MERCURY

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EDITORIAL COMMENT

To our many members who have waited. patiently for 'Mercury', here is the first edition of 1963, with our regrets that it has not been possible to produce before now. The exigencies of the service being, still, a prominent feature of our life, we have had to bid adieu to Capt. J.E.P. Philp, secretary of the society since its innovation, at a rather inconvenient time. He is now bound for VS1 land, and goes with the best wishes of all those who know the volume of work and time he has put into society matters. He will no doubt be active on 20 and 80 SSB once he gets his coconut palm ground plane activated, and will be continuing his interest in the society from VS1.

To those who wish to contribute to 'Mercury', we say please don't be bashful. The more material we have, the more diverse the subject matter, and the better will be the end product.

This includes our overseas members, who can enthral us with tales of DX worked on the proverbial blood orange and a piece of wet string.

As an inducement to write, we propose that QSL cards be used as currency. In other words, articles used in 'Mercury' will be paid for in Society QSL cards, printed with the contributors call sign or BRS number, which, of course, brings us to the subject of a society QSL card.

At the last competition for such a card, a grand total of six entries were received, which hardly makes for fierce competition! So, here we go again with another request to you, the members, to produce a card suitable for society and individual members use. As a guide to cards generally, for those which are sent direct, a business envelope measures 6" x 3½".

From the printing aspect, colours add considerably to the cost, and a multicoloured card would, although attractive, be rather prohibitively priced. Similarly high gloss finished and one-off designs put up costs, but somewhere in the colour spectrum, and material ranges, lies the happy medium, and we feel sure that you can find it. Please forward your entries, as many as you like, to reach the secretary by 1st July, who will then co-opt a panel of experts to judge the winning design.(who said Heaven protect us from experts?).

From the station activity aspect, HQ station G3CIO continues to radiate and will in fact be taking part in N.F.D. on June 8/9, and again on Princess Royal Day, June 28/29, when call sign GB3RCS will be in use. In this latter case we shall be working around the clock for the 48 hours of Friday and Saturday, which, we hope, will give us a better chance of working our many overseas associates, especially the VU’s, VK’s and VS’s.

The poor propagation conditions last year rather bedevilled us, although some 300 QSO were made. Activity will also take place on the 80 and 40 metre bands and GB3RCS will be looking out for contacts with members and affiliated club stations. We are toying with the idea of a sub-HQ station for this important day in our calendar, so that DX band activity can take place simultaneously with UK work. A separate circular will be sent to all members giving schedules and other details of the operation.

Now, about this edition, we firstly express our thanks to Short Wave Magazine for permission to reprint the article on the Army Sender 36. A very creditable Tx was produced by VQ2GF from this ex-A.A. gun site equipment, and it is thought that this article will help those club stations now holding these sets.

Another interesting article is that on the multi-band antenna by Tom Wylie, G3MEF, who has done much work on practical antenna systems. Tom, who was one-time Wireless Officer of 3rd Div Royal Canadian Corps of Signals, bases his article on the practical results obtaining from an average of two QSO's a week with W1DD over a span of four years. Nuff sed!

It is pleasing to have club notes in print, and those from G3PMZ are the first, we hope, of a series. We are glad too, to have some notes on the G3PYZ/A expedition to MIS TOR, one of the highest points on Dartmoor, by the Junior Leaders Regiment, R.Signals. When the editor was in contact with this expedition, and also G3CIO, from his club station at G3HKR, the vivid description of swirling mist and fine drizzle made one automatically reach for the silica gel!

Finally let me reiterate that the bulk purchase buying scheme is still a going concern and depends for its existence upon your custom. So, if you wish to save the odd bob or two on kits, beam aerials and so, contact the Treasurer, G3RUS, who will let you know what you will save.

Must get busy on next Mercury now, so

73’s

G3FGN

ARMY SENDER TYPE 36

NOTE ON DESIGN AND CONSTRUCTION - MODIFICATIONS FOR AMATEUR USE ON 10-40 METRE BANDS

by

G.N. FARE (VQ2GF)

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The transmitter consists of two main units - an RF section which contains a VFO, crystal oscillator, buffer/doubler and a PA stage. All the valves used in the three circuits of this section are 807's and the HT voltage to the VFO is stabilised by means of two type AW3 regulator tubes. An interesting feature is the use of tuning indicators ("magic eyes") in the tuning both of the crystal oscillator and buffer-doubler stages. The PA tuning is by means of a built-in 0-200mA meter. The PA stage operates as a doubler on both bands, using two 807's in push-pull.

The second main unit contains the power supply, speech amplifier and modulator. There are separate HT circuits for the modulator and the RF stages and a separate bias supply feeds both the modulator and the RF stage grids. The main HT is brought on by means of a relay in the bias supply line which functions when the bias supply is earthed, to switch in mains voltage to the HT transformer. The three full wave rectifier valves involved are type AW4.

On the audio side, the speech amplifier consists of a 6C5 transformer-fed from a carbon microphone and transformer-coupled to a pair of 6C5's in push-pull, driving a pair of 807's as modulators in class-B. The modulation transformer is mounted on the RF chassis. There is provision for modulating the transmitter from a remote source and an arrangement for feeding the audio output from a receiver to the GPO handset which is supplied as standard and incorporates a "push-to-talk" switch.

A 16-point connector mates the two units via a massive screened cable. The units are each mounted in a heavy hardwood case with sliding fronts, on the back of which appear miscellaneous data and circuit diagrams, including operating instructions. The installation complete weighs 210 lbs. - so it is no lightweight.

Band changing is by means of plug-in coils in the buffer and PA stages. Band 1 covers 10-20 mc/s. Band 2 covers 20-40 mc/s and Band 3 40-60 mc/s.

MODIFICATIONS FOR AMATEUR USE

The transmitter can be used exactly as received without modification, but the fact is that there several inherent disadvantages, namely:

(1) Bandspread is poor on the VFO and logging or tuning to a predetermined frequency (in an amateur band) is difficult.

(2) In spite of its very robust construction, the VFO is liable to drift.

(3) Harmonic radiation is excessive by any standards.

(4) Excessive provision of safety and interlock circuits make adjustment and testing difficult.

(5) Keying is not very well” shaped" and is inclined to be chirpy.

(6) A minor criticism is that the equipment is not very good to look upon when used in its cases.

(7) The range covered does not include any of the” gossip" bands, in particular 40 metres.

Whilst some of these disadvantages may appear formidable, modifications to effect a cure are simple to carry out and quite inexpensive; most amateurs will probably be able to raid the junk box for the few spares required.

INCREASING THE BANDSPREAD OF THE VFO

It is quite a simple matter to increase the band-spread of the VFO electrically, by putting a small variable condenser in parallel with the VFO tuning condenser. This condenser should be about 15μμF, of robust construction and preferably with ceramic insulation; otherwise, almost any type will do. If a 15μμF is not available, a large one can be used with all the rotor plates, except one, removed. It is necessary to bore a hole in the front panel to mount this new condenser (as a precaution, all the valves should be removed while this is done). Make sure that all metal filings are cleared out from the VFO compartment when the job is finished. The dial knob used by the writer was an ex-service type that happened to be available, with a 3 ins. skirt calibrated 0-100, but any dial which will fit in is suitable and it may be directly calibrated if so desired. A lead should be taken, in heavy wire, from the stator of the new condenser to the spare solder tag on the front gang of the main tuning condenser. The chassis forms the earth return.

Calibration is simple and can be carried out by means of an accurately calibrated receiver. Set the receiver to 28,000 kc exactly, which should be verified by means of a crystal calibrator or frequency meter. The new condenser should be fully in mesh and the main VFO dial set in 14/28 mc band edge. The transmitter is switched to CW and all calibration is carried out in this mode, with the key circuit open - the following stages thus being inoperative. With HT on (allow the transmitter to warm up thoroughly before switching on the HT), unscrew the Philips beehive condenser on top of the main tuning condenser until the signal is heard in the receiver or maximum deflection of the S-meter is obtained, if one is fitted. If, with the beehive condenser fully unscrewed no signal can be heard, insert a small value mica condenser (say 20μμF) in series with the new variable condenser. This should enable the signal to be tuned in with the Phillips trimmer; reseal the latter (blob of wax on the screwed shaft) and recheck the calibration. The receiver should then be set at 28050 kc and the new VFO parallel dial adjusted until the beat is heard. This setting is noted and the process repeated until the condenser is fully out of mesh, having covered all the ten metre band. The VFO is now calibrated and, of course, the reading if divided by two will give the transmitter frequency at 14 mc.

To calibrate the VFO for 15 metres, the main dial is set to 21 mc and, with the new condenser fully in mesh, a beat at exactly 21 mc should be tuned in. If not, carefully rotate the main dial, using the slow-motion drive, and mark the skirt accurately. This mark can then always be used to set up this frequency. Dial calibration at 50 kc intervals is carried out as before.

If the receiver does not respond to the beat from the VFO, switch the transmitter to ∀phone∀ and, using a dummy load, tune the following stages to resonance. Return the switch to CW and it will be found that the signal from the VFO will be very much stronger. In the case of a well-shielded (or an insensitive) receiver, a short aerial may be used, but in this case, make sure that the receiver is tuned to ∀Man.,∀i.e. AVC off or the receiver may be overloaded. It is now quite an easy matter to zero beat with any station on the band and the bandspread will be quite adequate for all normal purposes. If the dial is not directly calibrated the use of a graph is recommended so that any desired frequency may be selected.

The only thing to watch is that the main VFO dial is set exactly on 14/28 or 21 mc each time the band is changed.

Increasing VFO Stability : As it stands the VFO is not very stable and the potential frequency drift, especially at 28 mc, is somewhat alarming, to say the least! This instability is mainly due to overheating and can be almost completely corrected by lining the three sides of the VFO compartment with some heat insulating material, such as ½ in. softboard, thick felt, asbestos or thick cardboard. Also, $^{3}/_{8}$ in. diameter holes should be drilled at 1 in. centres at the top and bottom of the side of the coil compartment to assist in producing better air flow past the coil. If all this is done, the VFO will remain very stable and drift will be reduced to negligible proportions.

If drifting still persists check the voltage at the "cold" end of the anode coil; it should be rock steady at about 230 volts. If the voltage varies, suspect the voltage stabilisers and check the associated resistors.

<u>Suppression of Harmonic Radiation</u>

Harmonics are radiated from the transmitter in considerable strength and TVI certainly rears its ugly head. Fortunately, the remedy is simple and involves a minor operation on the tank coils and their base and the provision of an aerial tuner unit, together with more effective screening.(There is an item called the Harmonic Filter Unit, which was originally supplied to A.A. Regts. with this transmitter, Part No ZA-10791. This, however, is not available on the surplus market.)

The original method of taking off the RF is by means of a tap on the tank coil and via a condenser to the aerial socket. This condenser should be unbolted from the chassis and its associated leads cut off; a link coil is now interwound with the tank coil; this coil consists of 16 gauge wire in insulated sleeving and is composed of two turns for the 20 metre coil and one turn for the 15 and 10 metre coils. The ends are connected to the two spare pins on the base (one of which was left by the removal of the tap from the tank). From this latter pin a screened lead is taken to the aerial outlet socket and the outer braid is connected to the other pin and earthed. This new link coil should be interwound at the rear end of the coil when it is mounted in position.

The next stage is to construct an aerial tuner unit (ATU). The circuit for this is given in Fig 1. A length of coaxial cable is used to connect the ATU to the coaxial socket on the RF chassis. The drawer previously used to house spares is ideal for mounting this unit. The coil and condenser can occupy the centre compartment and the right hand compartment may house a change-over relay or (as in the writer’s own transmitter) a switch for bringing in a dummy load, for testing and setting up. The aerial socket is fixed to the rear of the drawer.

To load the transmitter, rotate C1, tune for maximum reading of the plate meter, retune the PA for maximum dip, and successively readjust on the ATU and PA until the transmitter is fully loaded. The dip at resonance should be very small (about 10mA).

The third stage in the suppression of harmonics is to improve the shielding of the RF chassis. This was done by means of 18 gauge aluminium sheeting cut to size and fixed with self tapping screws in position along the back and alongside the PA stage. A lid for the drawer was made with ½ in turn-down on all sides and is removable. There are no inherent difficulties associated with the shielding, and existing screws can be used in many cases to fix the sheeting. It should be noted, however, that with the shield for the side of the PA stage in position, it is not possible to use the coil clamps as they foul the side. These were therefore removed from the chassis.

After completing these modifications, the third harmonic was 60 dB down and could not be detected on a communications receiver 100 yards away.

Elimination of "Safety" Devices

This transmitter contains two switches which cut the HT if either the drawer is pulled or if the door on the front of the power unit is opened. As a licensed amateur knows what he is doing (presumably), such devices are an unnecessary luxury - in fact they are a confounded nuisance when it comes to checking HT voltages and general testing with power on. (In the original, these safety arrangements were incorporated to prevent tampering with the transmitter by "unauthorised Service personnel" there being a distinction between operator and mechanics). To eliminate these switches, terminals E and F are disconnected from the power plug, the wires soldered together, and the joint insulated. Similarly the wires to the pressel switch on the power pack door are removed from the switch and soldered together.

Keying Characteristics

There is a definite tendency, under certain conditions of loading, for a chirp to develop in the keying. This can be checked by obtaining a critical report from a nearby station. If there is a chirp, the remedy is to key the PA stage instead of the buffer, as normally wired. This is quite a simple job and involves disconnecting the lead from the cathode of the 807 buffer valve and earthing that cathode. The next step is to remove the wire running from the common cathode of the PA 807's to earth, and connecting the wire previously removed from the buffer to the PA cathodes. There were no apparent clicks emitted when this was done, and the chirp was completely absent. The usual key-thump filter should, of course, be fitted.

Beautifying" the Type 36

The units when used in their cases are bulky and unsightly, so it was decided to mount them on a rack. Two frames made up of 1½in X 1½in aluminium angle were devised, as shown in one of the photographs. The units were then bolted to the frame using the original mounting holes. The frame had to be cut away slightly to accommodate the various bolts, slides, and so forth which protrude from the sides of both units. The next step was to get rid of the untidy-looking cable connecting the two chassis together. First of all a 2 in hole was bored in the back of the chassis of the RF unit and the socket was remounted there. This meant unsoldering all the leads, carefully marking them and refixing to the new position of the socket. Most of the leads can be shortened and one or two need replacing with longer lengths, but the job is not difficult if care is used.

The same thing was done with the power pack. In this case most of the leads needed lengthening. The hole was cut in the thin sheet metal back.

The cable was then shortened to 9 ins by taking off one socket, removing the shielding and cutting all the wires to the correct length. As the writer is not a great believer in multi-point plugs, all the pins of the RF chassis socket were cut off and their wires soldered directly to the remaining stumps. The plug was retained at the power pack end.

Though cable shielding was dispensed with, there was found to be no radiation from the wires. The two holes left in the front panels were covered with a small piece of aluminium sheet bolted in place. The drawer fits in its original position and is withdrawn for coil changing.

Increasing Range to Cover 40 Metres

The final modification is to increase the frequency range to bring in the 40 metre band. This is the lowest frequency that can possibly be obtained, as the VFO runs at 5-10 mc. This could be accomplished by winding another coil similar to the 20 metre tank coil, but with four more turns. However, there are difficulties in obtaining or making the coil base, so it was decided to add a fixed condenser across the 20 metre coil, in parallel with the tuning condenser. A 2-pin (FT243) crystal socket was soldered directly across the pins connected to the ends of the coil, and a 200 uuF 1,000v working silver mica condenser was fitted with two pins to mate with the plug.

The final modification (for 40 metre operation) is to incorporate a switch to cut out the heater of one of the 807's in the PA. It will be remembered hat the PA is arranged in push-pull; this being so amplification is almost impossible at the fundamental frequency, but if one valve is switched out, that valve serves to neutralise the other, which does all the work. The switch was mounted in the blanking plate over the hole left by removal of the power socket, the unearthed side of the rearmost 807 was disconnected, and the two wires from the switch inserted in series.

To tune to 40 metres it is necessary merely to plug in the 200 μμF parallel fixed condenser and switch off the one 807 heater. The tank can now be tuned to resonance in the usual way. The power input should be about 45 watts when fully loaded. Efficiency is not very high, owing to the poor L/C ratio for 7 mc - but the point is that 40 metre operation is obtained in an easy way.

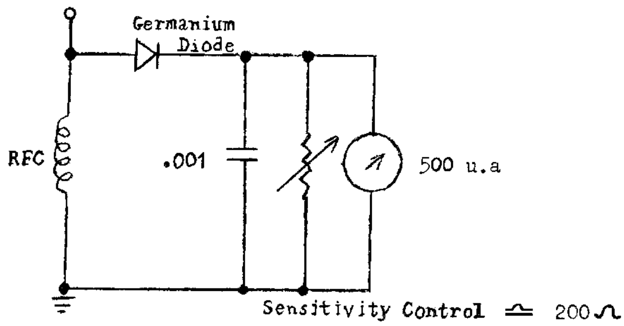
Conclusion

With all the modifications as described, this transmitter has been found to be extremely reliable. It is well constructed and even after twelve hours of continuous contest operating, no trace of electrical strain or serious overheating of any component was observed. Much DX has been worked on the 7-28 mc bands and excellent reports have been received from all Continents. CW reports have always been T9 and the modulation has often been favourably commented on without any prompting from the writer's end.

This equipment thus provides a complete transmitter, of a very business-like appearance. It should give many years of trouble-free service as all components are rated well above anything they may be called upon to stand. With the modifications described here the Sender Type 36 should prove a pleasure to use for even the most experienced operator.

ALL BAND OUTPUT INDICATOR   G3EJF

This small unit, simplicity itself to construct, has many uses in the shack. It is not frequency conscious, and operates quite well from long wave down to 2 metres using an Eddystone pi-wound RF choke.



G3EJF uses this instead of an RF meter as an output indicator, with the advantage that by merely adjusting the sensitivity control, it can cope with a full 50 watt rig, or any QRP Tx being used. Another typical use is for checking whether or not a receiver local oscillator is functioning, by putting the pick up lead near to the oscillator coil.

A MULTIBAND ANTENNA SYSTEM FOR SIMPLE SOULS SHORT OF SPACE.

By: Thomas C. Wylie M.I.R.E., G3MEF.

There is little doubt that in this densely populated country of ours, with steadily increasing emphasis on condensed housing, housing. estates, etc., that the radio amateur's principle problem is lack of lateral space to accommodate an efficient radiating system, even, in some extreme cases, on the higher amateur frequency bands.

Having owned a first-class "antenna farm" in Canada for many years, based on five acres of land, three 100ft steel towers, three 50ft cedar poles and a number of 30ft cedar poles, the writer was quite discouraged when, on retirement, he came to live on a new housing estate, on a corner lot with 66ft frontage and 84ft depth. The dimensions are deceptive. On a corner lot, the frontage and sides had to be kept clear, both for aesthetic reasons and to avoid conflict with the Local Planning Authority, so the total available space for a radiating system was 66ft by 18ft, at the back of the house, occupied mainly by the XYL's vegetable garden and having other obstructions, in the form of a garden shed and a garage extension. Very discouraging, but the "ham" bug, which first bit in 1912, had done its job well, and experiments were soon afoot to determine just what was possible under the circumstances.

The most obvious solution would appear to go up if one cannot go lengthwise, but past experience and experiments on the spot indicated that verticals, in their usual quarter-wave or trap multiband versions, did not provide the answer, In the writers experience, verticals are tricky. Despite manufacturers claims to the contrary, they require very efficient earth systems for efficient operation; at least four quarter wave radials or, preferably, eight or more. Further, they appear to work most efficiently from low-lying locations, and G3MEF is located atop the highest hill around Barnstaple! The ground-plane is a good performer, but would be extremely unsightly and perhaps subject to criticism or objection from the Planning Authority. As applied to both the true vertical and the true ground-plane, trap techniques are open to criticism on the grounds of efficiency, and vertically polarised emission is obviously more liable then horizontally polarised transmissions to cause interference in TV areas served by vertical polarisation.

In this location, completely unsheltered and looking out over the Bristol Channel and Atlantic Ocean on one hand, and over the hills and moors of Devon on the other, beams, quads and such wind-catching contraptions are totally out of the question.

There remains the simple, old-fashioned "flat-top" antenna; but how to tailor it to space limitations? The ideal would, of course, be a half-wave flat-top, at 80 metres, quarter to half wavelength up in the air, and centre fed by a 600 Ohm open transmission Line, but about this we may only dream here!

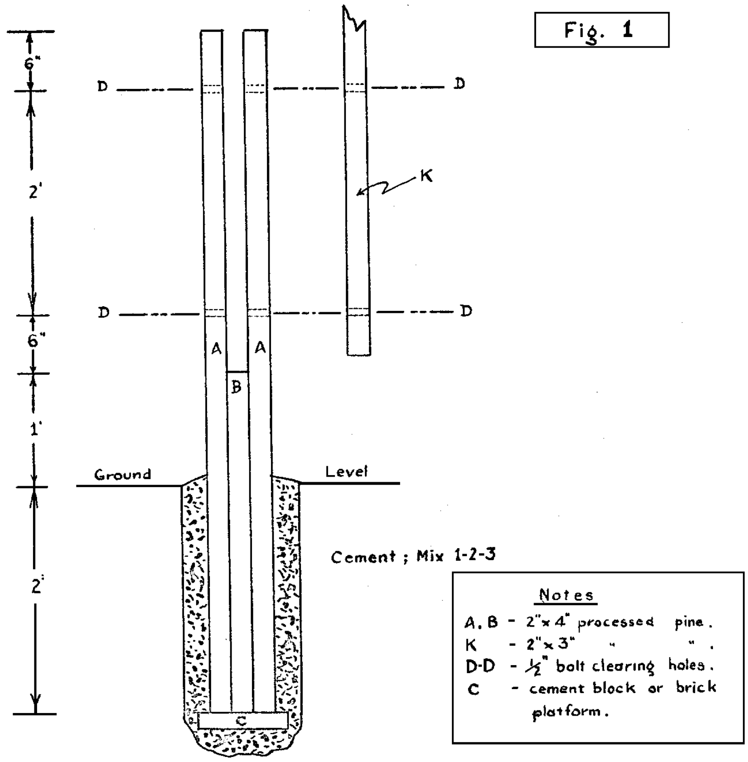


Fig. 1
6"
2'
6"
1'
2'
D
D
K
A
A
B
C
Ground
Level
Cement ; Mix 1-2-3
Notes
A, B - 2"x 4" processed pine.
K - 2"x 3" " ".
D-D - 1/2" bolt clearing holes.
C - cement block or brick platform.

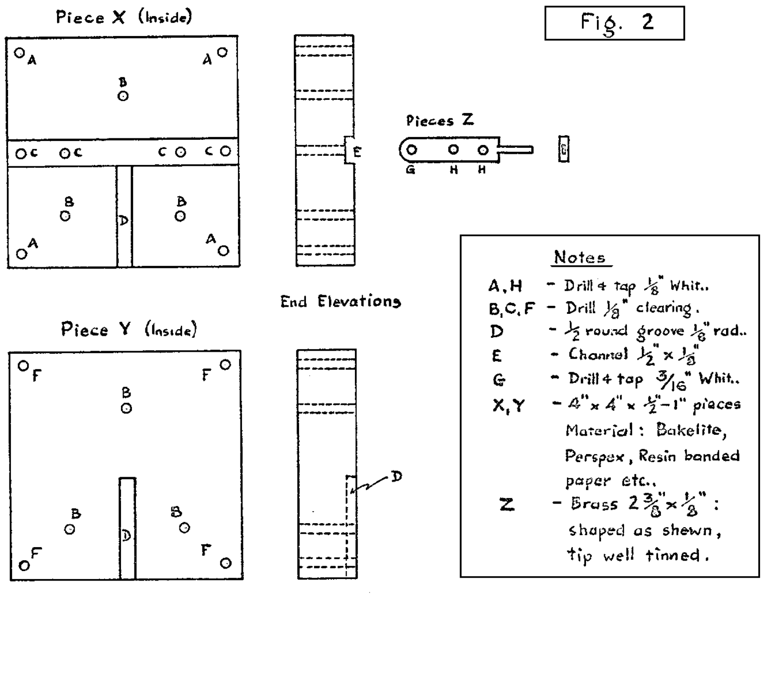


Fig. 2
Piece X (Inside)
Piece Y (Inside)
End Elevations
Pieces Z
Notes
A, H - Drill & tap 1/8" Whit..
B, C, F - Drill 1/8" clearing.
D - 1/2 round groove 1/8" rad..
E - Channel 1/2" x 1/8"
G - Drill & tap 3/16" Whit..
X, Y - 4" x 4" x 1/2"-1" pieces
Material: Bakelite, Perspex, Resin bonded paper etc..
Z - Brass 2 3/8" x 1/8" : shaped as shewn, tip well tinned.

Though not "top band" enthusiasts it might be nice to be able to work there at times, and though 80 metres is a bit of a mess on this side of the world we might like to work there too on occasions, and the system about to be described may be readily adapted for these bands, but due to space limitations we must cut our coat according to our cloth and settle for a 40, 20, 15 and 10 metre multiband job, with provision for operation on the lower frequency bands if specially desired.

Our 66ft lateral space looks, at first sight, good for a half-wave at 40 metres but, on the usual conception of a flat-top stretched between two masts, it is not, as there is no space for backstays.

It is hard for an old dog to learn new tricks, but it looks as if we must drop the old concept and concentrate on a radiating system based on a single, central stick and this is just what we do. Being of an experimental turn of mind, but lazy withal, it is decided to make this mast simple to construct and to raise and lower single-handed. Finances not being what they were before retirement, the whole system must be as economical as possible, compatible with efficiency and durability.

So, to work on the mast, which is of pine, pressure-processed to be resistant. It consists of two pieces of 2" x 4", six feet long ('A' in Fig. 1); one piece, of 2" x 4", three feet long ('B' in Fig. 1); and one piece of 2" x 3", thirty feet long ('K' in Fig. 1), this last named being longer or shorter according to location, conditions and requirements. Piece 'B' is sandwiched between the two pieces 'A', wide sides adjoining, as shown in Fig. 1, and the three pieces are fastened together by means of four long, flat-headed wood screws, spaced equidistantly and inserted, alternately, from opposite sides, screws preferably brass.(these screws are not shown in Fig. 1). Draw the three pieces together as closely as possible by means of the screws, and drill ½"clearance holes through pieces "A", in location as shown in Fig.1, noting that these MUST be drilled in the dead centre of pieces 'A', on their wide faces, and ABSOLUTELY at right angles to these faces. The base assembly is now complete.

Dig a one foot diameter, or one foot square, hole, 2½ft deep, in the ground at, or as near as possible to, the dead centre of your available space, ensuring that you allow a clear space at one side or both to allow the mast to fall clear when lowered. Place, in the centre of the bottom of the hole, a piece or pieces of cement block or brick to a height of approximately six inches from the bottom of the hole; top surface of the platform so formed to be, as nearly as possible dead level and smooth. Lower the base assembly into the hole, with its base resting centrally on the cement block or brick platform, and fill in the hole with a mixture of 1 part cement 2 parts good coarse builders sand and three parts sharp gravel, about ¼" screen. Tamp firmly and continuously while pouring, ensuring that the mix reaches every crevice of the hole, and finish up with a dome-shaped mound, slightly above ground level, and trowelled in to fit closely around the base assembly, to prevent water lying there and rotting the wood.

Fix the above-ground portion of the assembly in a dead vertical position, by means of steady-braces, and leave undisturbed for at least three days to allow concrete to dry out and harden. A week is better.

Now drill a ½"clearance hole through the dead centre of the 3" face of the 2" x 3" piece 'K', exactly 3 inches from one end, then drill another similar hole exactly 2 feet above the first. These holes MUST be at EXACTLY right angles to the 3" faces, so should, if at all possible, be done in a drill-press. They should match exactly with the holes already drilled in piece 'A'.

Next order of business is to beg, buy, borrow, steal or make a suitable centre connector, to take the two radiating sections of the antenna and the feed line, in T form. (The writer uses e very old Signals piece, formed by two round pieces of heavy Bakelite and having screws and wing nuts at each end, to which the radiating sections are connected). Suitable manufactured connectors may be available, but in case not let's make up a brain child of our own, as shown in detail in Fig.2. Channel 'E' may present some difficulty, and should be cut preferably in a milling machine, but an alternate would be to make this semi-circular groove, of $^{1}/_{8}$" radius, with a matching groove in piece 'Y', and to make pieces 'Z' of ¼" brass rod, To form groove 'D' pieces 'X' and 'Y' are clamped firmly together and a ¼" dia. drill used to form both groves simultaneously, Pieces 'Z' should be a tight fit in channel (or groove) 'E'. Assembly is simple. Holes 'C' in piece 'X' are countersunk to a depth which will place the tops of the screw heads slightly below the surface of the outside of piece 'X', and pieces 'Z' are firmly secured to piece 'X' by means of suitable $^{1}/_{8}$" Whit. brass screws, any protruding screw heads to be cut off and filed flush with pieces 'Z' and the tops of pieces 'Z' must be made flush with the inside surfaces of piece 'X' The feeder ends are then securely soldered to the tinned tips of pieces 'Z'. If co-axial feeder is used, grooves 'D' can be made a tight fit around the co-ax, forming a weather-tight joint. Various means can be used with other types of feeder, one method being to stuff the hole tight with Bostick-soaked cotton-wool and to seal the opening with clear Bostick after assembly. A weather-tight assembly is made by sandwiching a thin sheet of neoprene or rubber between pieces 'X' and 'Y', after which the whole assembly is tightly drawn together by four $^{1}/_{8}$" Whit. screws inserted through clearance holes 'F' and screwed into tapped holes in piece 'X'. The assembly is completed by two $^{3}/_{16}$" Whit. screws, $^{3}/_{4}$" long screwed into holes 'G' of pieces 'Z' and provided with suitable nuts and washers to take the radiating elements of the antenna system. The assembly is then firmly secured to one of the broad faces of mast-piece 'K' by means of three RH brass wood screws, 3½" long, with wide washers under their heads, through holes 'B'.

The mast may now be prepared for assembly. Lay piece 'K' with its top resting on the ground and its other end between base assembly verticals 'A'; with its upper hole 'D' aligned with upper holes 'D' of the base assembly. Insert a ½" carriage bolt, 7½" long, through the three upper holes 'D' and screw nut on lightly, with a washer underneath the nut.

When required, the mast is swung up, pivoting on the upper bolt, already inserted, and locked in position by means of a similar bolt through the lower holes. A drift pin, in this case a piece of ½" dia. iron rod, 7 inches long, tapered down to about $^3/_8$" and rounded off at one end, is useful in aligning the bottom holes, the drift pin being inserted through all three holes, then being driven out and replaced by the 7½" carriage bolt. Both nuts are then tightened down until adjoining faces of all three pieces are in good close contact. Excessive tightening is to be avoided, as this will cause the washers to cut into the wood and weaken it. This structure, on account of its low wind resistance and sturdy construction, should stand, without stays, in any wind which might be encountered, but stays may be included for additional security, as they are here. The stays four in number which may be of any suitable material, say 14G galvanised iron, and 'broken' each 25ft of run by small egg insulators, should be made fast to the top of the mast and run at right angles to each other, their far ends being secured to anything convenient. Here, two stays are made fast to the tops of the two antenna 'fielders', the antenna being fastened 1 ft below the stays, two additional 'fielders' being provided to take the side stays.

Next comes the radiating system, and PRACTICAL experiments carried out here indicate that by far the simplest and most efficient multiband job for 7, 14, 21 and 28 Mc/s is the half-G5RV. This consists of a radiating portion of 51 feet of 14G HD copper wire, measured from far insulator at one end to far insulator at the other end, or 25' 6" for each 'leg', measured from the centre of the centre connector to the end insulator; a 14' 6" portion of 300 Ohms transmission line, measured from the centre of the centre connector, and any length of 80 Ohms co-axial cable connected between the end of this 300 Ohms line and the transmitter or transmitter output matching network. THE DIMENSIONS ARE IMPORTANT. If operation on 3·5 Mc/s is required in addition to the frequencies mentioned above, and if space is available, the overall radiator dimension is 102 feet and the 300 Ohms section is then 29 feet. The 300 Ohm section may be of 'ribbon', but the tubular type is much superior on all counts. Also, this section may be replaced, if desired, by 400/600 Ohms open feeder, in which case the length for the half-G5RV is 17 feet, and for the full-G5RV 34 feet. Louis Varney G5RV, informs me that the 80 Ohms co-ax may be replaced by the 50 Ohms variety, without ill effect, but this has not been tried here.

Exhaustive practical tests have shown that there is no noticeable difference between results obtained with a horizontal top radiating portion and those obtained when the radiating 'legs' are sloped downwards from the mast to the ground, so it will be seen that this type of antenna can be made to occupy a minimum of lateral space while remaining quite efficient. However, if, as is the case at G3MEF, the XYL is a gardening fanatic, it is advisable to secure the far ends of the radiating portion to field poles, 8 feet or so high, so that the gardener may work unobstructed. The 'fielders' used here are standard, inexpensive 9 feet tubular steel clothes poles, with their tubular sockets set in concrete, flush with the ground.

Some authorities state that additional compensating length must be allowed in the radiating 'legs' when these are sloped away from the horizontal; up to 5% at acute angles; but this has been found here to be more academic than authentic, and no compensation has been required with an included angle of 45%.

With the antenna described, using a Panda Explorer transmitter with a modified final utilising a TT21 and with its original pi-network output circuit, together with a Z-match, SWR of unity is obtained on all frequencies covered. Results have exceeded expectations, and compare more than favourably with orthodox half-wave dipoles.

The centre mast construction and the centre connector described are equally applicable to the multi half-wave dipole antenna system, using 80 Ohms co-axial cable all the way from the Z-Match to the centre connector, but the half-G5RV antenna has been found superior in every respect, including maintenance, and simplicity and economy of construction, to the multiple dipole for all amateur bands between 7 and 28 Mc/s. However, the multiple half-wave dipole would be useful for those in confined spaces desiring to work on lower frequency bands, in which case 'loading' as described by Heaviside some time ago, could be used to conserve space while avoiding the pitfalls encountered when a self-inductive loading is used.

In conclusion, sincere thanks are offered to Louis Varney, G5RV, now a NATO consultant in Paris, for detailed information on his brain-child, and to my old friend Ed. J. Gallagher, W1DD, for his patient co-operation in protracted comparative tests on many different types of antennae, with identical antennae of various types at both ends, which, after four years and over 400 QSO's, enabled us to decide that the G5RV was best of all from the practical standpoint. (It might not work well on PAPER, but it certainly does its stuff in SPACE!)

Report from 3/343 Sqn, 42(L) Sig Regt, T.A., Amateur Radio Club.

G3PMZ
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Club activity has not been at a high level in recent months although we have frequented the 40m and 80m bands on C.W. using our modified TCS transmitter and BC348 receiver. Work is proceeding on various modifications to our 36 set which was obtained through the Royal Signal Amateur Radio Society. These are designed to reduce TV1 and to improve the modulator. It is hoped to have this transmitter on the air before long, so that we will be better able to work DX. The P.J.R.C. has also acquired an R107 on our behalf, and this will make a companion receiver for 20m operation.

After receiving a letter from the Amateur Radio Club at the Junior Leaders Regiment, Denbury, giving details of their operation from Yes Tor, we decided that we too would go portable on the same weekend. Accordingly we left Liverpool on Friday evening 29th March heading North, and set up camp on the southern face of Longridge Fell, a prominent feature just north of Preston. Saturday dawned dull and showery and we set to work to erect an 80m dipole, although the only masts available were 20ft CDN and consequently the aerial was a little on the low side. The rig on this occasion vas a conventional Tx line up running 50 watts to 5B/254M's in the PA, a single superhet, both driven from vibrator supplies, and all mounted in the back of a rather draughty Austin. It was interesting using the Tx calibration to check the resonant frequency of the dipole (expensive G.D.O.!), which came out exactly on 3·6 mc/s.

We spent the rest of the morning and the early afternoon working round the country, mainly on phone. Our schedule with the Junior Leaders was for 1500 hrs, but a short call five minutes early produced a welcome reply. A very enjoyable QSO took place in which G3CIO, HQ station Catterick, also took part. We also contacted G3PQY of 6th Regiment R.A. Larkhill who joined the three Royal Signals A.R.S. stations to make quite a large 'net'. The most surprising thing, and very confusing, was the similarity between our callsign and that used by the Junior Leaders. They were signing G3PYZ/A and the similarity to G3PMZ/A was remarkable.

Sunday was a much brighter day and we returned to Liverpool in bright sunshine after a most enjoyable weekend.

JUNIOR LEADERS REGIMENT. R. SIGNALS AMATEUR CLUB G3PYZ/A

A WEEKEND ON GREAT MIS TOR

Early in the term it was decided to hold a Weekend operating the unit amateur radio station from a high position on Dartmoor. It was eventually decided to operate from Great Mis Tor at an approximate height of 1700 ft ASL.

We left Denbury at 1500 hours with all personnel and gear stowed aboard a borrowed one ton vehicle. Arrival at the tor was at 1630 after a very bumpy ride up the track leading to the tor. The truck was unloaded and went away with instructions to collect us on Sunday, 31. As the truck disappeared out of sight J/Cpl Allison informed all that we had forgotten our tables and chairs. We pressed on regardless and soon had the operating tent erected. Aerials were the next problem and an hour or so was spent trying to erect four 34ft masts to support wire aerials. As members of the club can testify they have a nasty habit of bending into a U shape when nearly erected in the vertical position. However, we succeeded at last. Our first meal cooked by Smith 841 and Cpl Allison was then eaten (no complaints either).

At about 8 p.m. we made our first call on the air and we were answered by a station in Wiltshire followed by a station in the Rhonda Valley. The station was then closed down for the night.

During the night the wind tried to uproot the tent and aerials but thanks to some excellent erection by the boys they stayed put. On Saturday over 40 voice contacts were made, the first being with G3OFV operated by Sgt D. Jack of the Royal Signals and stationed at Colchester This was the renewal of an old friendship for Sgt. Akehurst as they were stationed together in Tripoli a few years ago.
Capt. Weiner the O i/c Radio Hobby paid us a visit on Saturday and was soon sitting crossed legged on the floor like the rest or us. During the course of the day contact was made with G3CIO the HQ station of the Royal Signals Amateur Radio Society. During the course of this contact the Army Apprentices School, Harrogate amateur radio club came on the air and joined us and a very nice three way contact followed for nearly one hour. Other amateur radio stations operated by Royal Signals personnel followed and we contacted the School of Artillery at Larkhill and G3PMZ the station of Liverpool University O.T.C.

During the late afternoon we contacted G3NCZ located near Preston. As this was near the home of J/Sig Smith more interest was taken and eventually J/Sig Smith was able to have a conversation with the operator at G3NCZ and they both discovered that they had passed each others houses many times.

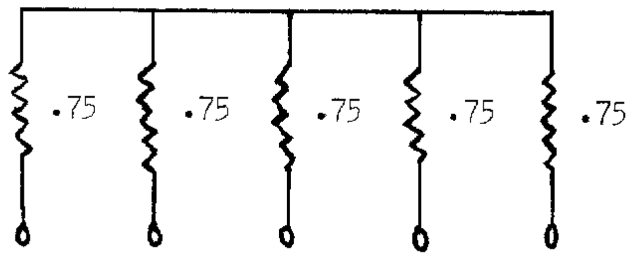
An invitation was extended to Smith to visit G3NCZ when he is next on leave. On Saturday evening contact was made with Poland on voice and an amateur station near Munich in S. Bavaria operated by a member of the U.S. Signal Corps. We also contacted stations in the U.S.A. the areas being New York, Ohio, Maryland, and Massachusetts. This completed operations for Saturday. On Sunday before dismantling the station contact was made with a personal friend at Looe in Cornwall and Romney Island. We arrived back at Denbury a 1230 in time for lunch.

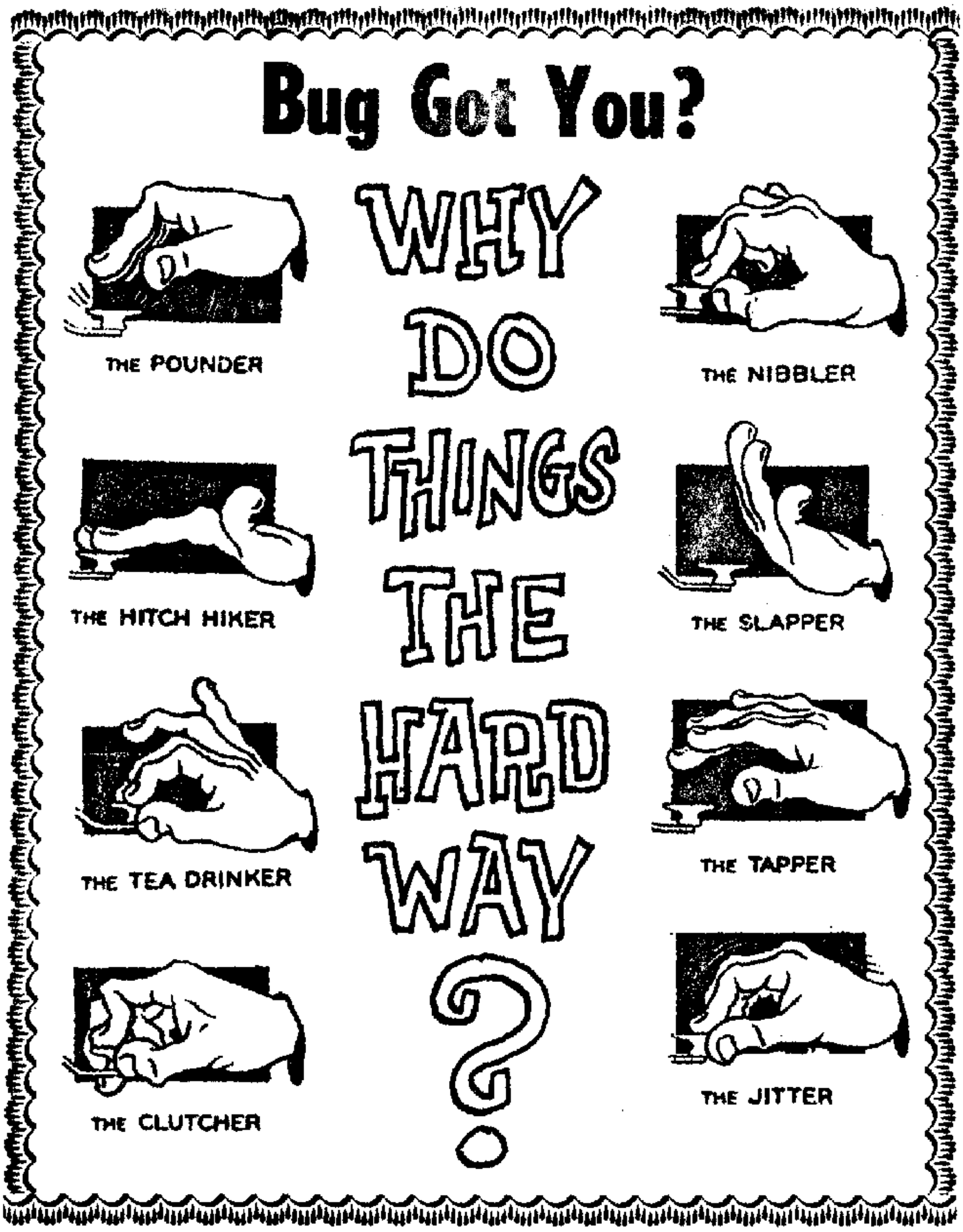
The members of the club taking part were J/Cpl Al1ison, Smith 841, Farndon, Whalley and F. Pannet who all said they had enjoyed themselves. Mention must be made of our Chief Cook and Dishwasher Smith 841, who on Saturday evening served us with a very tasty mug of soup. This started as Tomato but due to an excess of water had to be rethickened with a packet of Oxtail. The resulting flavour was excellent and Smith is applying for the patent to call his brew, Oxtoe.

BRAIN(?) TEASER SOLUTION

Our last brain teaser asked for the contents of a black box having five terminals, across any pair of which could be measured 1·5 ohms.

The first correct solution received came from GM3KLA whose answer is shown below :-




Bug Got You?
WHY DO THINGS THE HARD WAY ?
THE POUNDER
THE NIBBLER
THE HITCH HIKER
THE SLAPPER
THE TEA DRINKER
THE TAPPER
THE CLUTCHER
THE JITTER