differences from the suggested turns values should occur. The Top Band buffer will be close to switch wafer No. 1 and the 28 mc final doubler near switch wafer No. 6. Also, to keep the 28 mc wiring at a minimum, the PA socket will need to be close to this last switch wafer.

If, however, it should happen that one of the couplers tunes slightly LF even with the iron-dust slug right out, this can be replaced by an 0-BA brass one which will save altering the coupler. The real remedy would be to try and reduce wiring length a little.

Many sets of these couplers have been made up, with satisfactory results over long periods. Various other types of valves have also been used—such as 6AM6, 6BW6, EF50 and similar —though in some such cases it has been necessary to alter turns values somewhat in order to accommodate valve changes or alterations in layout. This will usually be necessary because these couplers are designed to be resonated by the circuit capacity.

COUPLER WINDING DATA

BAND mc	Pri. TURNS	Inter-Link TURNS	Sec. TURNS	Wire GAUGE
1.8	65/60/55	16	60/55/50	40
3.5	33/32/31	9	30/29/28	32
7	25/25	4	25/21	32
14	24	2	24	32
21	18	1	18	28
28	14	2	12	28

Notes: Formers are Aladdin 5/16-in. by 2-3/8 in. long with double iron-dust slugs. For 1.8, 3.5 and 7 mc primaries and secondaries, figures indicate number of turns in each layer. Separation between centres of windings is one inch. Windings are close-wound, in same direction for each section — see Fig. 2. Wire used is enam. covered, except for 21/28 mc, where DSC is used.

Improved Modulation for the DX-40U

SIMPLE CIRCUIT MODIFICATION

G. W. ILBURY (G3MMW)

The Heathkit DX-40U, while being an excellent transmitter for CW work, suffers somewhat by reason of lack of modulation when on telephony ; this is due to the system used. It is hoped that the notes following will be of interest to other DX-40U owners, many of whom have heard the results from G3MMW and have asked for information.

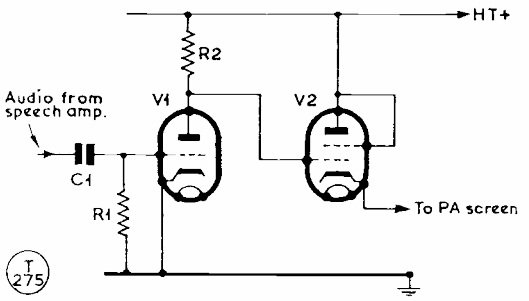

Fig. 1. Essential circuitry for the series-gate modulation system as specified for the DX-40U — see text. G3MMW has obtained better results on phone by modifying his DX-40U for screen control, as Fig. 2.

Those who are familiar with the DX-40U modulator arrangement will realise that it is of the type known as series-gate—see SHORT WAVE MAGAZINE, November, 1959. The basic circuit is shown in Fig. 1. In this system, as the audio input to V1 is increased, the bias due to C1,R1 rises, causing the mean anode potential of V1 to increase towards HT+; this rise is in turn passed, by the cathode-follower action of V2, to the screen of the PA, giving the required controlled-carrier effect, in that the audio modulating voltage is mixed in with the DC control voltage on the screen of the PA.

An inherent difficulty with this method of modulation is that, with the high audio inputs required for full control, V1 will tend to be biassed too far back, and in consequence the anode of V1 will keep almost at HT+. It follows that there can be very little voltage swing left for the audio signal, and in practice this gives rise to the flat, clipped speech effect* characteristic of many DX-40U's heard on the air.

To overcome this and yet alter the existing DX-40U circuitry as little as possible, it was decided to modify to normal screen modulation, and for this the Fig. 2 arrangement was

* The effect is very much dependent on PA loading. It is quite possible to set this up in such a way that full modulation is obtained with good speech quality. The trick is to adjust for something less than full CW output, so as to make better use of the available audio voltage swing on the PA screen.—*Editor.*

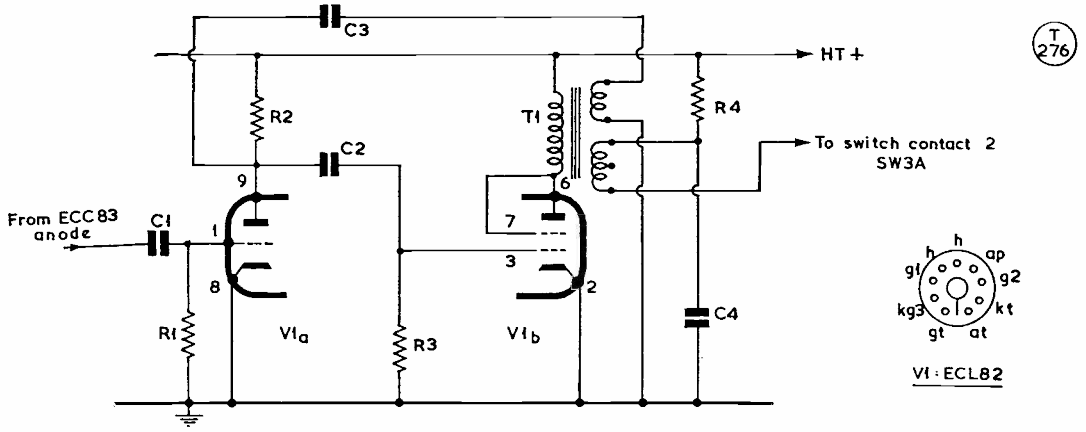

Fig. 2. Circuit modification suggested by G3MMW for improving phone working on the Heathkit DX-40U transmitter — and see Fig. 1. As explained in the text, no very drastic alterations are involved and G3MMW obtains better modulation characteristics using this arrangement than with the circuit specified for the transmitter.

adopted. The transformer used for T1 is a miniature 50-cycle mains type as provided in self-powered units such as external TV converters and the like ; its rating is 250v. input, 250-0-250v. output, with one 6·3 volt winding. This type of transformer was chosen because its size and characteristics are convenient and suitable, and there is the added very useful advantage of being able to use the heater winding to obtain feedback—*see* Fig. 2. T1 was fitted on to the DX-40U chassis without having to move any other component, and connected with the 250v. input (primary side) in the anode, the output side leads going to HT+ through R4 and to the screen of the 6146 PA *via* contact 2 on the function switch —*see* Fig. 2. The centre tap is not used and remainder of the circuitry is quite straightforward ; the values of C1 and C2 can be altered from those given to suit individual preferences as regards audio band-pass.

Feedback

The feedback circuit using the transformer 6·3v. winding through C3 in Fig. 2 should be incorporated if a 50-cycle miniature mains transformer is used, as without this correction speech will tend to be " toppy." If audio oscillation should occur when the feedback loop is connected, the leads to the 6·3v. winding need to be reversed.

Having done this modification, the existing feedback arrangement in the standing DX-40U circuit—R21, C37 in the diagram on p.352 of the November, 1959, issue of the MAGAZINE—should be removed, as it is no longer operative. (For those working from the DX-40U manual, C37/R21 are in the line from the cathode of the tetrode side of the ECL82 back to the cathode of the second half of the ECC83 ; C37 is 100 $\mu\mu$F, and R21 470,000 ohms).

Table of Values

Fig. 2. Circuit of the modified DX-40U modulator

C1	= .001 μF (C34 in original cct.)	R3	= 68,000 ohms, ½w.
C2	= .001 μF, 500v.	R4	= 12,000 ohms, 3w.
C3	= .001 μF, 750v.	T1	= Midget mains xformer — *see text*
C4	= 0.1 μF, 750v.		
R1, R2	= 100,000 ohms, ½w.		

(V1A-V1B is an ECL82, V5 in the original circuit on p. 352, November 1959 issue.)

Results

When operating the modified DX-40U on phone as described here, the PA current will read approximately 50 mA (30 watts) kicking up to 55 or 60 mA for full modulation. By whistling loudly into the microphone, it can be pushed up a good deal higher — but this corresponds to gross over-modulation, and so should be avoided. In some cases, depending on the microphone in use (some crystal types give a greater voltage output than others) the overall gain of the system may be so high that over-modulation occurs on room noises only. If this is the case, the gain can be reduced by changing the speech-amplifier valve (the ECC83, V4 in the circuit on p.352 November issue) for a 12AU7 ; these valves are interchangeable as regards base connections.

As a test, the author's DX-40U as modified to the Fig 2 circuit was run for two hours into a dummy load with a sine-wave input adjusted for full modulation ; at the end of the time, the

ECL82 was at normal working temperature and the modulation transformer quite cool.

Most DX-40U owners would agree that one should think twice before modifying commercial equipment built to a standard design—but results over the air from G3MMW have shown that the modification is fully justified and worth-while in terms of greater talk-power.

THE ZM7DA EXPEDITION

TOKELAU—JANUARY 5/12, 1960

THE Tokelau Islands in the Pacific, at about 9° S. by 172° W., are British territory administered from Western Samoa, under New Zealand trust. The chief island is Nukumonu (approximately 300 yards wide by four miles long at high water), and it was from here that ZM7DA was on the air, as most exotic DX, during the period January 5-12 this year.

Operators were W5PQA—leader and organiser of the expedition and, of course, an American national—with VR2DA, in whose name, as a British subject, the ZM7DA call was held. For a short time (one day, to be precise) the call used was ZM6AP/ZM7; this was from 0605 GMT on January 5 till 1845 on the 6th, when the official ZM7DA licence was notified by radiogram from New Zealand.

This expedition took a good deal of organising on the part of W5PQA, and involved him in considerable personal expense. Apart from getting the licence and providing suitable equipment, a 45-ton 6-knot cutter, the m.v. *Maroro*, with crew, had to be chartered for a term of three weeks to get the party from Suva, Fiji to Nukumonu, Tokelau, a sea-trip of about 900 miles, taking the best part of a week.

As regards gear, the main item of equipment was a Collins KWM-2, sent out by air from the factory; other gear included VR2DA's modified TA-12, his SX-28, a 10-watt portable-mobile rig for emergency use, and a 110v. AC generating set with 44 gallons of petrol to run it. Aerials on site consisted of a Minibeam, a three-band trapped dipole, and 7 and 14 mc dipoles; the 40-metre band was used for "local" working with VR2CC, Fiji, who maintained regular monitor watch for the expedition, their communication channel being 7040 kc.

Results and Experiences

Probably due to the rough travelling involved, the gear with not without faults. The KWM-2 had to be doctored and the power supply gave some trouble. Radio conditions were fair-to-good, except for Europe, from which direction most signals had rapid-flutter QSB, making them very hard to read. W5PQA himself handled the SSB phone operating, and VR2DA took on the CW, using both the KWM-2 and his TA-12 (on 28 mc). In all, 65 countries were worked and some 3,000 contacts made in the seven days on Nukumonu, using the 7-14-21-28 mc bands.

The return trip was somewhat hazardous, being made in very bad weather, but the party (which included Mrs. W5PQA and Mrs. VR2AP, who came along for company) got safely back to Suva, Fiji, on January 17, having travelled nearly 1,800 miles at an average speed of 6½ knots! During the trip out, some operating was done signing VR2DA/MM and W5PQA/MM, but this was not possible on the return because of the weather.

All genuine VR2DA/MM, W5PQA/MM, ZM7DA and ZM6AP/ZM7 contacts are being honoured by QSL card *via* W5PQA—but this does *not* include the pirate "ZM6AP/ZM7" who was active on the 21 mc band from January 4; when the expedition proper really got going, he was unable to stand the pace. Finally, it is understood that ZM6AP/ZM7 and ZM7DA contacts are being recognised by the ARRL for their DXCC.

(We acknowledge the notes by VR2DA in the March, 1960, issue of the Australian *Amateur Radio* as the basis of this article. —*Editor.*)

MORSE CLASS FOR G.P.O. TEST

For those within travelling distance of Croydon, a Morse class of ten lessons is starting at the Croydon Technical College, each Friday evening, 7.0-9.0 p.m., from May 13. The fee for the whole session is 12s. 6d. Any further information from: E. M. Childs, 10 Eaton Road, Sutton, Surrey.

UNLICENSED TRANSMISSION

While on the one hand the G.P.O. pursues pirates relentlessly, and rightly—and also licensed amateurs who break the rules—on the other, surplus dealers advertise, in the public print, walkie-talkie transceivers, "with a guaranteed range of 5-10 miles, and a delight to operate for young and old alike, batteries 20s. extra"—to quote a recent display advertisement in a national newspaper. The customer naturally thinks he is on safe ground in buying one of these things (there is no mention about any licence being required) and then proceeds to break every rule in the book without being in the least aware of it. The whole situation is quite absurd, and until the Post Office can bring a case that will be reported in every newspaper in the country, it looks as if it will go on.

C. W. OVERLAND, G2ATV

It is with deep regret that we have to announce the sudden death, on March 23, of Charles William Overland, G2ATV, of London, N.W.10. He was Editor of our contemporary, *Radio Constructor*, with which he had been connected since its inception, and his untimely passing is a great loss to his colleagues of Data Publications, Ltd. To them and to his family we offer sincere condolences.

PENETRATING COMMENT

When Mr. Aneurin Bevan, recuperating after his recent illness, was asked what he thought of TV entertainment, his answer was: "The medium is far greater than the capacity to satisfy it." How right he is! He might also have said that the sort of TV we see on our screens for most of the time is the prostitution of a great technical achievement.