

Another DX-40U Modification

FOR SINGLE-SWITCH
CONTROL AND HIGH-LEVEL
MODULATION

J. M. HERN (G3NAC)

The Heathkit DX-40U was described in detail in our issue for November, 1959, as a constructional kit. An article, by a contributor, in the May, 1960, issue suggested some circuit improvements on the modulator side. Here, the theme is single-switch control and the modifications for high-level modulation using an external modulator.—Editor.

ORIGINALLY, the writer bought the Heathkit DX-40U in anticipation of going overseas to some choice DX location! It is very light and packs a punch on CW. However, it has since come to be used as the main station transmitter at G3NAC. For this, some modifications were found desirable, as explained in this article.

One-Switch Control

The function switch is fine in theory, but not in practice. It has to be turned from "CW" through "Phone" to "Stand-by," which is a nuisance. To enable one-switch station control and VOX working to be used, a DPDT Leach aerial change-over relay is mounted on the right of the front panel, behind the "HT on" light. A length of coax is run out to the back panel to a plug; 12 volts DC from the station control unit is fed to the relay through this plug. In order to over-ride the relay, a DPST switch, S1, is mounted just to the right of the "HT on" light. The relay is wired as follows:

Break the HT where it leaves R26 and pass it *via* the relay so that the latter closes the circuit when activated. Then, when it is desired to tune up, set the function switch to "Tune," activate the relay, and the transmitter is then as the original, electrically. The DPST switch is wired in parallel with the relay for convenience.

If the alteration is left like this, it will be found that the PA will draw current when no drive is on the grid in the CW condition if the cathode is closed, because the screen HT is connected *via* SW3a. Therefore, it is necessary to break the HT between R26 and R23 and to pass this through the other contact on the relay.

The over-ride switch is also wired in parallel in this circuit as well.

Now one-switch control is practicable and if it is desired to return to individual control, the over-ride switch is closed.

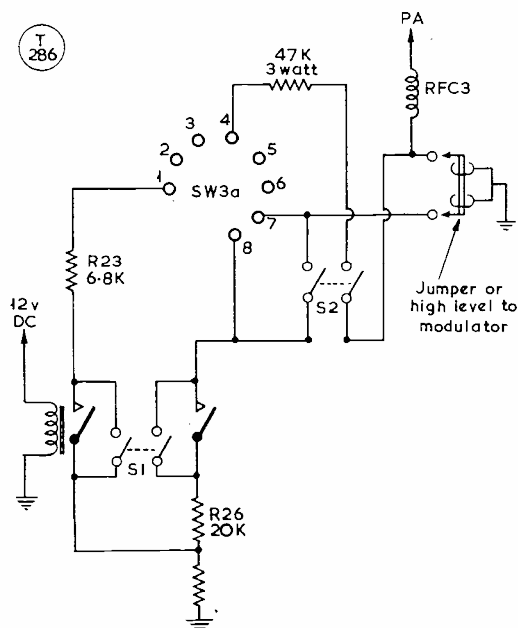
High Level Modulation

The control-carrier system of modulation leaves something to be desired on the HF bands. In order to be able to use high-level plate-and-screen modulation at will, the following modifications were carried out:

A coax socket is mounted on each side of the aerial "out" connector on the rear panel; the coax lead to the aerial plug is earthed at both ends. The HT feed to the PA is taken from SW3a, tag 7, to one coax socket and from the other, back to RFC3.

A coax jumper is prepared and inserted into the back panel for normal DX-40U phone operation. When it is desired to apply external modulation, the HT is fed to the modulator (in the writer's case 6146's in Class-AB1 and a Woden UM3) and then back to the transmitter, using coax leads in place of the jumper.

In order to enable plate-and-screen modulation to be effective, it is necessary to add a



Circuit of the DX-40U modification for single-switch control and external high-level modulation. The detail here refers to the early version of the DX-40U. Later models have not got quite the same mode switch connection; therefore, on SW3A it will be necessary to take the lead to the modulation switch directly from tag 3, and not tag 4; there is no tag 4 on SW3A, but there is one on SW3B, which is at earth potential.

screen dropper, which was made 47K at G3NAC, to feed the screen of the 6146. This is done as follows: Tag 4 of SW3a is utilised and a 47,000-ohm 3-watt resistor is connected between this tag and the modulated side of the HT. Then the normal screen feed is not used when the function switch is on "Tune"—but HT is applied to the screen. In order to feed HT to the modulator in the "Tune" position, it is necessary to insert a DPST switch which will join tag 8 to tag 7 of SW3a when "on" for high-level modulation. This switch is also used to close the circuit from tag 4 to the 47K resistor, so that when it is "off," tune-up in the ordinary way is possible. (This switch is mounted to the left of the green "on" light on the front panel.)

To use the transmitter as modified above: Set the modulation switch to "Off," the function switch to "Tune," and close the relay (or over-ride it). Tune normally, then open the relay, and turn the modulation switch to "On." Now, when the relay is closed, the transmitter is all set for high-level modulation on one-switch control.

The external modulator HT is also controlled through a relay; it also has a switch to short the UM3 for CW, or normal operation.

To revert to normal DX-40U operation, short the UM3, open the modulation switch, and switch off the modulator.

The function switch remains in the "Tune" position for high-level modulation. It is necessary that the HL modulation switch is *always off* whenever the function switch is in any other position but "Tune."

The PA anode meter is in the cathode of the 6146. It is therefore suggested that it be set to read 110 mA, and no more, for high-level modulation. For the writer's DX-40U, with 500 volts on the plate, this is 50 watts input. But the majority should have 600 volts on the plate so it equals 60 watts or more.

For convenience in carrying out these modifications, the reader should refer to the Heathkit DX-40U manual for the full circuit, but a sketch of the sections of the circuit as modified is given herewith.

Drive on 15

The manufacturers suggest that one adjusts for maximum drive on 10 metres. If, however, drive is low on 21 mc, tune for maximum on this band. It will be found that there is more than enough on Ten and sufficient on 15 metres—2.4 mA at G3NAC.

AUTO-MORSE SENDER

A Swedish firm is offering an interesting piece of telegraphic equipment, which amounts to a Morse code sender operated like a typewriter. In other words, if you can type a bit, you can send perfect Morse without even knowing the code, as the machine transmits the dot-dash configuration for the characters on the key-board. An apparatus of this sort has obvious applications in military and commercial communication systems, as it eliminates the need for operator-training. The radio amateur application, also obvious, is likely to be somewhat limited, however, as the one-off price of this new machine is £375.

POLICE COMMUNICATIONS EQUIPMENT

The first of a series of new miniature communications equipments, designed for individual police use, is announced by Campbell-Bruce Electronics, Ltd. The series is intended to enable foot police to play a more effective role in an integrated mobile and foot patrol radio network.

The equipment, CB4, comprises a "personal" receiving system providing full range coverage from existing central control stations, within certain limitations, and is designed to receive AM phone over 70-180 mc. A transistor front end works into associated demodulation and amplifying circuits with an IF tunable over 1 or 2 mc. Up to three switched frequencies within this bandwidth can be provided as standard, with up to six possible. Alternatively, the

CB4 is available as a tunable version for monitoring purposes. The equipment is normally mounted on a shoulder plate, complete with harness, for use with $\frac{1}{4}$ - or $\frac{1}{2}$ -wave aerials, according to range and reliability requirements; small aerials can be used under certain circumstances. Provision can be made for plugging into a standard $\frac{1}{4}$ -wave car aerial for mobile working.

This basic equipment is intended to provide an immediately available and economical receiving system for use in areas where existing and projected frequencies present no image problem, for pilot schemes and for operational development, where full interference suppression is not essential.

SOMERTON RADIO AERIAL FARM

The big radio station, which many will have seen near Yeovil, Somerset, is a Post Office receiving point for overseas traffic on CW. Somerton Radio was opened in 1929, has some 50 receivers regularly in operation and, since large aerial systems are used, is on a 600-acre site. This antenna layout, involving 65 directional arrays, is now being rebuilt to a new plan, in connection with which 27 steel masts, many of them 280 ft. high, are being dismantled piecemeal, to be replaced by 93 lightweight stayed masts 180 ft. high. The new aerial system at Somerton Radio will require, in addition to these masts, 133 miles of wire and 510 telegraph poles for carrying the transmission lines from the antennæ into the receiving building. About 70 acres of land will be released, as the new aerial farm will cover 530 acres.