

THE CODAR A.T.5

COMPACT AND EFFICIENT
LF-BAND CW/PHONE
TRANSMITTER—FOR FIXED OR
PORTABLE/MOBILE OPERATION

TEST REPORT

MANY Top-Band enthusiasts have in their possession a well-built, compact mobile rig for the band, which is left permanently in the car. The fixed rig, indoors, is usually less compact (to say the least) and is often downright clumsy and untidy, being the result of years of growth and modification.

On the other hand, many owners of such home outfits are deterred from going mobile by the very unsuitability of the gear, and their unwillingness to build a completely new transmitter for the car.

The Codar AT5 solves all problems by its dual personality. It is a 10-watt transmitter with full plate-and-screen modulation; a CW outfit that keys excellently; in short a transmitter that makes no concessions to its extremely small size. And the latter makes it eminently suitable for mobile work. A transistorised power supply unit for 12 volts is available, and also a conventional mains-driven PSU.

The actual size is remarkable—8½ in. long, 4 in. high and 4½ in. deep. The PSU is half an inch taller, but otherwise the same size. The two units together will stand on one page of the *Magazine* and still leave quite a lot of print readable!

Circuitry

The VFO is a modified Vackar using an EF80, followed by another EF80 which is a buffer for the 1.8—2.0 mc band, and switched to serve as a doubler for the 3.5—3.8 mc range. Ingeniously, the designers have provided two separate scales on the VFO dial, using the full rotation of the condenser, one being calibrated for each band, although of course the VFO itself remains on Top-Band all the time.

The PA, a 6BW6, has a *pi*-section output circuit which covers both bands without switching, and this does necessitate some slight concessions to maximum efficiency on 80 metres, but performs excellently on Top-Band.

For AM telephony a crystal microphone (not supplied) is used to drive the conventional circuitry using a 12AX7 and a second 6BW6 as modulator, an auto-transformer being used to couple its output into that of the PA—see circuit.

The PSU includes a switching unit with three positions—Net, Stand-By and Transmit, and this takes care of the aerial switching, too, for those who wish to operate in this way.

With the aerial, or ATU, taken through a coax lead to the appropriate socket on the PSU, which is connected through two other coax jumpers to the

transmitter and receiver, all switching used for other bands within the station set-up may be disregarded. The "Net" position leaves the aerial connected to the receiver, and gives a weakish signal from the VFO only, the transmitter full HT being disconnected; at "Stand-By" the VFO netting signal disappears, and the neon on the front panel of the PSU gives a series of flashes instead of the steady glow; and in the "Transmit" position all voltages are on, and the aerial removed from the receiver and coupled to the transmitter.

The full HT given by the PSU is 250-280 volts, and the PA, when fully loaded, runs at about 50 mA. For strict adherence to 10-watt operation on Top-Band this is reduced to 40 mA by slightly reducing the loading under which condition the full 100 per cent modulation is obtained without difficulty.

The VFO runs at 150 volts, stabilised, and really is stable and quite immune from "pulling" by the PA. From the first few moments after switching on, the drift is very slight indeed; in fact the maximum drift measured during a long "soak" period on 1850 kc was less than 200 cycles. During normally short periods of operation it was of the order of 25 cycles only, which most people would not detect at all.

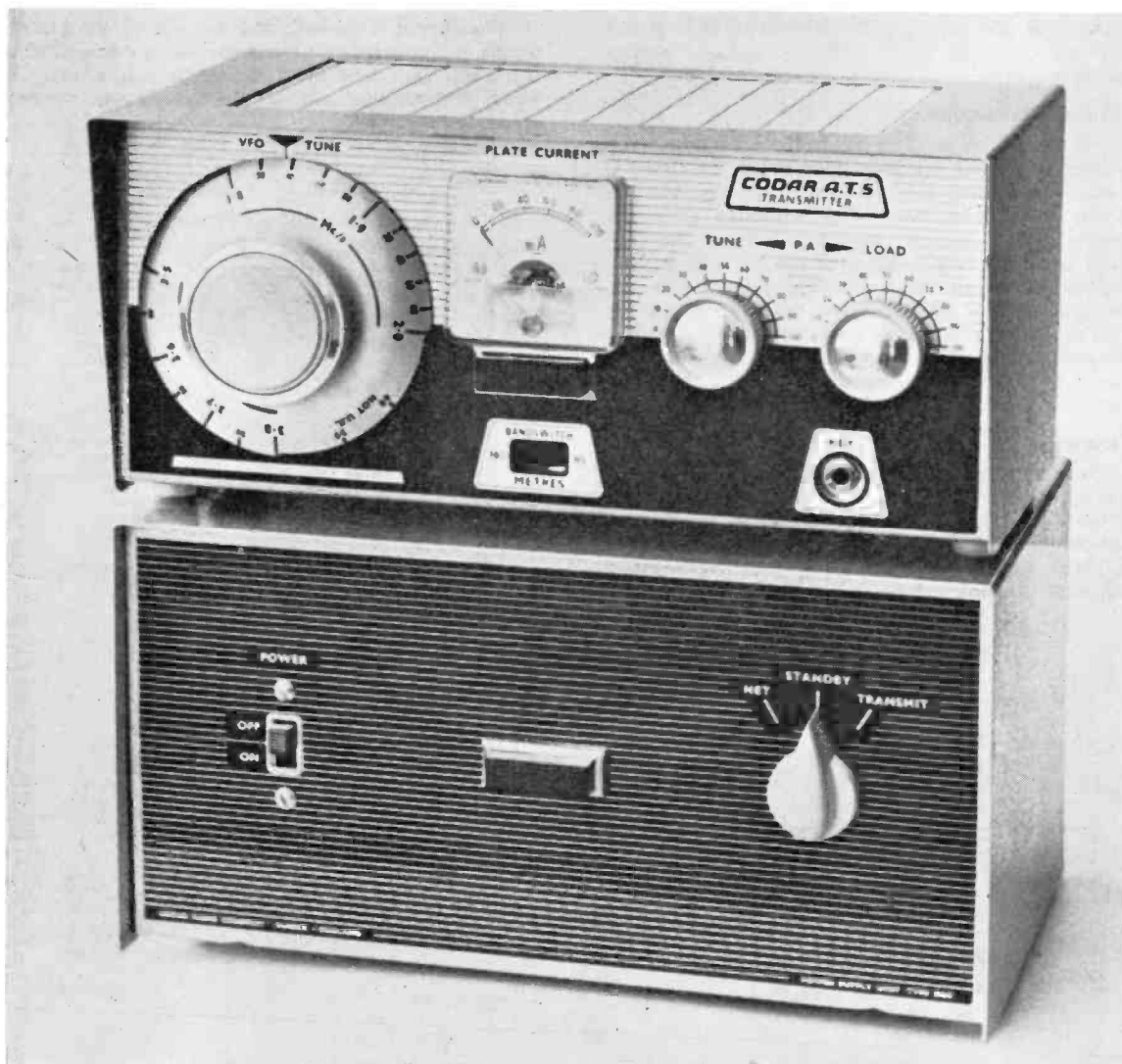
The 100 mA meter on the front panel measures anode current only; in earlier models it was in the cathode lead and therefore measured anode and screen current.

The change from Phone to CW is achieved by a small slide switch at the rear of the transmitter, and the depth of modulation is roughly indicated by the neon indicator on the front panel, which is said to glow on peaks of 70 per cent or over. The gain control for the modulator is a pre-set potentiometer at the rear, with a little key to operate it, conveniently kept in a small socket nearby. In practice it has been found that this control may safely be left at the maximum setting; slight over-modulation then occurs only if one speaks far too closely to the microphone (which, for this test, was an ordinary cheap crystal insert in a very expensive case!)

Operating Conditions

Unless the aerial is suitable for low-impedance feed, the use of an ATU is highly desirable. With a unit known to "look like 72 ohms," and normally in use with another transmitter for Top Band, the procedure outlined in the makers' instructions was perfectly satisfactory. With the loading set at minimum (fully clockwise on the control), resonance was found at about mid-point on the tuning scale. Loading was then increased, and tuning re-set, in the familiar manner, until an anode current of 40-45 mA was indicated. Under these conditions an RF output of roughly 6.8 watts was measured in a dummy load, and the ATU, combined with a half-wave aerial, tuned normally. Reports, over the air, were identical with those obtained from another transmitter running 10 watts to a single 1625 valve (but occupying roughly twelve times the space taken up by the AT5!).

The CW note was reported excellent, but was



The AT5 transmitter and the Type 250/S power supply are similar in size, and, standing as shown, take up an area of only 8½ in. by 5½ in. The three-position switch at the right of the PSU gives complete switching of both transmitter and aerial. The neon indicator in the centre of the PSU shows a steady glow on "net" and "transmit," and flashes intermittently on "stand-by"; that in the centre of the transmitter's front panel gives indication of modulation.

made slightly less "hard" and more pleasant to listen to by the use of an additional condenser across the key. The AM phone was reported as fully modulated and quite free of distortion by all stations worked, including locals who were receiving extremely strong signals.

On the 80-metre band the signal reports could only be compared with those obtained on a much higher-powered transmitter (input roughly 100 watts). The difference, in most cases, was surprisingly small—hardly ever as much as two S-points. But knowing about S-meters and their unreliability of calibration, to say nothing of reports by guesswork, this was not

taken as meaning very much.

The fact remains that no 80-metre station in the U.K. or Europe, called and raised on 100 watts, failed to give a good report on the 12-watt signal from the AT5 when it was netted on the same frequency and substituted for the 100-watter.

Aerial matching is not quite so satisfactory on 80 metres; in fact it appears impossible to arrive at an impedance of 72 ohms from the *pi*-output circuit, the L/C ratio of which is apparently too high for 80 metres. However, a 2:1 standing-wave ratio on the short length of coax between the transmitter and the ATU would not account for any measurable loss of

power. The addition of extra capacity directly across the output socket would probably make a perfect match possible.

Accurate Calibration

As received from the makers, the transmitter calibration was "spot on" for both bands. Provision is made for adjusting the oscillator frequency, but has so far been unnecessary. The calibrated scale can hardly be described as "bandspread"—but the Top-Band is spread over a sector of roughly 120 degrees, and the 3.5—3.8 mc band over 90 degrees. For export, the latter band is calibrated over the full 3.5—4.0 mc.

The tuning dial has a slow-motion drive with a reduction of approximately 6:1, which makes accurate netting extremely easy without giving too many turns to cover the whole band.

Versatility

Normally, with the mains PSU (250/S) the heaters are supplied with 6.3 volts AC; the changeover to 12-volt operation for mobile work is carried out automatically by using the alternative power supply (12/MS) and the power supply lead (with plugs) supplied with it.

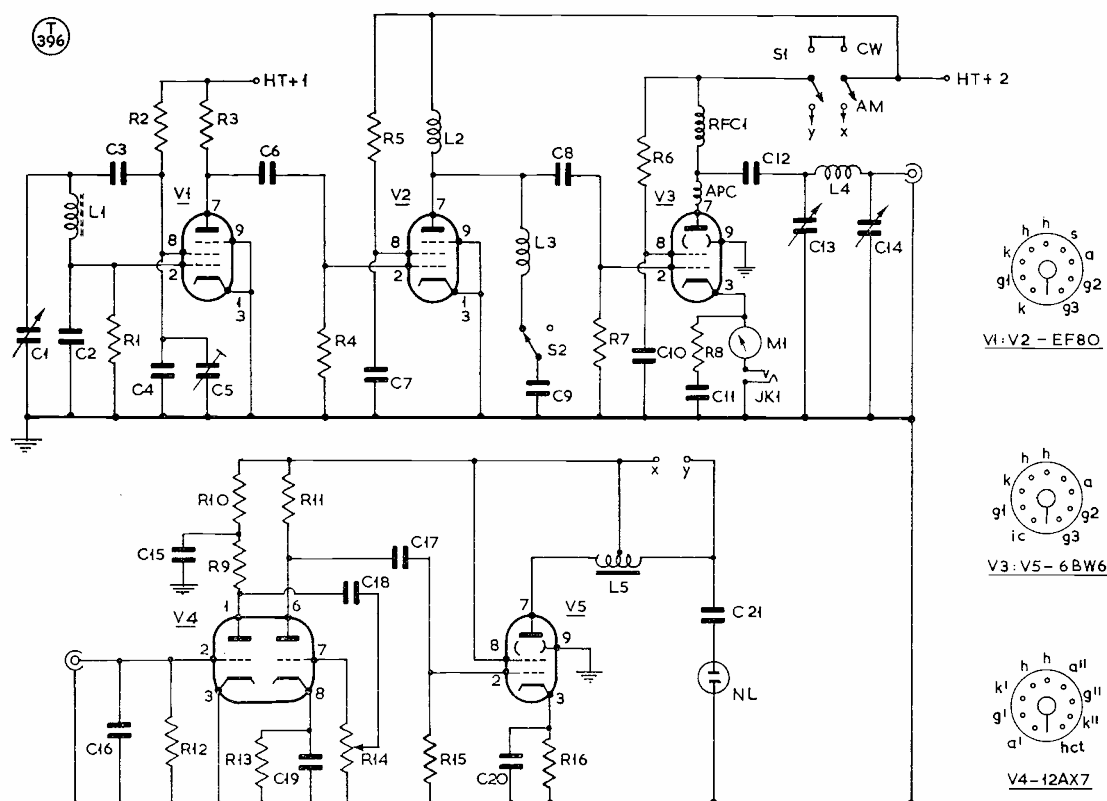
The chassis is earthed, and one side of the heater supply is connected to it—a point which needs watching when the transmitter is installed in a car, in which the positive side of the battery will almost certainly be earthed.

Table of Values

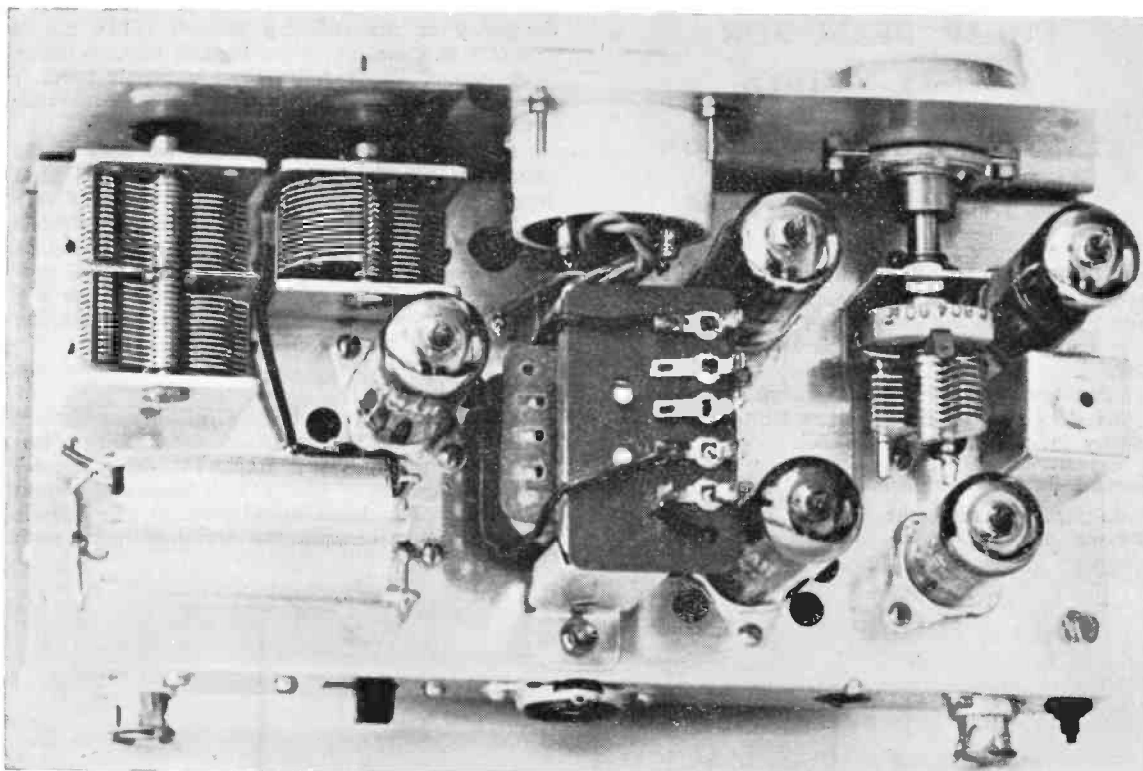
Circuit of the Codar A.T.5 CW/Phone Tx

C1 = 60 μ F, var.	R3, R5,
C2 = .002 μ F	R7 = 22,000 ohms
C3, C4 = 270 μ F	R4 = 56,000 ohms
C5 = 10/40 μ F, temp. comp.	R6 = 12,000 ohms, 2w.
C6, C8,	R8, R13 = 1,000 ohms
C16 = 100 μ F, cer.	R10 = 10,000 ohms
C7, C11,	R12 = 1 megohm
C18 = .01 μ F, disc. cer.	R14 = 500,000-ohm
C9 = 22 μ F, cer.	potentiometer
C10, C12,	R15 = 470,000 ohms
C17, C21 = .001 μ F, cer.	R16 = 270 ohms, 2w.
C13 = 365 μ F, var.	L2 = 2.5 mH RF choke
C14 = 900 μ F, var.	L3 = 3.5 mc doubler
C15 = 8 μ F, elect.	L4 = Codarcoil T422S
C19, C20 = 10 μ F, 25v. elect.	L5 = Auto-transformer,
R1, R2,	TL10
R9, R11 = 100,000 ohms	V1, V2 = EF80
	V3, V5 = 6BW6
	V4 = 12AX7

Notes: Items C3, C4, L1, R1 are in VFO can assembly. All resistors are rated $\frac{1}{2}$ -watt except as stated. NL is a neon indicator and APC an anti-parasitic choke.



Basic circuit of the Codar A.T.5, a very successful LF-band transmitter, producing a good clean CW signal and AM phone of excellent quality. The RF section is V1 (VFO), V2 (buffer/doubler) and V3 (PA). The speech amplifier is V4 and the modulator V5. There is no trickery about the circuit, which follows standard design principles, brought to a high standard constructionally. All values are given in the table herewith, and interior layout shown in the photograph opposite.



Five valves are used in the AT5; bottom right, 12AX7 (speech amplifier) and 6BW6 (modulator). Above them, from the right — EF80 (VFO), EF80 (buffer or doubler) and to the left, 6BW6 (PA). The same tank coil (bottom left) serves, without switching, for both 160 and 80 metres. At the back of the AT5 chassis are the aerial coax socket (left), the Phone/CW switch, the socket for the power supply cable, the pre-set audio gain control, the microphone plug and the key for setting the gain control.

Summary

From the fixed-station point of view we have practically no fault to find with the AT5; it has not, however, been tested under mobile conditions. Stations completely lacking Top-Band facilities can

now come on at a moderate price and with practically no demands on space. The equipment is stable, tractable and puts out a signal which should do credit to any station, both in quality and power. Its appearance is attractive and its compactness especially noteworthy.

AMATEUR STATION AT THE GERMAN RADIO SHOW

The German Amateur Radio Club (DARC) will be organising a special feature at the German Radio Show to be held in the Killesberg Grounds, Stuttgart, from August 27 to September 5, 1965. For the first time visitors will be able to see Amateur Radio operators making contact with other amateurs in Europe and overseas by radio and television.

A TV station built to conform with European standards will be transmitting, on the 70 cm amateur band, programmes filmed with a camera built—like the station—by amateur A/TV enthusiasts. Programmes will be received on a communal aerial in the Fair Grounds and translated to another channel

so that television sets being demonstrated in the Radio Show will be able to pick up the A/TV output as a fourth programme.

The amateur transmitting centre at the Radio Show will be easily found by the two 75-foot lattice towers with antennae—some of which will be rotary beams—for the HF and VHF amateur bands.

The Radio Show, organised by Stuttgart Exhibitions Limited, will cover the latest in radio and television sets, gramophones, tape-recorders, aeriels and records produced by German industry. Further information about the Radio Show, admission tickets, party rates, travel and hotel accommodation can be obtained from the U.K. Agent, C.E.S. (Overseas) Limited, 225c Balham High Road, London, S.W.17. (Balham 4650).

"Short Wave Magazine" can be obtained to order through newsagents in practically all countries