a mains transformer in an A.C. mains supply but if this is used, alternative arrangements for 'netting' may be necessary.

No L.T. switch is incorporated in the "Valiant". When the heaters are connected with an A.C. Mains supply unit, switching will be effected by means of the Mains input switch.

For mobile operation a master L.T. switch should be installed. This should be of heavy duty rating, say 25 amps, and can also be used as a safety precaution, to cut the supply to the H.T. Unit. It is advisable to fit a 25 amp fuse in the main L.T. lead close to the Battery in mobile installations as a precaution against damage caused by wrong cable connections or ultimate chaffing of cables due to car vibration.

Operating & Tuning Procedure

To put the Transmitter in operation, the following procedure should be carried out:-

- 1) Connect to Power Supply Unit, aerial and crystal microphone.
- 2) Switch on heaters and allow two minutes to elapse before switching on H.T.
- 3) Adjust the V.F.O. Band Switch (centre below main dial) and final R.f. amplifier band switch (switch above P.A. TUNE) to the band of operation.
- 4) Adjust the oscillator (V.F.O.) to the desired frequency as indicated on the frequency calibrated dial.
- 5) Turn up the DRIVE control half way.
- 6) Put V.F.O. TUNE/NORMAL switch to NORMAL.
- 7) Turn the aerial coupling condenser (ANT. COUPLING) to maximum capacity (12 o'clock) for loose aerial coupling.
- 8) Switch the meter to read GRID M/A.
- 9) Switch on H.T. and quickly adjust the P.A. GRID condenser (C20A) for maximum reading on meter. Then adjust the DRIVE control (R10) for reading on the meter, 2.8 to 3 m/a.
- 10) Turn meter switch to P.A. plate m/a. Watch the meter and rapidly adjust the final R.f. amplifier tuning condenser for lowest possible plate current.
- 11) Adjust antenna coupling control for an increase in P.A. plate current. Rapidly re-adjust P.A. TUNING for minimum plate current. Repeat this operation until plate current dip occurs at approximately 110 m/a -- the normal loading of the final R.f. amplifier. (With H.T. voltages lower than 450 V. the P.A. should be loaded to a proportionately lower current, e.g. with 300 V. H.T. the plate current should be in the region of 60 m/a - with higher voltages 110 m/a must never be exceeded). It should be realised that low plate current indicates loose antenna coupling and therefore low R.f. output. On the 80 and 160 metre bands it may be possible to obtain a dip in plate current at two different settings of the P.A. tuning control; one near a dial reading 12 - 2 o'clock and the other near 9 o'clock. In the latter position the final is doubling and this position should be avoided.
- 12) Re-check the grid current as indicated under para. 9). Now re-adjust the P.A. tuning control for minimum dip and re-adjust antenna coupling so that the minimum dip coincides with the required reading indicated on the meter. The P.A. tuning control should be operated rapidly to keep the 6146 from drawing excessive plate current for a long period of time; a condition which might damage the tube. After the adjustments for tuning the final R.f. amplifier and antenna coupling have been completed, modulation may be applied.
- 13) Turn the meter switch to % MOD. position and speaking into the microphone in a normal voice level at a distance of 3" to 6" adjust MOD. GAIN control until the meter reads 80-100% modulation on voice peaks (adjust control with screwdriver, through aperture in top of cabinet). After modulation adjustments have been completed the Transmitter is ready for operation.

C.W. Operation

The final R.f. amplifier tuning and antenna coupling procedure for C.W. is identical to the one just outlined for phone operation but the modulator gain control should be kept at zero. Plug key into appropriate socket at rear of chassis - transmission may then be started by pressing the key. When standing by, the external SEND/RECEIVE switch should be turned to RECEIVE. For C.W. operation the meter may be switched to read P.A. plate current offering a check of the tuning condition of the final R.f. amplifier, or it may be switched to read GRID current to avoid excessive stress on the meter itself.

Tuning the KW "VALIANT" Transmitter (continued)

160 Metre Operation

The KW "Valiant", which includes "top band" modification, is fitted with an additional wavechange switch at the right side of the cabinet. It is important that this switch be set to 12 o'clock position for operation on the bands 10, 15, 20, 40 and 80 metres.

For 160 metre operation, this switch must be turned to 2 o'clock position. Set V.F.O. wavechange switch to 80 metres and P.A. Tune Switch to 160.

Tuning procedure should be carried out as paras. 1) to 13). A suggested method for reducing power to 10 watts is given in VAL.2. Under these conditions the P.A. grid current may be reduced to about 2.5 mA. Should the resistor R.18 be in circuit for around 50 watts P.A. input on bands 10 - 80 metres an input of 10 watts will require microphone gain control adjustment (R.25) in order that speech peaks indicate about 50% on the meter. With the V.F.O. dial at 50° and 160 m. V.F.O. coil adjusted for a frequency of 1900 kc/s, the lower band edge will be at approx. 10° and 2000 kc/s at 90°.

Zero Beat Frequency Adjustment

In order to adjust the transmit frequency exactly to a frequency of another station, the NORMAL-P.A. TUNE switch should be set to the P.A. TUNE position. The oscillator of the Transmitter may now be adjusted to 'zero beat' with the signal being received. After tuning has been accomplished the switch is returned to the NORMAL position. After a minor change of frequency, perfect tuning of the final R.f. amplifier may be obtained by re-adjusting the P.A. tuning condenser.

Note

Should it not be possible to obtain sufficient drive on 14, 21 or 28 mc/s after adjustments to P.A. GRID and DRIVE control have been made, it may be necessary to adjust the dust iron cores in L.5 & 6, as indicated in the Signal Shifter leaflet. L.5 should be adjusted for maximum P.A. grid current on 21 mc/s and L.6 for maximum grid current on 28 mc/s. Should it be necessary to adjust the Signal Shifter to correct calibration, instructions should be followed as indicated in the V.F.O. leaflet.

Audio Response

Experiments have shown that a well balanced audio response for speech, using a crystal microphone, is usually achieved with 300 pf. in positions C33 & C34. It may be found, however, that with some microphones, or to suit an individual's voice, greater low frequency response is required and this can be effected by increasing the value of C34 accordingly. The capacity of C33 may also be increased if necessary. C32 is not normally fitted but should it be necessary to obtain additional gain, the fitting of a 25 uf. 25 V. electrolytic condenser will provide a 4-6 db. lift.

K.W. "VALIANI" PARTS LIST

Resistors

R1-3 See Signal Shifter 4/102 circuit diagram.
 R7 -ditto-
 R4 15 Kohms 2 w. carbon
 R5 2.2 Kohms ¾ w. carbon
 R6 2 x 15 Kohms in parallel - both 2 w.(see table on circ.diag)
 R8 3.3 Kohms 2 w. carbon (2 x 6.8 Kohms in parallel (-do-))
 R9 22 Kohms 2 w. carbon. may be supplied)
 R10 35 Kohms 3 w. wire wound potentiometer
 R11 22 Kohms 1 w. carbon
 R12 33 Kohms 1 w. carbon
 R13 27 Kohms 2 w. carbon (see table in circuit diagram)
 R14 68 Kohms 1 w. "
 R15 68 Kohms 1 w. "
 R16 Meter shunt
 R17 470 ohms ½ w. "
 R18 33 Kohms ½ w. " (see table on circuit diagram)
 R19 100 ohms ½ w. "
 R20 100 Kohms ½ w. "
 R21 1 Mohm ½ w. "
 R22 1000 ohms ½ w. "
 R23 2.2 Mohms ½ w. "
 R24 470 Kohms ½ w. "
 R25 1 Mohm Potentiometer Log track
 R26 4.7 Kohms ½ w. carbon
 R27 470 Kohms ½ w. "
 R28 470 Kohms ½ w. "
 R29 2.2 Kohms ½ w. "
 R30 100 Kohms ½ w. " ± 2%
 R31 100 Kohms ½ w. " ± 2%
 R32 220 Kohms ½ w. "
 R33 220 Kohms ½ w. "
 R34 47 Kohms ½ w. "
 R35 47 Kohms ½ w. "
 R36 250 ohms 2 w. "
 R37 10K carbon 2 w.
 R38 22 Kohms 1 w. "
 R39 47 Kohms 1 w. "
 R40 4.7 Kohms 5 w. wirewound
 R41 33 ohms 2 w. carbon
 R42 100 Kohms 1 w. "

Condensers

C1-20 See Signal Shifter 4/102 circuit diagram
 C20a 15 pf. max. airspaced trimmer
 C20b 22 pf. silver mica.
 C21 1000 pf. ceramic
 C22 3x1000 pf. " (one from each cathode connection to chassis)
 C23
 C24 2x1800 pf. (in parallel) ceramic disc 1000 v. w.
 C25 1800 ceramic disc 4000 v. w.
 C26 .01 uf. 1000 v. w. tubular
 C27 1800 pf. ceramic disc 4000 v. w.
 C28 270 pf. airspaced variable
 C29 2x560 pf. gang "
 C30 100 pf. ceramic
 C31 .1 uf. tubular
 C32 25 uf. 25 v. w. electrolytic (not usually fitted)
 C33 300 pf. silver mica
 C34 300 pf. " "
 C35 .01 uf. tubular
 C36 .01 uf. "
 C37 25 uf. 25 v. w. electrolytic
 C38 .005 uf. 600 v. w. tubular
 C39 .005 uf. 600 v. w. tubular
 C40 8 uf. 450 v. w. electrolytic
 C41 8 uf. 450 v. w. "

K.W. "VALIANT" PARTS LIST
(contd.)

T4	Modulation Transformer
L1-11	See Signal Shifter circuit diagram
L12	R.f. choke
L13	Pi Coil (including S2)
S3a	Normal/Tune Switch
S4	Meter Switch
J1	Mic. Socket
J2	Ant. "
J3	Key Jack
RM	Meter Rectifier
M1	Meter

Miscellaneous

1	4/102 V.F.O.
1	Dial
1	Escutcheon with motif
1	Pointer
3	Plain Knobs
5	Pointer Knobs
1	Chassis
1	Front Panel
1	Set of Screens & Brackets (see overleaf)
18"	6 mm. sleeving
30"	1.5 mm. sleeving
Wire	7/36 P.V.C. 18 ft.
Screened	cable single 6"
1	7 pin Socket
1	Valve Top Cap. (6146)
2	1/4" Rubber Bushes
10	Screws 4 BA 1/4" C.H.
6	Screws 4 BA 1/4" R.H.
24	Screws 6 BA 1/4" C.H.
1	Screw - special for R.f. choke
4	Washers 6BA.
2	Screws 6BA 1" chrome head
4	Screws 4BA 1 1/4"
5	Screws 6BA 1/2" C.S.
40	Screws P.K. 1/8" "
24	Nuts 4 BA.
28	" 6 BA.
6	Solder Tags 6 BA.
10	" " 4 BA.
1	" " 2 BA.
5	Tag-strips (2x16 way 1x5 way 1x4 way 1x2 way)
1	Bush for " spindle
4	Octal V.holders
2	B 9A "
2	B 9A Screens
1	Coupling for spindles
1	1/4" Spindle 2" long
1	Circuit diagram
1	Set of instructions
1	7 pin Plug

Valves

1	6146 (QV06-20)
1	6V6GT
2	6L6G
1	6AU6
1	6J5GT
1	VR150
1	6BR7
1	12AX7

K.W. "VALIANT" PARTS LIST
(contd.)

Screens & Brackets

1 P.A. Screen
2 Cabinet Side Plates (L.H. & R.H)
1 R.F. choke bracket
1 Condenser Bracket (C20a)
1 Plate for Octal Bases
1 Tie Rod
4 Sleeves to stand-off above plate
1 Cabinet cover
4 Rubber feet, screws & nuts

Additional components for 160m. model

2 P.K. Screws $\frac{1}{4}$ "
4 P.K. " $\frac{3}{8}$ "
1 Bracket
1 Coupling
1 Spindle $\frac{1}{4}$ ", $1\frac{1}{2}$ " long
1 Pointer Knob
1 Panel Bush
1 P.A. Coil
1 V.F.O. Coil
1 Driver "
1 160m. w/c switch
2 feet for P.A. coil
4 4BA $\frac{1}{4}$ " R.H.
4 4BA Nuts

The KW "VALIANT" can usually be supplied with cabinet side plates which have a cut out for resilient mounts for mobile operation, or with plain side plates which would be more suitable for Base station installation.

Pair of resilient mounts - 5s0d extra.

Under-dash mounting bracket, plated finish - 7s6d extra.

K.W. ELECTRONICS LIMITED
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