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 valveholder Key is in correct position and has solder tag on fixing screw - see schematic drawing).
When fitting the 6146 valveholder a solder tag should be placed under the 4BA fixing bolt on top of the chassis in the left-hand position looking from the rear. This tag is required for earthing the rotor of the PA condenser.
Mount Mains selector panels, "Key" and "RX Mute" sockets to the tag strips, 2 LF chokes, fuseholder, all rubber grommets; mount C20A trimmer on the bracket and secure to the chassis by means of two 4BA bolts and nuts.
Mount all transformers (twist each set of connecting wires and push through appropriate grommet).

3. Mount PA RF choke.
It is necessary to remove the two wiring nuts and bottom section of insulator.
Place the choke in an upright position with the other half of the insulator bush on top of chassis through appropriate hole and replace outer insulator bush and two nuts on threaded rod below chassis.

4. Mount the PA tuning condenser on bracket, foot of bracket facing front panel. Secure with two 4BA bolts and nuts.
The right-hand position (looking from rear) is a mushroom head bolt and should be inserted from underside of chassis.
Earth rotor of PA tuning condenser (large tag under retaining nut) to 4BA solder tag (see Note.2) with braided flexible wire.

5. Mount VFO on chassis.
First remove the two nuts on the dial and switch. Guide these spindles and VFO Unit into position under chassis. Replace nuts on spindles.

6. Mount 2-Gang Condenser C29 on Front Panel by means of two 4BA x $\frac{1}{4}$ C.S. screws. Bolt Panel to chassis by two 2BA screws and nuts at foot of panel. Mount switches, variable potentiometers etc. on panel.

7. Fit PA screening box and side brackets.
Self tapping screws are used at base.

8. Mount all feed through condensers on VFO Unit bottom screen and on Mains filter box in readiness for assembly.

9. Wire resistors and condensers on to tagboard (see Fig.2.) also meter rectifier (care must be taken not to solder to the rectifier tags but only to the wires provided, otherwise damage to rectifier may occur). Tagboard is mounted on side of chassis by two 4BA screws and nuts. Two 4BA nuts are used to space the tagboard off chassis.

10. When wiring under chassis, a suitable cardboard box placed under an H.T. transformer to keep chassis level will help.

11. Commence wiring by putting in all 'earth' connection between valve pins and chassis. Connect all heater wiring - use the thick PVC wire for heater connections and for all wire carrying high tension. Keep in mind, when laying wires behind bottom screening box, around power supplies and transformers, that a much neater finish will be achieved if most of these wires can be laced 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

12. "Make off" all transformer wires. These should be cut off to appropriate lengths. The heater wires must be well cleaned before soldering.

13. Mount resistors R5, 6, 8 & 9.
Mount feed thru' condensers on bottom screen to VFO Unit (note that C55 and 56 should be 91 pf - these can usually be identified by a purple and white spot).
HT to the VFO Unit is fed via feed thru' condenser in the bottom VFO screen, to R9 situated near R10.
HT from slider of the potentiometer R10 to No.2 tag on the VFO Unit tag strip must be screened.
A length of suitable screen cable is provided.

14. Complete wiring the base of the 6146 and fit coupling and spindle to C20a. Connections to the feed thru' condensers in the bottom screen should be 'made off' under the screen. The screen should be screwed in position and the external connections made to the feed thru' condensers.

15. Complete wiring power supplies - care should be taken to position the electrolytic condensers in order that the connections joining the two pairs of 32 uf electrolytics in series, are well isolated from chassis.

16. Looking at under chassis, the wires through the grommet from S4 (on Front Panel above chassis) should be threaded through the 8 m/m sleeve provided and layed along the bottom of the tagboard near to chassis.

17. A short length of screened wire should be used to connect the Microphone socket to R20. This resistor and C30 should be connected by shortest possible wires.
~~The open side of the channel should face outwards from the~~ chassis allowing adequate clearance above the VR150 valveholder tags.
~~The screened wire should be layed in this channel piece.~~

18. Connect wires to Send/Receive switch, Meter switch, all Toggle switches and meter.

19. Connect up Pi Coil and circuits in PA stage. Wire 33 ohm 2 watt resistor centrally in L17 and connect to top cap for 6146. A short length of flexible wire should be used.

20. Assemble and connect up Mains filter and fit cover plate.

21. Carefully check over all wiring before connecting to Mains and testing out.
Adjust mains selectors to appropriate mains voltage.

- - - - - - - - -

NOTE: Care must be taken in selecting the thin black wires for T.1 connection to the 6146 heater. The heavy black wires connect to chassis and 'D' heaters as shown in the schematic diagram.
C.48. With some VFO Units the chassis corner may have to be trimmed to allow the feed thru' condenser C48 sufficient clearance.

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a pair of 807's or 6146's in parallel. The difference between the two units is in the five output inductances. With the 4/102-V a grid trimmer of 25 pf. maximum capacity is required to be connected between P.A. grid and chassis in order to resonate the output inductances according to band of operation. The 4/102 does not require this trimmer. These units may also be used to drive a single 807 or 6146. The 4/102 requires a 25 pf. trimmer between P.A. grid and chassis, also the 4/102-V. must have this trimmer plus a 22 pf. silver mica condenser in parallel.

The unit employs three tubes - a 6J5GT "Clapp" oscillator, a 6AU6 buffer-multiplier for the 10, 15 and 20 metre band and a 6L6G driver (doubler/tripler). The plate tuning circuit of the driver has an inductance for each frequency range, adjustable to the centre of the frequency band in use. The r.f. output may be adjusted by varying the voltage applied to the screen of the driver valve. Installation must be within the main chassis for the transmitter close to the P.A. stage. Output connection to Grid should not exceed 3".

TECHNICAL DATA (Extracts from Geloso Instructions)

Power Supply: 400 V. at 50-70 m/a. 6.3 V. 1.5 A.

Frequency Ranges: 80 - 40-20 - 15 and 10 meter bands.

R.F. Power Output: sufficient to drive two 807's or equivalent tube types, connected in parallel operating at a plate voltage of 600 volts and a screen grid voltage of 225 volts. Under these operating conditions a grid current of 8 m/a may be obtained through a grid bias resistor of 12,500 ohms.
It is necessary to insert between the ground and the R.F. output drive tube grids a 25 pf. variable condenser (trimmer) of low minimum capacity for tuning R.F. output stage grid circuit.
If only one 807 or equivalent is to drive with same voltage Rg will be of 25,000 ohm and the grid current value of approximately 4 m/a; the variable condenser ground-grid must be shunted by another approximately 15 pf. fixed capacity.

Valve Line-Up: 6J5GT - 6AU6 - 6L6G.

Physical Dimensions: Chassis 5" x 5½" x 2¼" deep.
Dial escutcheon 8¼" x 5".

ALIGNMENT.

The unit is supplied already calibrated. When put to use, just a little "touching-up" is required in order to line it up to top performance.
With the aid of the calibrated dial No.1640 which indicates with precision the various frequencies, utilising a good r.f. signal generator, it is possible to proceed to an eventual realignment following the instructions contained in the table given below.
Before calibration attempts are started, it is necessary that the exciter unit and the tuning dial are definitely mounted and fastened in place on the chassis in such a way that the indicator of the dial coincides exactly with the "zero" of the centesimal logging scale if the variable tuning condenser is turned to minimum capacity (mechanical stop), the dial indicator may pass the 100 degree indication by several degrees.

ALIGNMENT. (continued)

Realignment may become necessary after the replacement of any one of the tubes. It should be noted that for the alignment of the buffer and driver stages the same previously calibrated "Clapp" oscillator may be used. For this purpose those frequencies are selected on the dial which are indicated in the table given below; the coil cores are adjusted for maximum output which will correspond to the point of maximum reading of a milli-ampere meter inserted into the grid circuit of the final r.f. power amplifier of the transmitter.

Alignment points for 6AU6 and 6L6G

Band m.	6AU6 mc/s.	Driver mc/s.
80	Aperiodic	L7 = 3.8
40	"	L8 = 7.15
20		L9 = 14.1
15	L5 = 21.2	L10 = 21.150
10	L6 = 28.6	L11 = 28.2

Oscillator tuning points

Band m.	Inductances mc/s.	Trimmer mc/s.
80(3.5-4mc/s)	L1 = 3.5	C1 = 4
40(7-7.45 ")	L2 = 7	C2 = 7.45
20(14-14.4")	L3 = 14	C3 = 14.4

Band	Clapp oscill.	Buffer plate	Driver plate	PA Plate
80	3.5-4 mc/s.	Aperiodic Amp.	3.5 : 4 mc/s	3.5 - 4
40	7.0-7.45 "	Amplifier	7 : 7.45 "	7 - 7.45
20	3.5-3.6 "	Dblr.7 : 7.2mcs	Dblr.14:14.4	14-14.4
15	3.5-3.6 "	" 7 : 7.2 "	Trpl.21:21.6	21-21.6
10	7.0-7.45 "	" 14 : 14.9"	Dblr.28:29.8	28-29.8

Voltage measurements

Valve		Voltage
6J5	(Plate	170
	(Grid	- 10 *
	(Cathode	0.3
6AU6	(Plate	230
	(Screen	230
	(Grid	- 11.5*
6L6	(Plate	390
	(Screen	200 ø
	(Grid	- 16 *

* Varies with Band and frequency
ø Variable 0 - 275 volts.

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K.W. ELECTRONICS LTD.
Dartford

February 1963

TUNING

The KW VANGUARD Transmitter

Operating & Tuning Procedure

Adjust the three mains voltage selectors at rear of chassis to appropriate voltage. Connect mains lead to A.C. supply (Green is earth). Plug in Antenna or Dummy load to ANTENNA socket (situated at rear of P.A. screening box - remove cabinet back panel).

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

1. Turn the TRANSMIT/RECEIVE switch to RECEIVE
2. Switch the NORMAL-TUNE switch to NORMAL.
   This ensures that no H.T. is applied to the Rectifier valves.
3. Switch MAINS switch to ON. This applies mains to the heater Transformer and should cause all valve heaters to light.
4. Switch the PHONE-CW switch to PHONE; adjust the VFO BAND-SWITCH and final R.f. amplifier band switch to the band of operation.
5. Adjust the oscillator (VFO) to the desired frequency, as indicated on the frequency calibrated dial.
   Set VFO switch to required band, also P.A. Bandswitch.
   Note: On the 10-80 m. model there are two 80 metre positions on the P.A. Bandswitch. Both positions should be tried for best antenna loading on this band. The 10-160 m. model has one 80 m. position only and this is fixed to provide a suitable match into a 50-80 ohm load or Antenna Tuning Unit.
6. Turn the drive control (R10) half-way up.
7. Turn the modulator gain control to minimum.
8. Turn the meter switch to read P.A. PLATE M/A
9. Turn the antenna coupling condenser to maximum capacity corresponding to a dial setting of '10' for loose antenna coupling.
10. During the procedure listed above, the valve heaters will have warmed up sufficiently and plate voltage may now be applied. Turn the TRANSMIT/RECEIVE switch to TRANSMIT. Watch the meter and rapidly adjust the final R.f. amplifier tuning condenser for lowest possible plate current.
11. Switch the meter to read GRID M/A and 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.
12. Return the meter switch to P.A. plate m/a position and 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. It should be realised that low plate current indicates loose antenna coupling and therefore low R.f. output. On the 80 metre band 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 of 7-10 and the other near the reading 0-2. In the latter position the final is doubling to 40 metres and this position should be avoided.
13. Re-check the grid current as indicated under para. 11. Now re-adjust the P.A. tuning control for minimum dip coincides with 110 m/a 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.
14. Turn the meter switch to % MOD. position and speaking into the microphone in a normal voice level at a distance of 3" to 6" gradually increase MOD. GAIN control until the meter reads 80-100% modulation on voice peaks. After modulation adjustments have been completed the Transmitter is ready for

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. The PHONE-C.W. switch should be brought into the C.W. position. Plug into appropriate socket at rear of chassis - transmission may then be started by pressing the key. When standing by, the TRANSMIT/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.

Reception

The change-over from transmit to receive is accomplished by operating the TRANSMIT/RECEIVE switch. The co-ax socket adjacent to the antenna socket should be connected to the Receiver antenna terminal.

Rx Mute

This socket at the rear of chassis may be used for muting a receiver (e.g. by breaking H.T. to R.f. or I.F. stages in the Receiver). In the transmitter, the "Rx Mute" socket is connected with the Send/Receive switch, which, when in the "Receive" position, provides a shorting line across the two "Rx Mute" terminals.

Zero Beat Frequency Adjustment

In order to adjust the transmit frequency exactly to a frequency of another station, the NORMAL-TUNE switch should be set to the 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 adjustment to P.A. GRID and DRIVE control has 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 VFO leaflet.

Harmonic Filter

When the Transmitter has been aligned according to the above instructions, the harmonic filter may now be adjusted. This filter is tuneable over the 40-70 mc/s range and is suitable only when feeding a low impedance 50-100 ohms. If it is required to use an aerial with a high impedance feed, e.g. long wire or windom, it is advisable to employ an Aerial Tuning Unit coupled to the Transmitter with a short length of co-axial cable. The harmonic filter should be adjusted for minimum radiated power at the frequency of the Television Transmitter (40-70 mc/s band) received locally. This can best be checked by a receiver at the television frequency connected to an aerial a few yards from the transmitting aerial.

"VANGUARD" 160 METRE OPERATION

1. Turn V.F.O. wavechange switch to 80.

2. Turn switch on right of V.F.O. switch by means of screwdriver to 160 m. position.

3. Put Power switch at rear to 10 watt position (up).

4. Put P.A. Band Switch to 160.

5. Tune as for other bands.
Adjust P.A. grid current to approx. 2.5 m/a.
Load serial to 36 m/a P.A. current.
(i.e. 275 v. at 36 m/a = 9.9 w.).

6. Adjust Mod. Gain Control for peaks to 50% mod. on metre (this is equal to 100% mod. with 10 watts input).

NOTE: (i) It is possible to double frequency in the P.A. to 80 metres. Under these conditions a 'dip' in anode current will occur with the P.A. Tune Control around 0 - 1 degrees. Resonance for 160 metres will be between 6 and 9 degrees.

(ii) Should an aerial system with a very low impedance feed be employed, it may be necessary to connect an additional 1000 pf. ceramic condenser across C29 (Ae. Coupling condenser). This additional condenser can most conveniently be connected across the aerial socket outside the P.A. screening box or in the A.T.U. when one is used.
To assist in correctly matching an aerial system for 160 metres to the P.A. Pi circuit, a tap is provided on the 160 metre P.A. Coil. This can be connected instead of the end of the coil thus providing a smaller inductance in circuit. Under this condition the P.A. Tune Control should have a resonant point between 8 and 10 degrees.

Calibration

The 160 metre V.F.O. is set up for 1900 kc/s to correspond with 50° on the outer scale. It will be found that the dial reading for 1800 kc/s is approx. 10° and 2000 kc/s is at approx. 90°.

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Geloso VFO Unit and K.W. "Vanguard" on Top Band

MODIFICATIONS FOR 160 METRES

R. G. SHEARS, B.E.M., A.Brit.I.R.E. (G8KW)

(K.W. Electronics, Ltd.)

This article will be of great value to all who own a Geloso VFO Unit, whether or not it is incorporated in a Vanguard transmitter. For those who possess this Kit, as described in our March, 1958, issue, the notes here will be of particular interest; they show how the Vanguard can be modified for 160 metres, thus making it into a six-band CW/Phone Transmitter, matching into a wide range of output impedances. The modifications evolved by our contributor can, of course, be applied to any transmitter incorporating Geloso RF units. He also shows a much more efficient way of reducing PA input (for Top Band) than the methods commonly used.—Editor.

THE Geloso "Signal Shifter" (Models 4/101 and 4/102), now enjoying world-wide popularity, provides an excellent VFO and adequate drive for either a single or a pair of 807's, or 6146's, on 10, 15, 20, 40 and 80 metres.

Many Top Band operators have, however, been compelled to build a separate transmitter for 160 metres when the Signal Shifter is included in their HF bands transmitter. As the Geloso Signal Shifter is incorporated in the K.W. "Vanguard," it was decided to investigate the possibility of a modification to make the Transmitter operable on Top Band without impairing efficiency on any of the other bands, and thus making the Vanguard a six-band job.

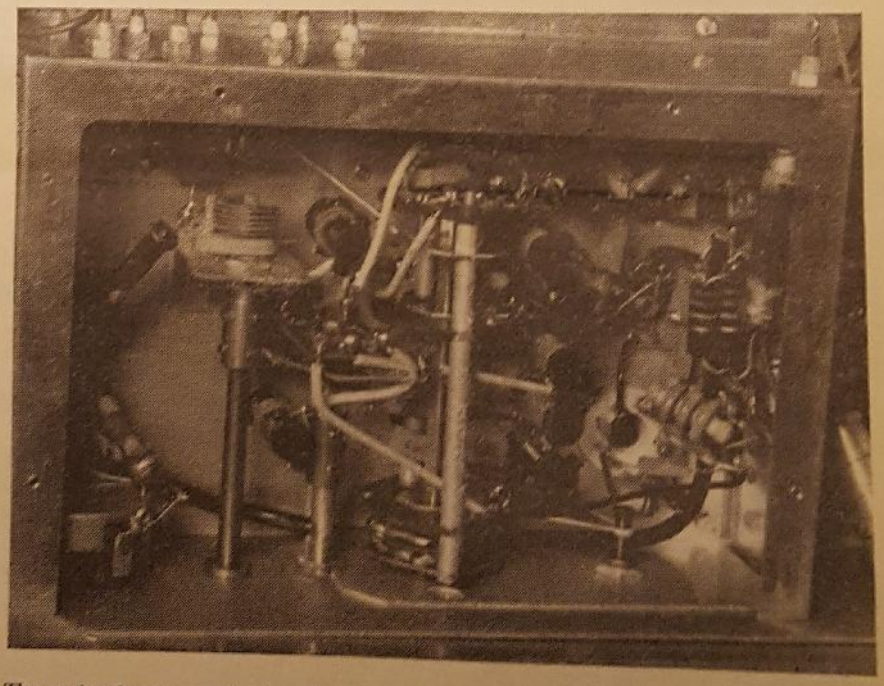
Three main problems had to be considered: The conversion of the VFO and driver stages in the Signal Shifter and the switching to return the circuitry back to normal: the modification of the PA tuned circuit; and the method of reducing power from 50 to 10 watts, while yet maintaining a satisfactory match between modulator and PA.

Modifying the Geloso Signal Shifter

It will be seen from the circuit diagram of the Geloso Signal Shifter, on p.22 of the March, 1957, *Short Wave Magazine*, that this unit employs a Clapp type VFO with three switchable grid inductances. Two of the inductances are on approximately 80 metres with different L/C ratios to provide satisfactory bandspread. One is for the 80-metre band and the other, when multiplied in frequency, gives good band-spread calibration on 20 and 15 metres. The third coil is operating on 40 metres and is proportioned for adequate bandspread on this band and also on 10 metres.

In order that sufficient bandspread for a 160-metre VFO could be obtained, it was decided to use the existing circuit arrangement for the 80-metre band and to pad out to 160 by switching in additional inductance in series with L1, as shown in Fig. 1a here. Details of this inductance and others used in the modification are shown in the Coil Table.

The same treatment was applied to the 80-metre inductance L7 in the anode circuit of the output stage (6V6G or 6L6G)—see Fig 1b and



The under-chassis modification for Top Band, applied to the Geloso Type 4/102 VFO Unit, and equally applicable to either mark of Geloso "Signal Shifter." The additional switch unit SA1/SA2 (see Fig. 1a/Fig. 1b) is fitted alongside the existing main band-change switch, with coils LA1 and LA2 adjacent; the actual positioning will immediately be clear on examination of the Geloso VFO with this photograph.

full circuit p.22, March, 1957. No modification to the 6AU6 is required, as on 80 metres this is already operating as an aperiodic untuned amplifier stage and provides sufficient drive for the following valve. The method of switching in the additional band had to be considered and the writer suggests that the neatest and most compact way would be to replace switch wafers S1A and S1C (in the original Geloso Unit) with a 6-position wafer—but this would also require modification to, or replacement of, the 5-position selector. As these changes constitute a major undertaking, it was decided to incorporate an *additional* 2-position change-over switch of the wafer type to give 160 metres in its position 1 and normal (giving 80, 40, 20, 15 and 10 metres) in its posn. 2.

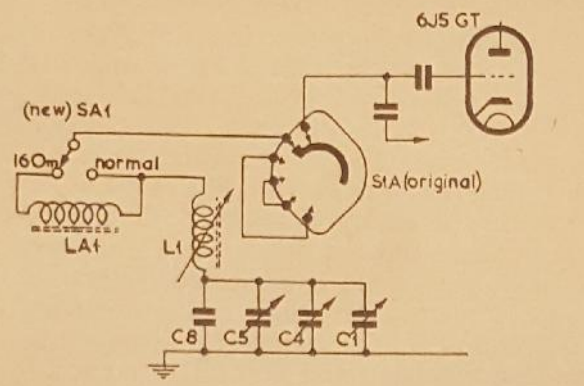


FIG 1a

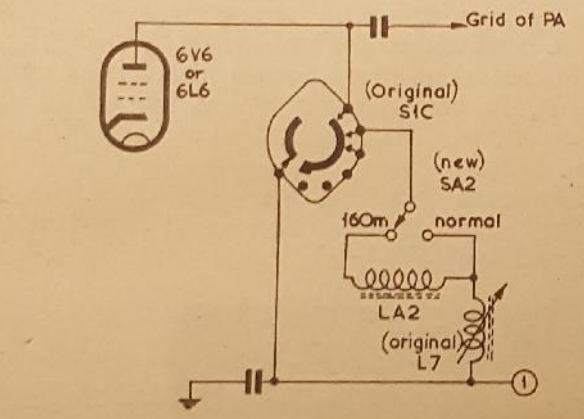


FIG 1b

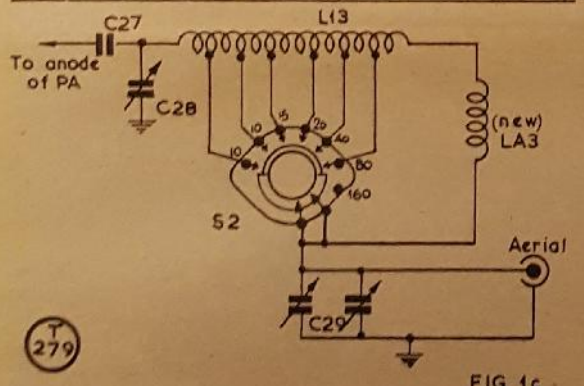


FIG. 1c

In this sketch, Fig. 1a shows the modification required to the frequency-generating side of the standard Geloso 4/101 or 4/102 unit for operation on 160 metres. The lead connecting the top end of L1 is taken off S1A and rewired with the additional items LA1 and SA1 to the circuit given here. In Fig. 1b is shown the modification to the output stage of the Geloso "Signal Shifter," applicable to Models 4/101 and 4/102 when they are to be used on the 160-metre band. Fig. 1c gives the alterations to the standard Geloso 50-watt PA pi-coil assembly for operation on Top Band. The coil LA3 is wired in as shown, and its position in the PA tank compartment of the Vanguard transmitter is illustrated in the photograph on the opposite page.

The fitting of this switch and coils can be seen in the under-chassis photograph; it should be noted that the metal mounting bracket for the additional switch (SA1 in Fig. 1a) permits sufficient screening between the two additional coils (LA1 and LA2). The position of the switch is not critical but it is convenient to locate it adjacent to the centre wafer of the main unit.

It should be noted from the Coil Table that two details are given for LA2—one is for use with a Signal Shifter Type 4/101 driving a single 807, 6146 or similar valve, the other is for a Model 4/102 driving a single valve with a grid resonating trimmer (such as in the Vanguard), or when the 4/102 is used with a pair of valves in parallel.

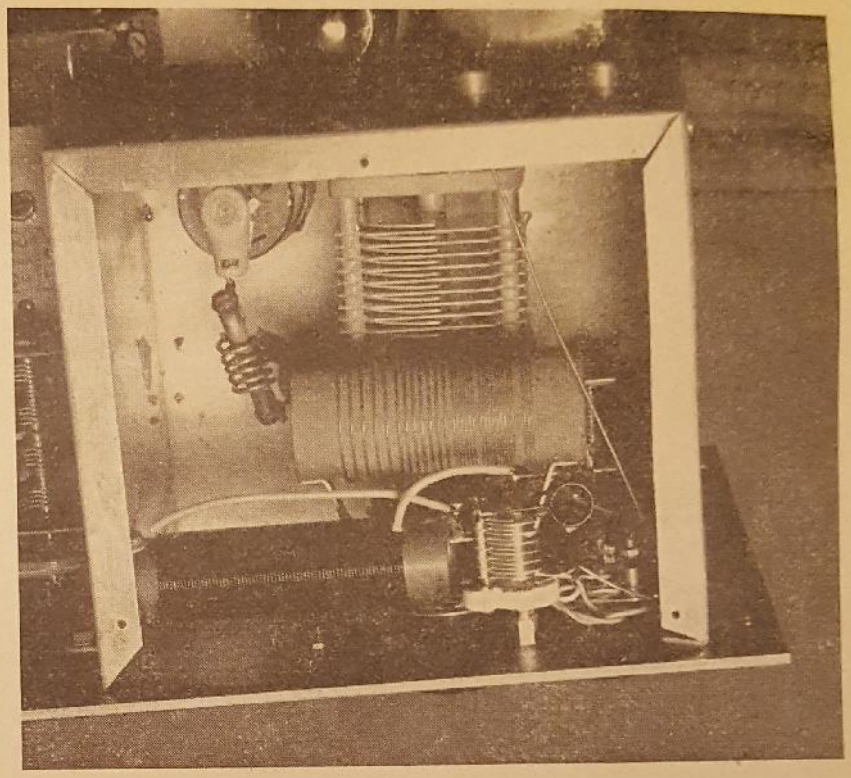
Wiring out for these modifications should be kept as short as possible, using 20g. tinned copper wire with sleeving.

For those who wish to carry out these modifications to their Vanguard transmitter as already constructed, it must be borne in mind that, due to the small amount of panel space available, the control spindle for the extra switching SA1/2 must be brought through the front panel exactly mid-way between the VFO switch and drive control knobs. (The writer does not use a knob for operating the switch but a flat key, or a screwdriver.)

Modifying the Vanguard RF Amplifier

The Vanguard transmitter PA has a Geloso pi-coil assembly, Type 4/112. This Coil Unit is fitted with a 6-position switch providing two positions for 10 metres and one position each for 15, 20, 40 and 80 metres. As an additional switch position is required for 160 metres it is necessary to modify the coil unit. The first 10 metre position remains unchanged. The wire between the second tap on the coil and the second switch position is cut out. The wire from 15 metre tap is reconnected to position 2 of the switch; the 20 metre tap is re-

wired to switch position 3 and so on. (The 80 metre end connection is cut from the switch rotor and re-wired to switch position 5). The 160 metre coil is connected between position 5 of the switch and the switch rotor. With the variable condensers specified, tuning over all bands 10-80 metres with a wide range of output impedance (approx. 40-2,500 ohms) can be expected. If one is prepared to accept a low impedance output (say, 40-350 ohms) on 80 metres only, the second 80-metre switch position can be disconnected and utilised to bring in the 160-metre coil, as shown in Fig. 1c. The placing of the additional coil, LA3 does not appear to be critical, but the writer found the most convenient place to be that as illustrated in the photograph (alongside) of the PA compartment.



Positioning of the additional 160-metre coil in the Vanguard RF power amplifier compartment, with the PA valve itself (a 6146) at upper left; the small winding close up to the top cap of the valve is an anti-parasitic choke, L17 in the original circuit diagram on p.34 of the March 1958 issue of "Short Wave Magazine." The 160-metre PA coil itself is the winding at lower front, and consists of 70 turns of 20g. on a 1-in. diameter former 4½ inches long—see text. (In later "Vanguards" the 160 metre P.A. Coil is mounted on the right hand side of the box behind the Geloso Pi Coil).

The detail given for the PA inductance (LA3) is suitable for low-impedance aerial feed when operating *on low power only*. This provides an impedance range of about 60-500 ohms over the band. Should a lower impedance feed be required, a ceramic condenser of ·001 may be connected across C29—that is, across the aerial socket. To obtain a higher impedance feed, LA3 should be made 80 turns of 22g. enamelled copper on the 1in. dia. former.

It is of interest to note that the inductance value of LA3 should be *reduced* for 50-watt operation; 40 turns of 20g. enamelled will give a feed impedance range of approximately 60-500 ohms. This is due to the PA anode load impedance being almost halved when running 50 watts compared with 10 watts.

COIL TABLE

FOR GELOSO VFO/PA UNITS ON TOP BAND

(*Refer to Geloso and Vanguard Circuit Data*)

LA1 — 50 turns 38g. enamelled, close-wound on 3/8-in. diameter Aladdin former with iron-dust Core.

LA2 — (*For Type* 4/101): 64 turns 38g. enamelled, close-wound on former as for LA1. (*For Type* 4/102): 58 turns as above.

LA3 — 70 turns 20g. enamelled, close-wound on 1-in. diameter Paxolin former 4½-ins. long. (Or 40 turns for 50-watt operation — *see text*).

RA1 — Power dissipating resistor, 3500 ohms, wire-bound, rated 20 watts.

SA1/SA2 — Double-pole change-over wafer switch (*see text*).

SA3 — On-off toggle switch, insulated for 500v., for PA input reduction.

Reducing Power to 10 watts

The method of reducing power in the Vanguard transmitter from 50 watts is shown in Fig. 2. (It may also be considered for use with other transmitters.) Systems whereby power is lowered by increasing the value of the screen resistor to a PA stage using a pentode or tetrode, or by reducing the voltage output from the PA power supply, can cause a serious mismatch between modulator and PA. The value RA1 in Fig. 2 has been calculated to fulfil three main considerations. (1) Suitable working voltage for the PA valve; (2) Impedance match between modulator and PA; and (3) Dissipation of audio volts not required when on low power. It will be seen that, with switch SA3 open, the audio volts appear across the PA load of the modulation transformer secondary (4,000 ohms in the Vanguard) and the resistor RA1 in series, equalling 7,500 ohms together. This reduces the PA anode voltage to about 275 volts. The aerial

loading should be adjusted to draw 36 mA anode current; this will give a power input of 9.9 watts and an anode load of approximately 7,500 ohms, which is a good match to the modulator.

The resistor RA1 and Switch SA3 can be placed at the rear and under the chassis in the Vanguard. A good quality switch should be used for SA3 as this must withstand DC volts in addition to the modulator voltage swing. To return the transmitter ready for 50-watt operation, it is only necessary to close SA3.

Adjusting the Vanguard for Top Band

The switch SA1/2 and PA pi-coil switch should be put in their 160-metre positions.

First, it is necessary to align the VFO. In the Vanguard this can be done by putting the netting switch to "Tune." Set a receiver, with BFO switched on, to 1900 kc and set the Geloso dial pointer to 50° on the outer scale. Adjust the iron-dust core in LA1 until a beat note is heard in the receiver. This will allow the 160-metre band to be spread in an almost linear manner from about 1800 kc at 5° to 2000 kc at 94°. This calibration will be slightly affected by the tuning of L1 and C1 in the "Signal Shifter," but these should be made correct for 80-metre calibration and not touched thereafter. Next, put the switch SA3 to the low-power position, return the netting switch to "Normal" and turn Send/Receive Switch to "Send." Adjust the iron-dust core in LA2 for maximum grid current with the VFO about the middle of the 160-metre band and the grid tuning condenser (C20A in the circuit on p.54. March, 1958, issue) about half-way in. Drive will then remain constant over almost all the band. The level of drive should be adjusted, by means of the drive control, for a PA grid current of 2·5-2·8 mA. Adjust the "Aerial Coupling" and "PA Tuning" controls in the normal manner, so that the PA is loaded to 36 mA plate current. The modulation gain control should be turned down lower than the position used for 50 watts input. The speech peaks on the modulation percentage meter should not be allowed to go higher than the "50% modulation" mark *when operating 160 metres.*

Keying is not affected by this 160-metre modification and may be used in the manner prescribed for 50-watt operation.

Conclusion

Many users of the Geloso "Signal Shifter" will find this a very simple way with which to obtain excellent results on Top Band. It may help those who have a separate transmitter for 160 metres to dispose of it and make room for something else! It may also help others to give Top Band a try and thus to meet a new circle of very good friends.

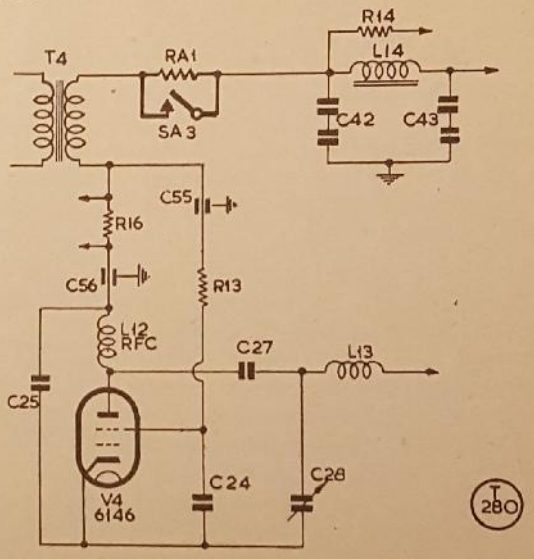


Fig. 2. The method of reducing PA input when the Vanguard is operated on 160 metres. The resistor RA1 is so proportioned that, with the modulation transformer secondary, it produces the correct modulator/PA load when the RF stage is run at 10 watts input. It should be noted that C25 in the original circuit (p.34 March) is now connected between L12 (the RF choke) and the 6146 cathode. Switch SA3 has to carry full DC plus the modulating voltage, so should be selected accordingly; the resistor RA1 should be mounted clear, as it also carries the voltages across the switch.

The writer wishes to thank all those in the London area, Kent and Essex, who so willingly stood by for tests and gave useful reports on the 160-metre test transmissions from G8KW while this modification was being evolved.