Cambridgeshire Repeater Group

Newsletter Number 40

Millenium Rally Report	6
The Wodan Morse Key	9
Let There Be Light pt II	11
Technical Report	12
Beginners Receiver Project	14
A Matching Transmitter	26
Formula One Telemetry	30
20th Century Dates Puzzle	34

2000 Committee Members

CHAIRMAN
Gerald Gardner GOHEM
New House, Birdbush Avenue
Saffron Walden
Essex CB I I 4DJ
01799 500543
gerald@gardner.enta.net

SECRETARY
David Leech G7DIU
4 Rydal Close
Huntingdon
Cambs PEI8 6IJF
01480 431333
david.leech@lineone.net

TREASURER
Roger Carder G7SRK
45 Chalklands
Linton
CambsCBl 6HQ
01223 891668
rcarder@virgin.net

REPEATER KEEPER
Tony Collett G4NBS
10 Quince Road
Hardwick
Cambs CB3 7XJ
01954 211521
0468 0224992

TECHNICAL COORDINATOR
Eddie Boyd G8CRN
20 Dolphin Close
Linton
Cambs CB1 6XA
01223 894788
07909 535029

RALLY ORGANISER
Paul Dyke GOLUC
76 Gaunts Way
Letchworth
Herts SG6 4PN
01462 683574
07050 1261692
goluc@btinternet.com

NEWSLETTER EDITOR
Terry Bickell G0UIO
161 High Street
Chesterton
Cambridge CB4 INL
01223 572226
g0uio@ukonline.co.uk

COMMITTEE MEMBER
Ian Waters G3KKD
39 Stow Road
Stow-cum-Quy
Cambridge CBS 9AD
01223 811477
ian.waters@freenet.co.uk

Editorial

Welcome to issue 40 of the newsletter. The rally is now over with for another year (see article for a review) and plans are already being made for the next one. As usual it was a good chance to meet up with old friends and catch up on all the gossip.

Once again I have to make the usual plea – there must be members out there with a tale to tell. Every time the newsletter deadline comes around I have to desperately hunt for articles, when all it takes is for just a few of those who use our repeaters frequently to make a little effort. Worst of all is when I get a promise of an article and it never materialises. *Moral: if you can't put up, shut up*. There, is that subtle enough for you?

Those of you with Internet access may have experienced problems with delays loading the CRG Home Page (www.qsl.net/crg). This is due to problems with the US-based Server. Although this address can still be used, we also now have our own 'proper' site, at www.gb3pi.org.uk. You may find this one quicker to access, but whichever one you choose, please sign the guest book and let us know what you think. Many thanks to Paul, ***G0LUC*** for all his hard work maintaining our Internet presence.

Just a reminder that membership enquiries and subscription renewals should go to our treasurer, Roger ***G7SRK*** at his home address. Feel free to pass this important information on to all your friends.

73 de Terry G0UIO

	GB3PI	GB3PY	GB3PX	GB3PT	GB3PS	GB3PV	GB7PX-2	GB7PX-1	GB7PX-7
Transmitter									
Operating Channel	R6	RB8	R58	439.7125MHz	RM3	RMT12	144.950MHz	1299.425MHz	439.825MHz
Location	Barkway, Herts	Madingley, Cambs	Barkway, Herts	Barkway, Herts	Berkway, Herts	Madingley, Cambs	Madingley, Cambs	Madingley, Cambs	Madingley, Cambs
Mode	Speech	Speech	Speech	9600bps data	Speech	FM TV	AX25	AX25	AX25
Polarisation	Vertical	Vertical	Vertical	Vertical	Vertical	Horizontal	Vertical	Vertical	Vertical
ERP	25W	25W	18W	20W	10W	9W	5W	25W	25W
Frequency	145.750MHz	433.200MHz	51.280MHz	439.7125MHz	1297.075MHz	1318.5MHz	144.950MHz	1299.425MHz	439.825MHz
Aerial: Type	2x2 ele yagis	Stacked dipoles	Dipole	Stacked dipoles	White stick	Alford slot	Dipole	15+15 yagi	8 ele yagi
Direction	North	South-east	Omni	Omni	Omni	Omni	Omni	315	196
Receiver:									
Frequency	145.150MHz	434.800MHz	50.780MHz	430.5125MHz	1291.075MHz	1249.650MHz	144.950MHz	1299.425MHz	439.825MHz
12dB SINAD at	.0.18uV (p.d.)	0.19uV (p.d.)	0.175uV (p.d.)	N/A	0.18uV (p.d.)	N/A	0.32uV (p.d.)	N/A	N/A
Direction	(single ant wkg)	(single ant wkg)	(single ant wkg)	(single ant wkg)	(single ant wkg)	single ant wkg	(single ant wkg)	(single ant wkg)	(single ant wkg)
Access method	1750Hz tone plus speech	1750Hz tone	Continuous CTCSS	Valid data	1750Hz tone	Video signal (line sync)	Packet repeater	Packet link	Packet link
CTCSS (77Hz) access?	Y	Y	Y	N/A	No (planned)	N	N/A	N/A	N/A
CTCSS (77Hz) transmit?	Y	Y	Y	N/A	Y	N	N/A	N/A	N/A
Timeout	2 minutes	5 minutes	None	None	10 minutes	10 minutes	N/A	N/A	N/A
Reaccess after timeout?	Y	Y	N/A	N/A	N	N	N/A	N/A	N/A

CRG Members 2000

G0: ANV, DKE, EVZ, GKP, HEM, KRB, LUC, NDY, NQN, OKL, OQD, OQE, PYS, SFQ, TLQ, UBX, UEU, UIO, UPY, WVE

G1: DRM, JZN, LTL, MHU, RVF, UAF, WSF, XAA, XAM, YFE, YFF, ZPU

G3: EDD, FCM, GGK, KKD, KZE, LAZ, NIE, NUL, PTQ, PWK

G4: AKD, BAO, BIK, ETG, FDF, JRC, KJJ, NBS, WIA, YFU, YHN, ZZM

G6: DFR, DGT, FKS, FNB, GZH, HBQ, HKQ, KJR, RNN, TQM, XRX, YMU

G7: ASH, DIU, JJP, JSB, JUC, SRK, RVS, VCE

G8: CRN, DJK, IDL, INI, JHE, JSL, KMM, VJF, XLH

M0: ASH, BWH

M1: ADV, AQP, CKO, DDZ, DJY, DTX, DZF, EEO, EOI, GRT

M5: AGX, AXX

2E1: CRK, HLF, HLH

2E0: ASU

3 SWL. 104 Members.

Millennium Rally Report

After a thoroughly wet and horrible Saturday, the morning of Sunday 16th April was bright and sunny. Taking advantage of the weather, perhaps, by 7.30am traders had already arrived and were busy setting up.

After problems last year, we had arranged extra parking by the car boot sale once the main car park was full. Fortunately our concern that the grass would be too waterlogged for vehicles was unfounded, and thanks to care taken by visitors we didn't leave a rugby pitch behind!

As usual, some visitors decided to arrive early to catch all the car-boot bargains, and by 9.30 lots of people were milling about. I should point out that the rally photographs in this issue were taken early in the morning, before most visitors had arrived – please don't think nobody turned up…

We did have some concerns as the date for the Rally grew nearer and

not all the tables had been booked by traders. However, we needn't have worried, and there was only one set of tables empty, the trader having failed to turn up. It seems as though all the others had been paying particular attention to the long-range weather forecast, though, especially those who arrived on the day to take a car boot pitch.

When reading through the hobby magazines, it's sad to see that so many Amateur Radio Rallies are being cancelled; the blame usually put upon

the increasing amount of computer equipment for sale at the expense of radio gear. It was therefore nice to see that although computers were very much in evidence, there seemed to be more radio hardware and components for sale. Hopefully this trend will continue, and we can look forward to a more even mix of traders at future events. Indeed, here's an early note for next year's diary; the Rally date is Sunday the 8th April 2001, which is the week before Easter.

Without some help from the membership on the day, running the Rally would be too difficult for the CRG Committee to manage alone. Therefore special thanks are due to Ken, ***G7JUC***, John, ***G7JSB*** and Mike ***G8VCN***. Also to Jane, Ebony, Mavis & Brian (for the auction help), Matt (the bouncer on the door) the other spouses & friends who pitched in to help.

In conclusion, I think this year's Rally was definitely a success, with a wide variety of traders and to top it all a lovely sunny day. I hope those of you who attended will agree with me, which seemed to be the case from comments I heard on the Repeaters afterwards.

Question for Members

Brian, ***G1RVF***, has Emailed me the following, and would like to hear from any other members who have experienced this problem.

"Following a chat with a few people complaining of low audio from PI, could you place a question in the newsletter asking people to say what radios they are using, whether they are also experiencing low audio levels on PI compared to other repeaters,. and to send their replies to me via e-mail.
"I don't expect much of a response nor will the numbers be large enough to prove anything! but I would be interested just the same

73, Brian. g1rvf@redhotant.com"

The Wodan Morse Key Mk 2

By John S Smith G4KJJ

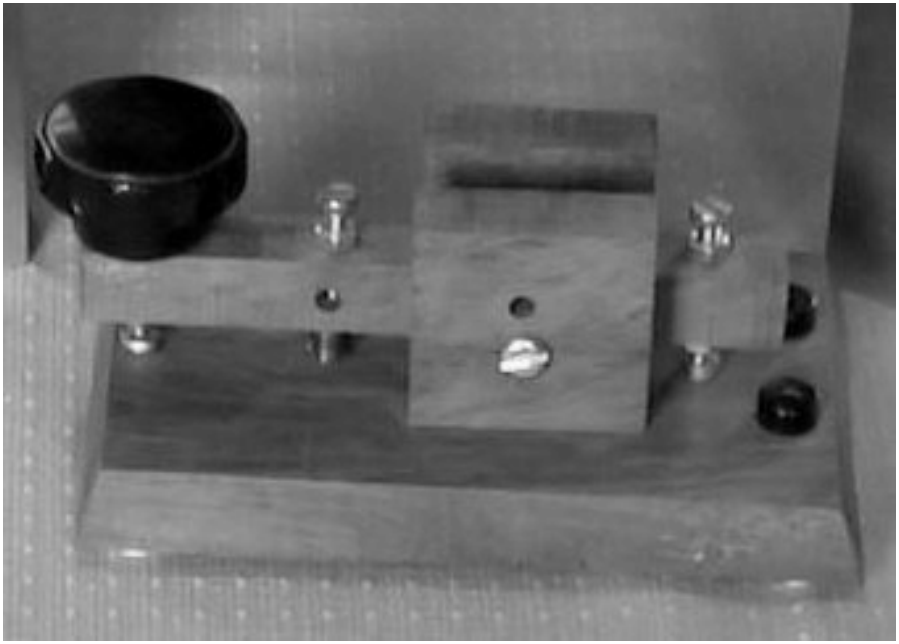
This key has been primarily designed for use by QRP operators but will be of interest to those Radio Amateurs who like to create and use their own equipment. It is in agreement with the QRP philosophy KISS, being cheap and made from readily available material, i.e. wood! Its unique all wood design, except for a few contact parts and a spring which by necessity must be metal place a number of operating limitations on the user. Other features, which are again unique to this key, easily outweigh these disadvantages, no other commercially available unit as far as I am aware can meet this specification, details later.

The limitations are as follows, the key must not be used in direct sunlight and the ambient temperature must not exceed 42 degrees centigrade or be lower than minus 27 degrees centigrade. Keying speed should not normally exceed 25 wpm, although short duration bursts up to 40 wpm are permissible. The Wodan Mk2 does however have the advantage of a small 12v-fan unit, which can be mounted above the anvils. This option is really limited to base station use and is not recommended for portable operation where power supplies are a consideration. Provision was made for this feature (not shown in the photograph. fixing holes visible) to be added to the Mk 2, thought prudent after the untimely demise of the Wodan Key Mk1. following an extended period of operation on the 80m band on one of the few very hot days last summer! Additional cooling is provided by the flutes/spirals/ threads that are just discernible in the photograph and the relatively large flat and dark brown surfaces of the arm and anvils, which serve to increase heat loss, by convection/ radiation. The wood in this case is mahogany, with a relatively high specific heat, which also contributes to the dissipation of heat throughout the body of the key. Even with these sophisticated design considerations the maximum directly keyed power should not exceed 5 watts, not considered to be a problem for the dedicated QRP enthusiast; fan cooling extends this limit to 10w.

This key should be of particular interest to maritime-mobile operators, outdoor operators / fishermen/channel swimmers or amateurs like myself, who by choice operate from the horizontal position in bed, and now, thanks to the Wodan Mk2 the bath. A word of caution, on no account attempt to use mains operated equipment or any high voltage equipment in the bath!

The Wodan Mk 2 Morse key is unique. Simple wood working skills and a few hours of your time is all that is needed to reproduce this remarkable design. Many tempting offers to purchase the original Wodan key from collectors world-wide have been refused, with a gentle suggestion that they make their own! It now only remains for me to comment briefly on the construction and operating features of the "Wodan" and my experiences of use on the air.

The physical size of the key depends on personal preferences. The larger the arm the greater the inertia the slower the speed and increased effort in operation. The key in the photograph is sitting on a base 12cm long and



7.5cm wide. Arm length 11cm,anvils 3.6cm square blocks; base, arm, anvils 1cm wide. The contact gap, arm tension, backstop adjustments, follow the traditional construction methods and provide adequate variability to suit most "fists"

Although some of the above comments are tongue-in-cheek the Wodan is a working key. It has the general handling characteristics of a pitbull, and taking it for a walk on the air although pleasurable induces fatigue after a short period. It is however far more forgiving than the average pitbull when passed over for an outing and you take your favourite key for a workout on the bands instead!

Let there be light II

John Bonner GOGKP.

In a large HF transmitter site in the middle east, the lights and transmitters have all gone off, but not to worry because the very large diesel generator (in a cave about half a mile away) will soon be up and running. This happens because a solenoid is released and its contact rings a large bell, (from a car battery,) to alert the attendant who leaps up and lights the waiting oil-soaked rags in depressions on the six cylinder heads as pre-heaters. He then starts to crank a handle to get a flywheel spinning and as the rags burn out, a lever is thrown to connect this flywheel to the engine to turn and start it and… we have supply again. That was the theory but what often happened was… nothing! So, we trudged over to the cave to find the attendant asleep, a wad of paper under the bell hammer and no waiting oily rags. After about twenty five minutes we get the engine/generator running nicely and have returned to the site to find lights and the smaller transmitters working but the large ones have to be run up slowly; LT and grid biases and wait for timers, medium HT's on and check all drive levels, finally the main 6kV HT's and check outputs are OK. Oh, by the way… did anyone check the fuel tank level?

Technical Report

Eddy Boyd G8CRN

1) Madingley Site

a) GB7PX-1 (23cm Packet)
GB7PX-2 (2m Packet)
GB7PX-7 (70cm Packet)

All reported functional.

b) GB3PV (23cm TV)

Despite intermittent logic problems, this is performing relatively well. Ian, ***G3KKD***, welcomes more use of this repeater and is always available to conduct path profile tests with anyone interested.

c) GB3PY (70cm Speech)

Problems with an intermittently low transmit output have been traced to a dry joint in the input circuit of the PA module. The TX driver output section has also been modified in accordance with the manufacturer's recommendations to improve stability. The possibility of adding a high-stability ovened reference oscillator to the transmitter is being investigated. If successful, this will maintain PY's output frequency within 1Hz. The RA have announced that there is no mandatory requirement to change to 12.5KHz, so GB3PY will remain at 25KHz. Thanks to G4BIK for help in maintaining this repeater.

2) Barkway Site

a) GB7PT (70cm High-Speed Packet)

Over the last three months there have been problems with accessing, owing to the logic "locking-up"! The Tx has also suffered, with the VCO being "out of lock". Thankfully these problems have been resolved, thanks to ***G1YFF***, ***G1ZPU***. Sometime in the coming few months, there are plans to include a small UPS or a 24V DC based PSU backup system – this should help with any "brown-outs" occurring.

b) GB3PS (23cm Speech)

Working well and giving sterling service.

c) GB3PI (2m Speech)

i) To comply with the latest RA regulations, the Tx deviation was reduced to ±2.5KHz (CTCSS deviation ±300Hz) approximately mid-May. Shortly after, ***G1YFF*** increased the CTCSS deviation to ±400Hz as some users were reporting problems with Kenwood equipments using their CTCSS decode function (these are known to require higher levels!).

ii) The "backup batteries" are now technically "spent"; the group is currently sourcing new sealed gel batteries.

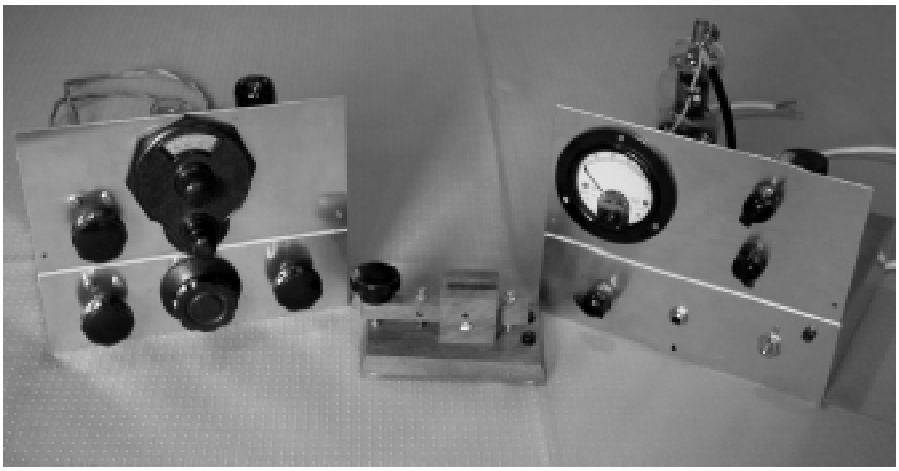
iii) Some background interference is still being experienced on an intermittent basis. This situation will be monitored carefully but is proving difficult to track down.

d) GB3PX (6m Speech)

Tx/Rx range has suffered lately. This has been traced to a faulty antenna. A new one is being sourced which will then be installed in conjunction with NTL, the site owners.

A Practical Beginners Receiver Project

Submitted by John Smith G4KJJ[1]



This receiver was originally designed as a standby set for those occasions when the main equipment was being used on a differing frequency — as is sometimes the case when an amateur contact is taking place with one transmitter radiating on 80 metres and the other on, say, the 160 metre band. It is an ideal receiver for the beginner to Construct in that, with the first version, the valves used are of the octal type. This valve has a somewhat larger base than the other types featured in this book and, since this is so, it follows that the actual valve holder is also of larger physical dimensions. The use of such a larger type of valve and valve holder enables the beginner—probably wielding a soldering iron for the first time—some degree of latitude with respect to the iron bit and the surrounding components.

Octal valves themselves are easily obtainable and are, in fact, current equipment types — not being obsolete by any means. They are obtainable either brand new or as ‘surplus’ types.

A comparable design, but using the miniature types, is described later and, in this manner, the intending constructor has the choice of two receivers each incorporating a differing type of valve but both using the same range of plug-in type coils. These are the Denco (Clacton) Ltd. miniature dual purpose coils of the Green range .(see Component Lists). The coverage of these coils is as follows:— Range 1, 750 to 2000 metres; Range 2, 195 to 580 metres; Range 3, 57 to 180 metres; Range 4, 20 to 60 metres; and Range 5, 9.5 to 28 metres. The actual coverage of the receiver will, of course, be somewhat different by virtue of the fact that a bandspread condenser has been included in the design. The range to be expected is as given for the 'Centurion' receiver.

Circuit Description

With this receiver, the minimum of components has been used consistent with reasonable efficiency. The power supply has been constructed as a separate unit, partly for the reason that it is required for other apparatus at times, and partly for the fact that most beginners prefer to build a power supply as an individual item of equipment.

In the first stage of the receiver, a 6SL7GT high-mu double triode acts as detector and first audio amplifier, the resultant audio being fed directly into the output stage via a volume control. The output stage is entirely conventional and consists of the 6V6GT output beam tetrode.

Plug-in coils are used as these have several advantages for the beginner over the manufactured coil assembly types. They are available separately, and may be thus purchased one at a time if required; also the use of these coils obviates the need for a switching system with its attendant losses and, to the beginner, its complex wiring.

A series aerial condenser is incorporated in order to avoid 'dead spots' with the reaction control. In the prototype shown herewith, this is mounted on the chassis, but if preferred, this could easily be mounted on the front panel thus allowing instant variation without recourse to

screwdriver adjustments for each coil inserted.

The output transformer is of the midget variety enabling this to be mounted under the chassis and on the chassis backdrop.

Circuit

This is shown in Fig. 1, the aerial being fed into the primary winding of the coil via C1, the variable condensers C2 and C, being the handset and bandspread controls respectively. R1 and form the grid components of the leaky grid detector. Reaction is obtained by varying the condenser C5 As this is in series with the anode it therefore has an r.f. potential across it. This being so, the actual condenser must ***NOT*** be earthed to the chassis at any point.

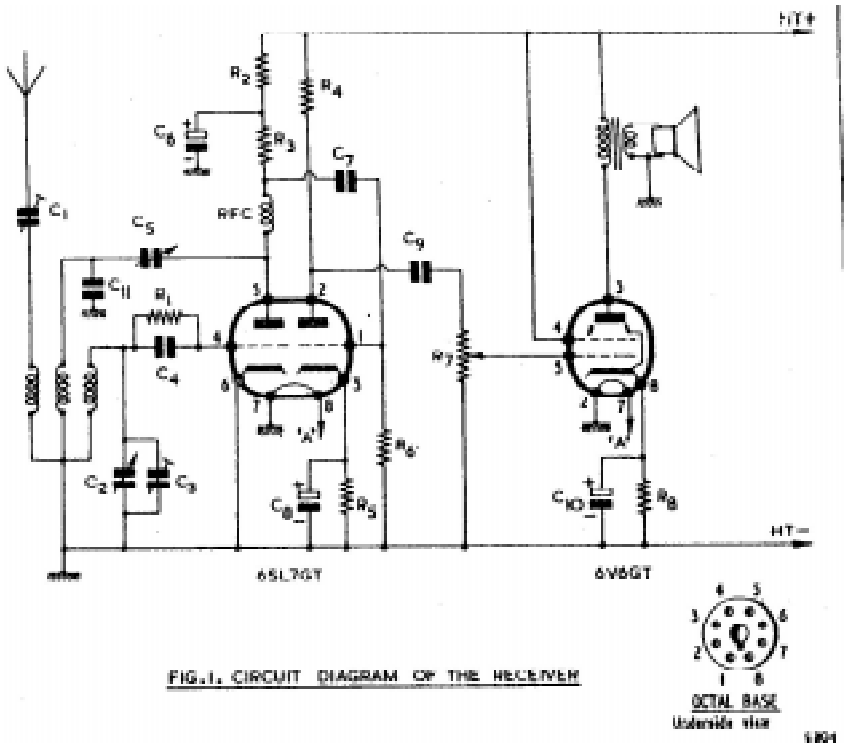


FIG. 1. CIRCUIT DIAGRAM OF THE RECEIVER

As mounted in the prototype, two insulating washers and a short length of paxolin tube have been used in securing the component to the front panel — effectively isolating the metal parts from the chassis and panel. The same object may be achieved by cutting out a small square from the panel and bolting into position a slightly larger square of paxolin, through which a hole has been drilled enabling the condenser to be mounted. If adopting this method, however, ensure that the condenser fixing nut does not itself come into contact with the panel or chassis

The resistors R2 and R3 form the decoupling and anode load components which, together with the associated bypass condensers C5 and ensure that smooth reaction is obtained, in association with the other detector circuit components, over the range of the receiver.

The audio output of the detector stage is fed, via C7, into the grid of the following triode portion of the 6SL7GT, where R6 acts as the grid leak component. Cathode bias is supplied via the resistor R5 and the electrolytic condenser C8. R4 is the anode load and the output of this first audio amplifying stage is taken, via C9, into the volume control R7.

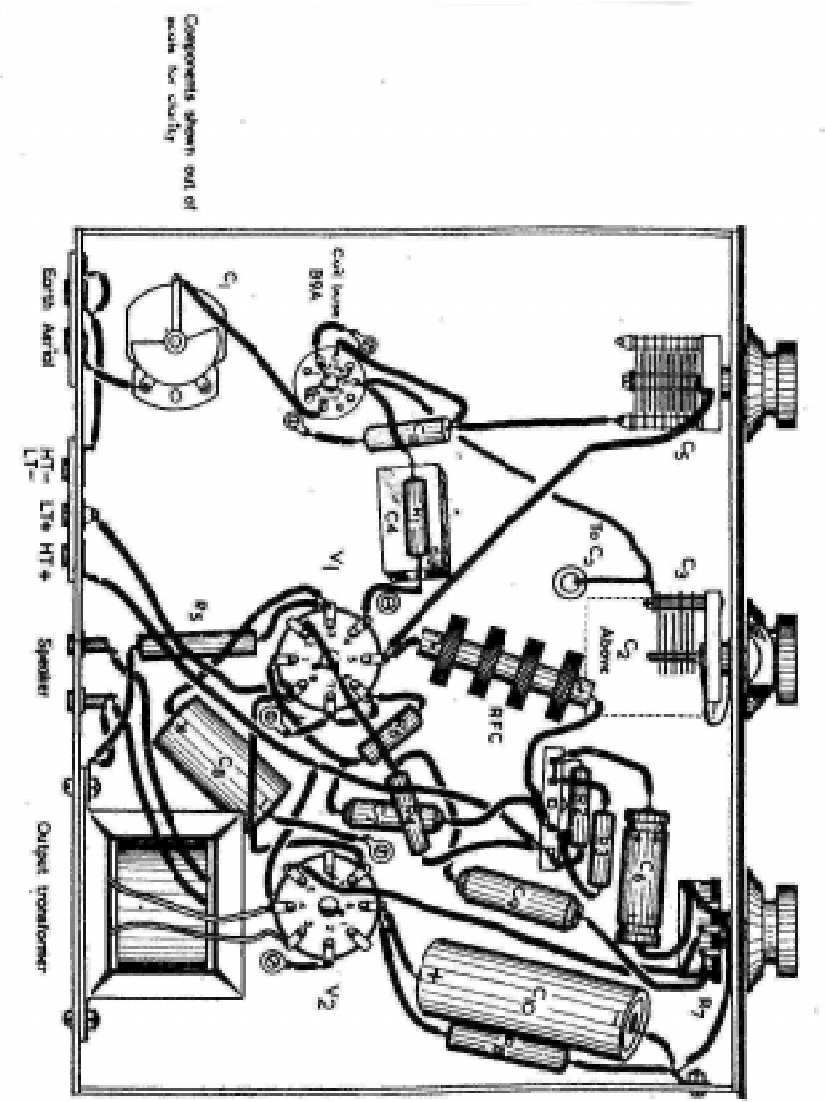
The output stage is entirely conventional and one with which the beginner soon becomes conversant, the 6V6GT being a very popular output valve with home constructors. R8 and C10 are the bias components

Constructional Notes

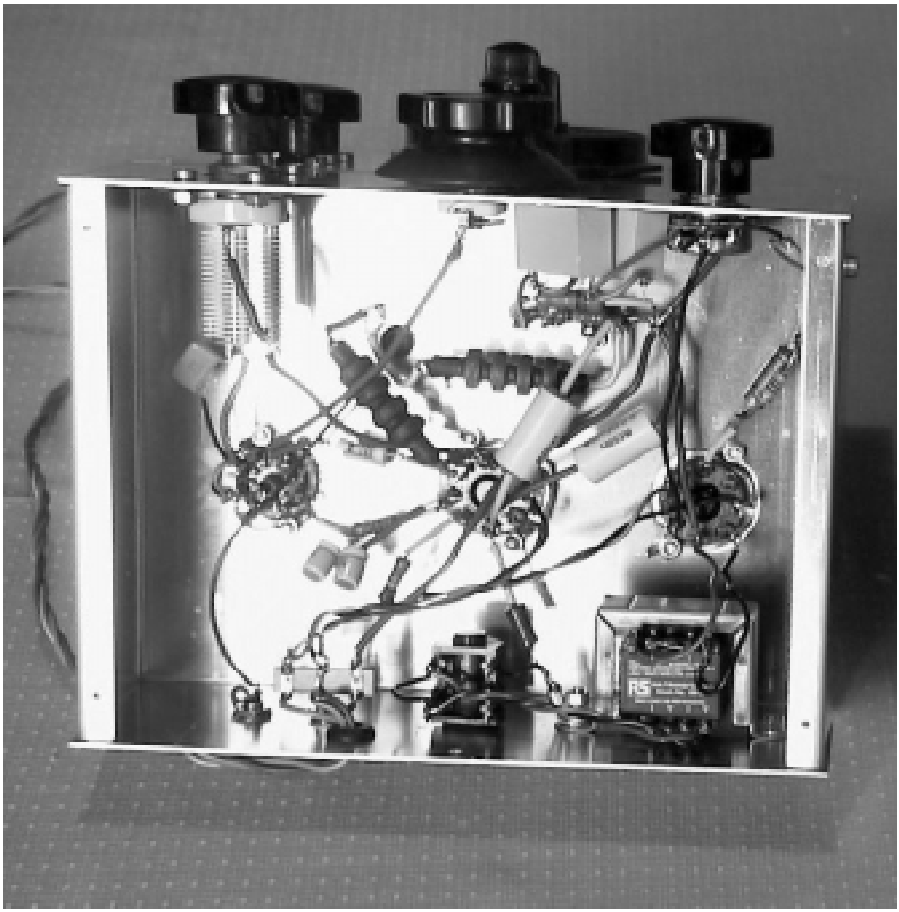
Providing the circuit as shown in Fig. 1 and the illustrations are studied carefully from time to time as construction advances, no difficulty should be experienced by the beginner. The layout is straightforward and, commencing with the detector portion of the double triode valve, the logical sequence of wiring follows thus: 1st audio stage followed by the output stage.

All the resistors are watt and the ratings and types of the various

condensers are given in the component list. All of the specified parts are currently obtainable on the market — suppliers of the various items used being stated where applicable.



Drilling details of the front panel, chassis and chassis backdrop are given later. Beginners are advised to obtain the components and also a chassis



size 7 in. by 5 in. by 2 in. together with an aluminium panel size 7 in. by 6 in. A slightly larger panel and chassis will, of course, do no harm; one does not necessarily have to conform strictly to either the sizes stated or the drilling details given. Provided the panel and chassis are of sufficient size, the remaining point of importance is to ensure that the layout of the components as shown herewith, is followed reasonably closely.

Fig. 1, in addition to showing the circuit of the receiver, also features a small inset. This is the octal valve base as seen from the underside, and this, in turn, refers to the numbers shown on the circuit around each valve. Thus, in the detector stage pin 6 is the cathode and must therefore be wired to an earth tag.

When mounting the actual valve holders, one earth tag should be bolted to each holder, using one of the self-same bolts which secure the valve holder so the chassis. In this way, each valve has its own earth return.

The speaker is separate from the receiver, a small 5 in. type being sufficient for the purpose, it being fed from a paxolin strip mounted on the receiver chassis backdrop.

Power Supply

This is shown in Fig. 2. It is generally conceded that the power pack is the item of equipment which frightens the beginner most of all. Having perhaps had some experience of battery supplies with 90 or 120 volts of h.t., the — to the beginner — 'high voltages' of mains equipment, in this case 200 volts or so on load, is apt to be somewhat of a problem. This being so, it is proposed to clearly itemise the construction of the power pack.

The chassis size is the same as that for the receiver — 5 in. by 7in. by 2 in — Provided the same mains transformer and rectifier as specified are used, the following instructions, if carefully carried out, will result in a power supply which will cause no worry at all.

Before commencing, however, a few words about power supplies and the very obvious precautions to be taken AT ALL TIMES will not come amiss. With the unit completed, and connected to the receiver, NEVER make any adjustment or alterations to the circuit with the power supply either switched on or connected to the mains. If you insist on making

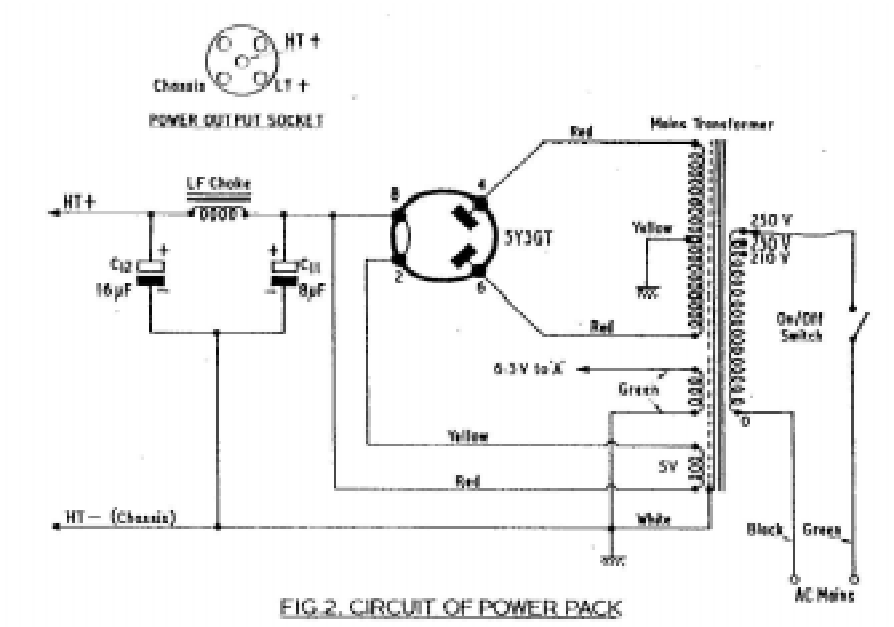


FIG.2. CIRCUIT OF POWER PACK

any alteration while the set is working, then place one hand behind your back — or better still — put one hand in your pocket.

With the components mounted on the chassis as shown in the photograph, not forgetting the use of rubber grommets for **ALL** leads going through the chassis back, commence wiring as follows.

Mains transformer - white yellow and one green lead (one of the thick enamel covered ones) should be connected to chassis. This connection is soldered to the earthed tag of the tag strip mounted on the chassis wall. The other thick green lead is connected to pin 3 of the valve holder, and from there a short length of wire is taken to the appropriate tag of the power output socket (see Fig. 2). NOTE: In case you are mystified by the use of pin 3 of the valve holder, this is used solely as a holding tag — no connection is made to the actual valve, by virtue of the fact that

the 5Y3GT has no pin 3 at all. The thin red and blue wires should have their open ends taped with insulation tape and then be tucked away under the paxolin strip. Ensure that the taping is done efficiently, that neither open end is in contact with each other and that no accidental connection is made with the chassis.

The thin black wire should next be soldered to a free tag, i.e., not an earthed one, of the tag strip. The thin green wire should be similarly treated.

A length of twisted mains lead should now be fed through a rubber grommet affixed to the wall at the rear of the chassis. Baring both wire ends, solder one each to either side of the on/off switch. At a point near the tag strip, cut one wire only. Bare both ends of these cut lengths and solder one to the same tag already holding the thin black wire. Solder the other end of the cut length to the tag to which the thin green wire has previously been soldered.

On the other side of the mains transformers there are three red wires. Select the thick red wire and connect to pin 8 of the valve-holder. (This wire is enamel covered). The thick yellow wire (also enamel covered) should now be connected to pin 2 of the valve holder. Before attempting to solder, however, ensure that the enamel is removed, otherwise a bad connection will result. One way of removing this enamel is to scrape away the covering with either an old knife or a single-edged razor blade.

The two thin red wires should now be soldered to pint 4 and 6 of the valve holder — one wire to each pin of course.

From either pin 2 or 8, it does not matter which, solder a length of covered wire, the other end of which is secured to the 8µF tag of the smoothing condenser, and from there to the tag of the smoothing choke — it does not matter which tag.

From the other tag of the smoothing choke, solder a length of covered

wire to the 16µF tag of the condenser and from there to the power output socket (see Fig. 2).

The power supply is taken from the power pack to the receiver via a short length of 3-way cable. This cable is terminated at each end with a miniature plug arrangement which inserts into an appropriate socket forming part of a paxolin assembly mounted on both the receiver and power pack chassis backdrop. Having completed the wiring as described, next check that the above instructions have been carried out, check with the circuit diagram, then insert the valve. Connect to the mains supply socket via a suitable plug and switch on. The valve filaments should glow red, switch off. Do not allow the power pack to run for a long period when not connected to the receiver as this will eventually damage the valve.

Conclusion

With the information given, together with the circuit diagrams and the illustrations, the beginner, and those requiring a small standby receiver, may go ahead and construct the power pack while at the same time gathering the components for the receiver. A comparable design using the miniature valves 12AT7, 6BW6 and EZ4l follows.

List of Components

Resistors
R1 1M ½ watt
R2 10k ½ watt
R3 100k ½ watt
R4 100k ½ watt
R5 1k ½ watt
R6 470k ½ watt
R7 500k Pot
R8 270R ½ watt

Condensers
C1 25pF variable
C2 365pF JB single-gang type ‘D’
C3 25pF variable
C4 l00pF, mica
C5 75pF, variable
C6 2µF 350V wkg, TCC type CE17N
C7 0.02µF 350V wkg, TCC type CP33N
C8 25µF 25V wkg, electrolytic
C9 0.02µF 350V wkg, TCC type CP33N

Valves
6SL7GT Brimar
6V6GT Brimar

Chassis and Panel
The Teletron Co.

Output Transformer
Miniature type

Coils
Denco (Clacton) Ltd. Miniature dual purpose (Green) Ranges 1 to 5

C10 25µF 25V wkg, electrolytic
C11 100pF, ceramic

R.F. Choke

Valve holders
McMurdo

Paxolin Strips, etc.

Power Pack Component List

Chassis

Mains Transformer
Ellison type MTl6l

Tag Strips, Plugs and Sockets, etc.

L.F. Choke
10H, 6OmA

C11 and C12
8 x 16µF 350V wkg, electrolytic

Valve
5Y3GT Brimar

Although the receiver previously described was recommended as a design for the beginner, there is no reason why that offered herewith should not also he constructed by the learner. The main constructional difference lies in the fact that wish these smaller based valves, there is far less physical room around the actual valve-holder in which so mount the various components. The use of a miniature soldering iron is advised in order to avoid heat damage to the surrounding components.

The circuit about to be described is very similar to that featured in the last chapter, except that the 6SL7 detector stage has been superseded by a 12AT7, and the 6V6GT output stage by a 6BW6 — the octal

variety, therefore, being replaced in the design by the B9A (Noval) types.

As before, the power supply is separate from the receiver, the 5Y3GT being replaced by the Mullard EZ41 miniature B8A rectifier.

The receiver front panel layout is exactly the same—the chassis, of course, being somewhat different so accommodate the smaller type valves.

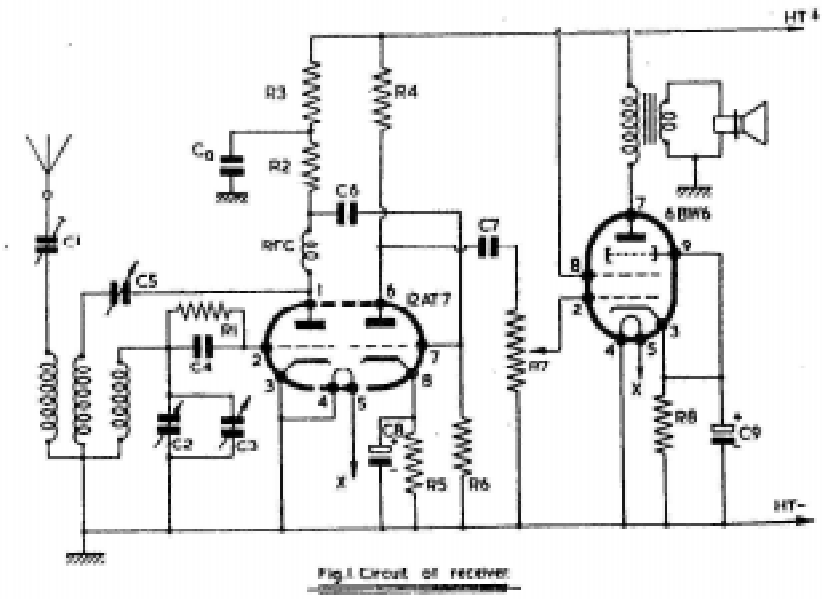


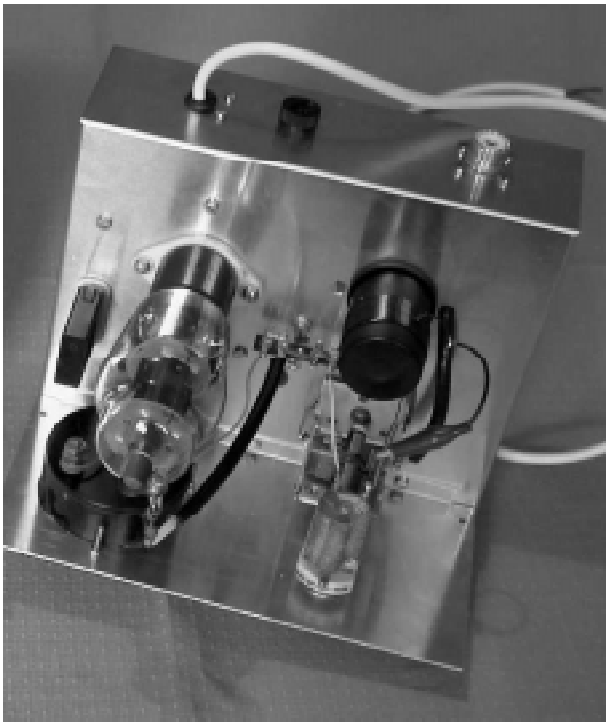
Fig.1 Circuit of receiver

[1] *Adapted from 'Short Wave Receivers for the Beginner', published by Data Publications Ltd*

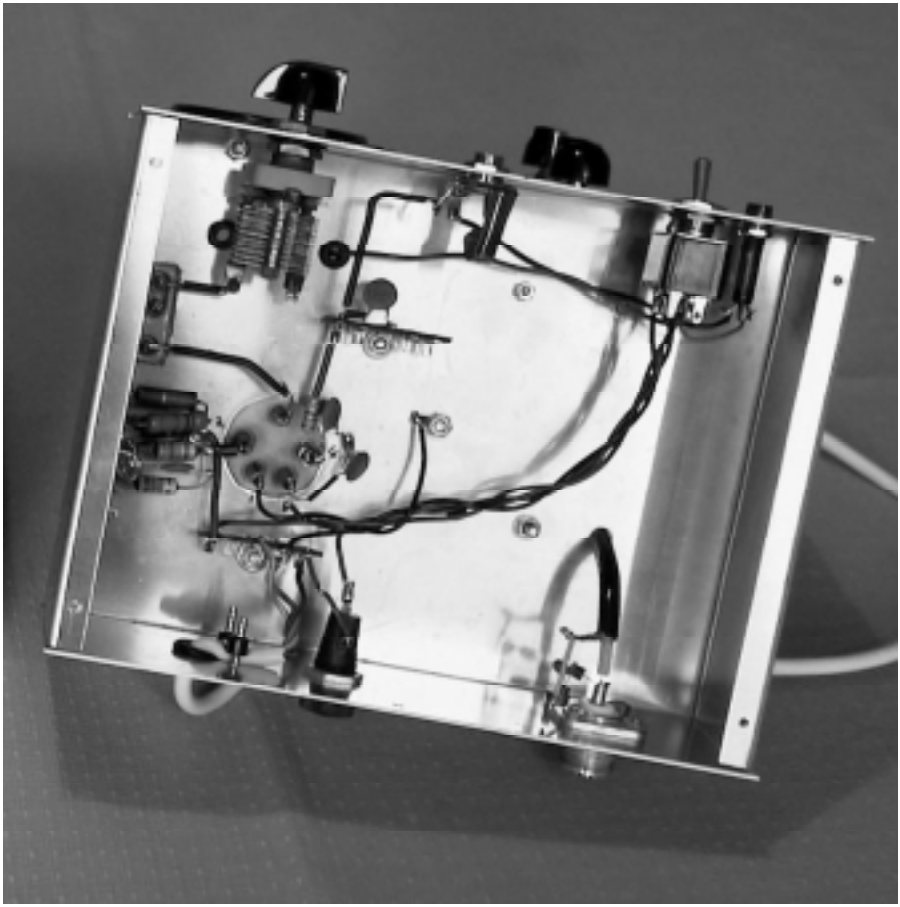
A Matching Beginners Transmitter

John Smith G4KJJ

No originality is claimed for this circuit. The motivation to construct such a simple transmitter was the pleasing appeal of the shape and size of the 807 valve, well they do say, each to his own ☺. The other factor was that it is possible to get a reasonable power output, in this case 5w on 80m, 2w on 40m. More power is of course possible with a higher HT voltage. Perhaps I should give a word of warning here to those of you more used to dealing with solid state equipment. The top cap of the valve, the anode, has in my case 250v (key down, more key-up!) relative to the chassis, potentially lethal, so do be careful and preferably enclose the unit completely when in operation. The watch word here is, 'do as I say not as I do'; I like to see the valve glowing. I intend to insulate the top cap at some future time, hopefully before I receive an "instructive belt"!

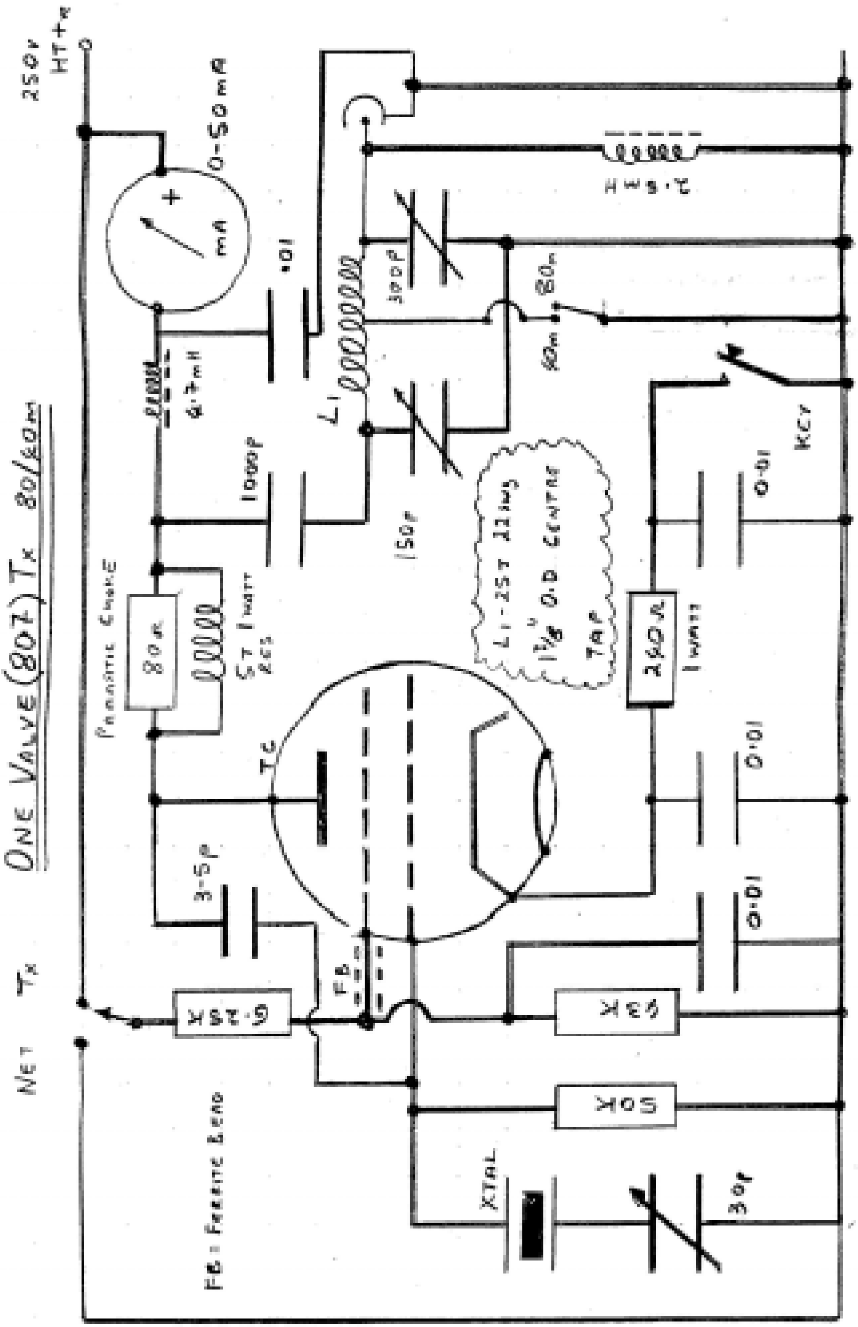


The diagram and the photograph are self explanatory. A 3-5 pf capacitor has been shown between anode and grid. I think the fact that the isolation was so good between above and below chassis components meant there was insufficient internal capacitance in the valve to sustain oscillation. The net switch was also an afterthought, not on the original as yet. You



might like to experiment with this set up, change the cathode bias, HT voltage, stabilised HT etc.

The unit shown has been used on both 80 and 40 m for contacts through out Europe. Signal reports excellent, complimentary comments from other ops etc, especially about the slight "chirp" ☺. Band changing is just by using a croc-clip to short out half the coil for 40. I do use a 7 element filter in the output so I am very confident about the 'cleanness' of the signal. The unit is used in conjunction with a Sangean 807 Rx, homebrew RF aerial change over switch and G5RV ant.


ONE VALVE (807) Tx 80/40M
250v HT+ve
0-50mA
mA
·01
300P
80m
40m
2·5mH
L1
4·7mH
1000P
150P
L1 - 25T 22swg 1¼" O.D CENTRE TAP
PARASITIC CHOKE
80Ω
5T 1watt RES
260Ω
1watt
0·01
0·01
0·01
KEY
TC
3-5P
FB
6·25K
33K
50K
XTAL
30P
Tx
NET
FB: FERRITE BEAD

Finally all components need to be rated at 350v working or better, resistors ½ watt minimum.(cathode resistor 1 watt). For further references check any RSGB handbook prior to 1970 and ***SPRAT*** publication ***61***, article on *Vandals Tx*. Several other references can be found on the "*glowbugs*" web site.

A ***SPRAT*** challenge some years ago was the construction of a simple Tx. The object was to build the Tx and obtain your first contact all within 15 minutes!!!

Hopefully the next edition will contain details and the layout of such a unit on matrix board that will give ½ watt output on 80m, more than sufficient for contacts in England Wales, West coast of Holland, Belgium, France etc but the next room will do to meet the challenge! Less than 10 components in total, vxo, pi-filter etc (battery not included ☺).

73 John G4KJJ

CAMBRIDGE COMPUTER SUPPLIES LTD
152 HIGH STREET, CHESTERTON
CAMBRIDGE CB4 1NS

Sales: 01223 324440/313777 Technical: 01223 324441
Fax: 01223 324442 Account: 01223 369741

1st for Quality 1st for Service 1st for Price!

Open 7 days a week We accept all major credit cards

We supply complete systems, computer parts and peripherals - all at very competitive prices.

Discounts for CRG members - please ask.

Basic Introduction to Formula One Telemetry & Radio Systems.

Rob Compton G1ZPU

Winning in Formula One is not just about the fastest driver. To get the fastest car takes development to the limit. To that end, modern F1 cars are fitted with comprehensive telemetry systems.

On most F1 cars there are usually two separate systems. One is used by the engine supplier to analyse and monitor the engine's performance in real time. The other is a microwave data burst system that downloads other data as the car passes the pits.

I'll concentrate on the engine system as that is the system I have most experience of.

On each car there are a plethora of sensors, which measure everything important to the team and the designers in particular. Those sensors pick up suspension movement, engine parameters, transmission data, atmospheric information from the engine's intake, and other stresses and strains on the car.

The real-time data is fed back to the pits, usually via a 9K6 UHF transmitter to a dedicated RX for each car within the team's pits complex. Many teams use two radios for voice and data comms, though there are a few who use one radio for both jobs.

A UK company has pioneered high durability radio equipment specifically for motorsport. Vodac UK, based in Northampton, and guess what, almost entirely staffed by Radio Amateurs, is at the forefront of this field.

Vodac's systems use just one compact transceiver for both data and voice communication between car and pits. In a sport where size and

weight is of extreme importance, as much as durability to some extent, being able to package the radio into the tightest of spots is as necessary as having four wheels.

F1 cars are a harsh environment, our amateur spec units would shake to bits before the car left the pitlane, so build quality is important. Where it is common to see multi-board designs in the commercial world, these would introduce potential problem areas in F1, so our compact transceivers need to be single board designs, using state of the art surface mount technology.

Moving on to the modulation methods, it's simple FSK. That's it. Nothing fancy. It's a real KISS application, keep it simple - stupid!.

What data is carried, well here's a brief list. Starting at the engine, we have RPM (18000 or so!), oil pressure and temperature, water temp, fuel pressure, throttle angle, exhaust gas lambda sensors for each bank of cylinders, and ignition sensors. Moving to the gearbox there is a sensor which measures the input torque (which can show how much power the engine is producing, and the clutch is transmitting).there is a clutch sensor, a gearbox input rpm sensor, rpm sensors for each drive shaft, torque sensors for each drive shaft, gear selected, gearbox oil pressure & temperature. If separated, there may be sensors for the differential oil pressure & temperature.

There are sensors at each wheel measuring wheel speed, and on each suspension link measuring movement and rate of movement. The distance between the car and the ground is measured a number of points to show body roll, as well as detect the effects of the aerodynamics on the car at speed.

There are many other sensors I haven't mentioned, or forgotten! Though most of those are used during testing & qualifying to fine tune the car's performance.

All of those sensors are connected to the car's main control unit, which controls the engine and transmission. That combines the data to a telemetry stream which is transmitted back to the pits.

Back in the pits, the data is analysed and presented in graphic format, as well as recorded on disk to aid problem solving and development. A network of computers is used, with engineers looking after their own individual area on the car. ISDN lines carry data to engineers around the world too. Some of whom may be watching the GP in their armchair, while monitoring the telemetry via their laptop!

It is not uncommon to collect over 2Gb of data in a race per car!

Data is generally backed up onto DVD-RAM disks as they provide the capacity required.

Back to the wireless side of the show.

The main problems encountered are interference from car generated sources, and poor aerial performance because the designers don't like to see triple 5/8 aerials fitted to the cars!

The cars are constructed of carbon fibre, which while being a conductor, and therefore a reasonable ground plane, suffer from an electrostatic charging as the car speeds through the air. Vibration also alters the material's properties and this causes drop-outs in the data.

What's the solution? GB7PT is the key! No, not operating the cars via GB7PT while at Silverstone, but to operate their own regenerative data repeaters sited at strategic points around the track.

This either requires two receivers at the pits, or, cunningly tailored coverage to the regen., i.e. it only hears the car in the area where there is a problem. Its signal will be far stronger than that from the car, so it's as if there is only one transmitter. This reduces the drop-out to a minimum.

Somewhere like Monaco used to get a 15-25% telemetry coverage, using regenerative repeater technology can increase that to 80 or 90%.

The TX o/p of the transmitter on the car is governed by battery power. 3w is deemed acceptable, more than that may cause problems, remembering that these cars do not have alternators, and the battery is at the maximum size the designers will tolerate.

At some circuits it comes down to using a combination of beam and omni to get maximum coverage, that's why you'll see well populated pump-up masts on the trucks at the back of the garages.

The only other issue that can blight you come race day, is the local radio authority allocating the same frequencies to two teams! It's then time for delicate negotiations and lots (50-60) of radio's to reprogram to a group of channels. It's the radio engineer's job to monitor the spectrum to ensure that the team doesn't suffer from interference, nor do they cause interference.

Sounds easy, doesn't it? Most radio engineers work 7.5hrs per day, 5 days per week. Try 48hrs non-stop when a problem has got to be solved, it's a multi-billion dollar industry where failure is NOT an option. Then do that 7 days per week, 46-48 weeks per year...

20th Century Dates Puzzle

1) What year was Martin Luther King assassinated?
2) In What year did the Hawker Hunter make its maiden flight?
3) In what year did Neville Chamberlain become PM?
4) When did the Wright brothers make their first flight?
5) The year of the formation of the Labour Party
6) In what year did Apollo 16 land on the moon?
7) The year the Berlin Wall was opened
8) When did Damon Hill win the F1 drivers championship?
9) Crick and Watson won the Nobel prize for work on DNA in this year
10) The year of Blériots flight across the Channel
11) In what year did Churchill succeed Chamberlain as PM?
12) Mussolini came to power in this year
13) In what year was Archduke Ferdinand of Austria assassinated?
14) The year the first Cruise Missiles arrived in Britain.
15) In what year did Britain test its first atomic bomb?
16) The year the US space shuttle made its first test flight.
17) The year of the first round-the-world balloon flight.
18) The year that clothes rationing ended.
19) In what year was the Wall Street Crash?
20) The year that Wiley Post completed the first solo round-the-world trip.
21) The year Marconi received the first transatlantic wireless signals.
22) The year of the first UK—US wireless broadcast.

Please post your entry to Roger, G7SRK at the address shown at the start of the newsletter.

Opening Soon

Cambridge Computers Elite

The latest technology at the best prices

Mitchams Corner

Cambridge

www.cambridge-computers.com

Sales: 01223 324440/313777 **Technical: 01223 324441**
Fax: 01223 324442 **Account: 01223 369741**

1st for Quality **1st for Service** **1st for Price**

OPEN 7 DAYS A WEEK

All major credit cards accepted - no surcharge