

The GELOSO Signal Shifter

DESIGN, CONSTRUCTION
AND OPERATING NOTES
ON A COMMERCIAL VFO

R. G. SHEARS, B.E.M., A.Brit.I.R.E. (G8KW)
(K. W. Electronics, Ltd.)

THE "Geloso" Signal Shifter has, for the past two years, been very popular in Europe, Australia, New Zealand, South Africa and other parts of the world. It is now fast gaining popularity in this country. For those who are already using one, or like to study the design of commercial equipment, or are contemplating including one in a new installation, the following notes will probably be of interest.

The Unit, to the circuit of Fig. 5, is supplied with an attractive calibrated band-spread dial and escutcheon 8½ ins. x 5 ins., as shown in the photograph, and is already wired. The chassis is 5½ ins. x 4½ ins. and 2 ins. deep and is designed for mounting directly into a transmitter assembly—the cut-out required is shown in Fig. 1.

The Circuit

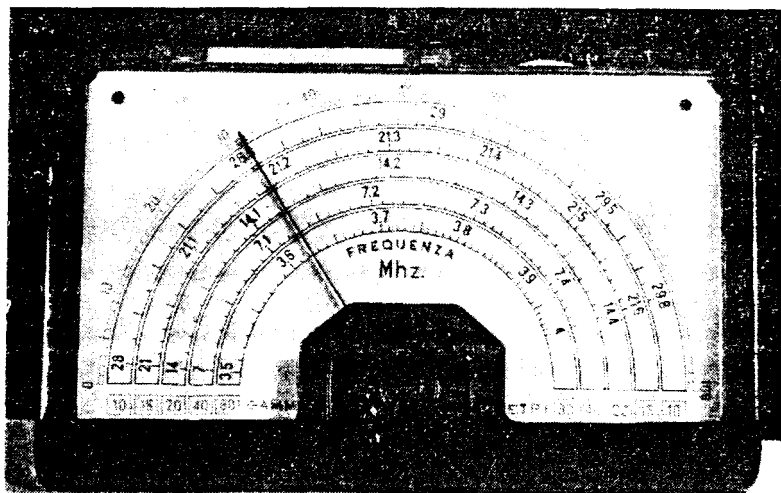
The circuit sequence is a 6J5GT Clapp oscillator, 6AU6 isolator and 6V6G (or 6L6G) output stage. Particular attention has been paid by the manufacturers to the stability of the VFO. The frequency bands covered by the unit are in three switched ranges. 3.5-4.0 mc for the 80-metre band, 3.5-3.6 mc for 20 and 15 metres, and 7.0-7.45 mc for the 40-metre and 10-metre bands. This system provides excellent band-spread over all bands 10 to 80 metres. The tuning of the oscillator is controlled by a 4-gang condenser. Two sections are connected in parallel for the 80-metre oscillator, the third section is used in the oscillator for 20 and 15 metres, and the fourth section in the 40 and 10-metre oscillator. In order to obtain complete isolation and freedom from pulling effects between the oscillator

and output stage the 6AU6 isolator stage is employed. This is fed by a 100 µF condenser from the cathode of the oscillator valve. On 3.5 mc and 7 mc this stage is an untuned aperiodic amplifier, but on 14, 21 and 28 mc it functions as a frequency doubler. The output stage operates as an amplifier on the 3.5 and 7.0 mc bands, a doubler on 14 and 28 mc and a tripler on the 21 mc band.

Two Models

There are two models made. The Model 4/101 is designed for driving a single 807, and the 4/102 for driving directly a pair of 807's in parallel.

The only difference between the two models is in the value of the five inductances in the output stage (L7, L8, L9, L10 and L11 in the circuit Fig. 5). This is to suit the appropriate grid input capacity of the PA stage. With a pair of 807's this is about 22 µF plus stray capacities, and with a single 807 approximately half this. A 6L6G is normally used in the output of Model 4/102 and a 6V6G in Model 4/101. Alternative PA valves, such as 6146 (s), 829, 5B/251M and similar can be used. Each coil is slug-tuned, which provides quite a large tuning coverage. The slugs of the five output coils should be adjusted for maximum grid current in the PA stage, in accordance with instructions supplied with each Unit. Coax should *not* be used to connect the output of the unit to the PA grid because with the additional capacity it may not be possible to resonate the five output inductances.



Panel appearance of the "Geloso" Signal Shifter, which gives good spreading of the five amateur bands covered.

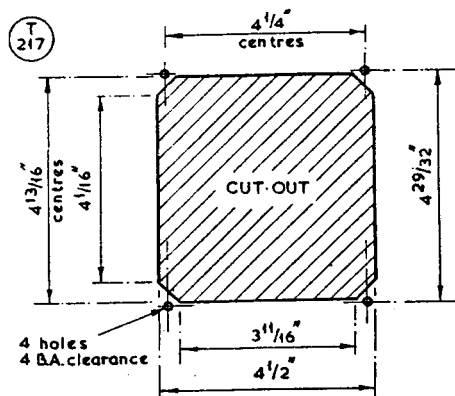


Fig. 1. Standard chassis cut-out to accommodate either model of the "Geloso" VFO-driver unit. The idea is that it should be fitted into a transmitter assembly.

Grid Drive

The level of grid drive provided over all bands averages 3.5 mA through 25,000 ohms for a single 807 (4/101) and 8 mA through 12,500 ohms for a pair of 807's. It is recommended that, to drive an 813 PA for AM telephony operation at 150 watts input, a Model 4/101 be chosen with an intermediate stage consisting of an 807 or 5763. If an 807 or 5B/251M (miniature 807) is used in this stage it can be operated, in the interest of TVI reduction, in Class-A. However, it has been found by test that adequate drive for an 813 can be obtained from a Model 4/102 Unit by putting in a KT66 instead of the 6L6G and

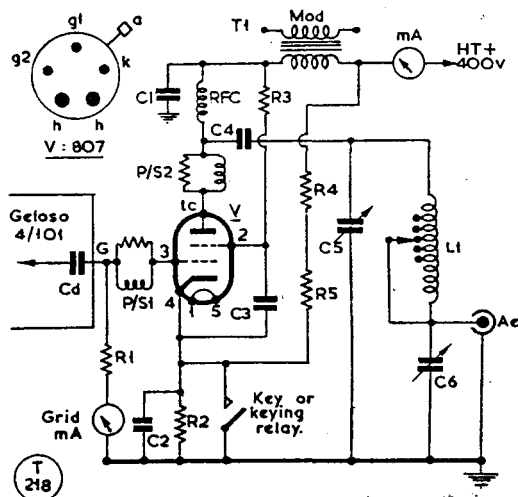


Fig. 2. Circuit of a suitable 807 PA to follow the "Geloso" 4/101 Signal Shifter. The tank coil L1 can either be a single winding for the preferred band, or a coil tapped for operation on several bands.

Table of Values

Fig. 2. Circuit of 807 PA Stage for Geloso Unit

Cd = 100 μ F drive coupling, as fitted in Unit	R2, R4 = 58,000 ohms
C1, C4 = .002 μ F	R3 = 22,000 ohms
C2 = .005 μ F	R5 = 47,000 ohms
C3 = .001 μ F	P/S1 = 5 turns 16 SWG, 1/2-in. dia. by 1-in. long on 33-ohm resistor
C5 = 200 μ F tank tuning	P/S2 = As P/S1, but 6t. spaced 1-3.4 ins.
C6 = .001 μ F output tuning (2 x 500 μ F twin-gang BC type, sections in parallel)	RFC = 2.5 mH RF choke
R1 = 25,000 ohms	T1 = Mod. xformer
	L1 = Tank coil, tapped for bands as required.

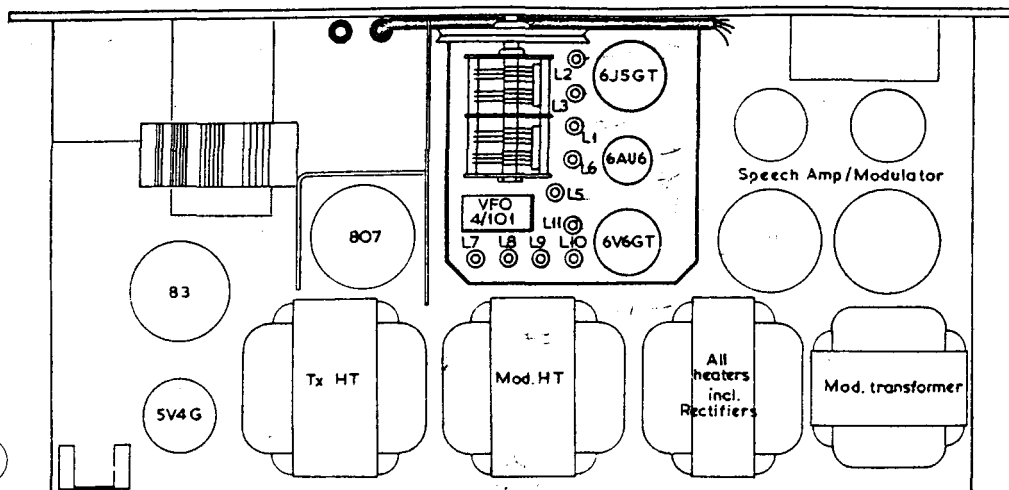


Fig. 3. Suggested layout for a cabinet or table-top transmitter using a Type 4/101 "Geloso" Unit as VFO-driver; its positioning is emphasized in this sketch. The PA could be a single 807, with associated speech-amplifier/modulator and power supplies. The Signal Shifter should be fully screened from the PA.

keeping the grid connection to the 813 as short as possible. The degree of drive is adjustable by a potentiometer in the screen of the output stage—see circuit.

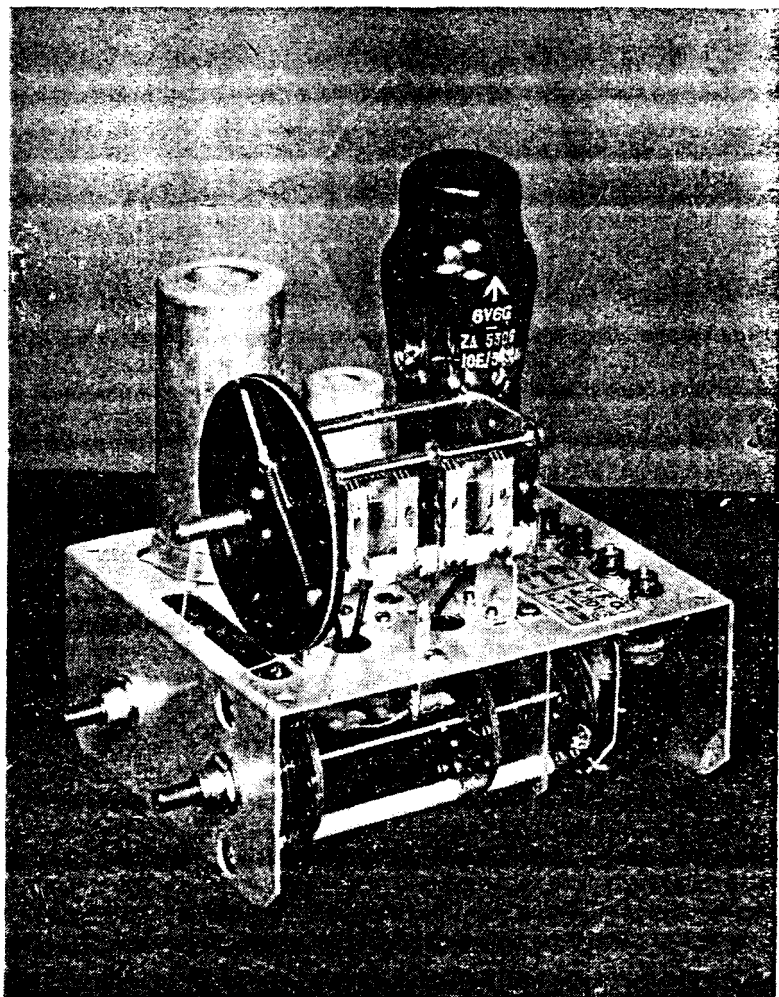
Power Requirements

To obtain the drive figures indicated above the HT supply to the Unit must be 400v. at 32-54 mA for the 4/101, and 400v. at 75-86 mA for Model 4/102 using a 6L6G in the output stage. The heater requirement is 6v. AC (or DC) at 1 amp; with a 6L6G it is 1.5 amps. The HT voltage dropping resistors R1-R7 are *not* supplied with the unit. The values shown are for use with a 400v. supply and, all except R7, may be proportionately reduced with a lower HT voltage. R7 should be 470 ohms for any supply up to 400v. (In the circuit Fig. 5, R7 is the unmarked 470 - ohm resistor connected to point (1).

TVI Factor

The harmonic content of the Unit is no more than from the average VFO and driver. The effects from direct radiation are, however, better than average, because of the efficient and compact design. To minimise TVI particular attention must be given to the design and layout of the PA stage. The Geloso Unit should be mounted into the transmitter chassis and the whole installed in a fully-screened steel cabinet. It is also desirable completely to screen the bottom of the Unit. All HT and heater leads need to be well by-passed to RF. The PA stage should be designed with a Pi-output circuit. A low-pass filter in the aerial feed should preferably be installed inside the transmitter cabinet. No "cut-out" in the front panel is required for the Geloso dial and therefore leakage can be kept to a minimum.

In order to maintain the maximum stability which the VFO is capable, the stage follow-



The "Geloso" Signal Shifter is available in two models, the Type 4/102 being the high-output version. It is designed to fit straight on to a transmitter chassis and the unit shown here will drive an 807 direct as a PA.

ing the Signal Shifter should be keyed. In many transmitters this will, naturally, be the PA stage and the usual methods of blocked grid, screen or cathode keying can be adopted. Geloso, in their G210/TR Transmitter, make use of cathode keying of the 807 PA; a circuit for this is shown at Fig. 2. For those who wish to work "break-in," the cathode of the 6J5GT oscillator may be keyed. It will be necessary for the 6AU6 grid leak to be changed to 10,000 ohms and approximately -7.5v. bias fed through it. Also, the 6V6G (6L6G) grid leak should be made 6,800 ohms with -10v. bias. HT to the 6J5GT must be stabilised.

(over)

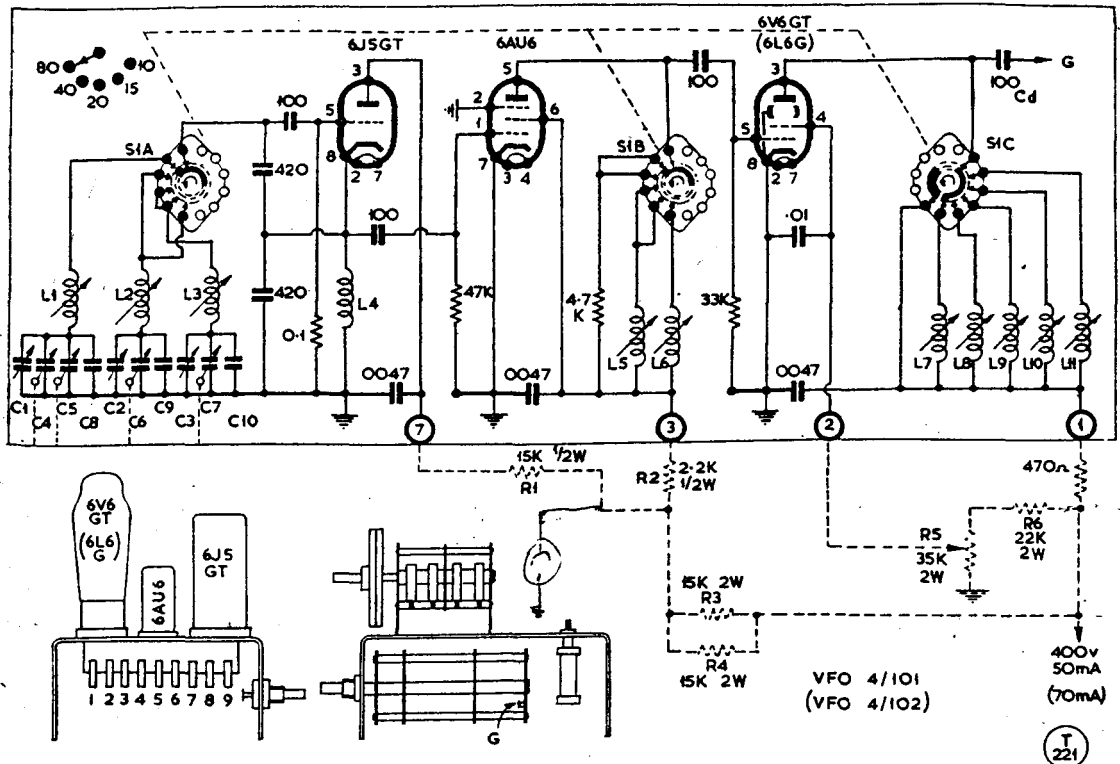


Fig. 5. Circuit of the "Geloso" Signal Shifter, which consists essentially of an oscillator (6J5), isolating stage (6AU6) and buffer-doubler/amplifier (6V6, or 6L6 in the higher output version, Type 4/102). Circuit elements shown dotted are explained in the text. Either unit gives RF drive on five bands, 3.5 to 28 mc. (Note—In this circuit the 470-ohm resistor connected to Point (1) should be marked R7)

Frequency Stability

Frequency stability of a very high order can normally be obtained from the VFO but if the mains fluctuate badly it is advisable to fit a "stabilavolt" such as a VR150/30 in the HT feed to the 6J5GT—see Fig. 4. Calibration of the dial is very accurate and once set up re-calibration should not be necessary unless there has been a change of oscillator valve.

Conclusion

This is a Unit which has been well tried and will appeal to those who wish to save many hours of labour in building a VFO and driver stages. It will help to give the transmitter that "professional" look and it will ensure an excellent performance at a reasonable cost.

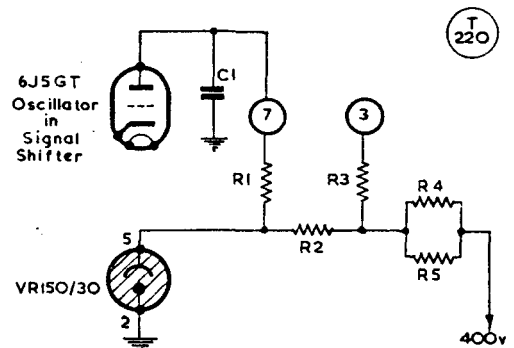


Fig. 4. Method of stabilising the HT supply to the oscillator valve for the Signal Shifter. C1 is .005 μ F; R1 is 1,000 ohms; R2 10,000 ohms 1-watt; R3 2,200 ohms; and R4, R5 are both 15,000 ohms, 2 watt.

ELECTRICAL ENGINEERS' EXHIBITION

Over-lapping by three days the R.E.C.M.F. Exhibition, the Sixth Electrical Engineers' Exhibition will take place at Earls Court, London, during April 9-13. Organiser and general manager of this important undertaking, for which more than 360 exhibitors have taken space, is P. A. Thorogood, better known

to many readers of SHORT WAVE MAGAZINE as G4KD. Full details about the E.E.E. can be obtained from him at: 6 Museum House, 25 Museum Street, London, W.C.1. He tells us that more than 50,000 invitations for the Exhibition have been sent overseas.