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The Vital Link—Exploration and the Role of Amateur Radio

Send CW on VHF/UHF with your FM rig and our ‘KEYDAPTOR’

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</tbody>
</table>
CONTENTS

REGULAR COLUMNS

LETTERS .............................................. 6

RADIO TODAY ........................................ 8

MICRO' NET ......................................... 22

RADIO TOMORROW .................................. 57

CONSTRUCTION

THE 'KEYDAPTOR' .................................. 16
Send MCW on VHF/UHF with your FM rig.

CONVERTING CB DISPLAYS ...................... 51
Direct frequency readout for a converted CB rig.

PROJECT OMEGA ALL MODE TRANSCEIVER .... 54
G3WPO and G4JST describe the circuit of the PA logic board (to be continued) and give a general update.

FEATURES

DXCC! ................................................. 12
Martin Atherton looks at the daddy of all awards.

THE VITAL LINK ..................................... 26
Exploration and the role of amateur radio. By John Heys, G3BDQ.

GOT A GOOD FIST? ................................. 30
Fun plus the chance to be awarded a GW Morse key. Read on!

READERS SURVEY .................................. 33
Your chance to tell us what you think, post paid, and win one of ten subscriptions!

CQ ET .................................................. 43
Radio amateurs communicating with extra terrestrial intelligence? We're not joking...

HOW LONG IS A PIECE OF WET STRING? .... 47
Any length of wire can be made to radiate on any frequency - if you know how.

REVIEWS

TOKYO MICRO-7 70cm BUDGET HANDHELD .... 38
The editor tells how to get on 70cm for around £100.

WRITE FOR ASP .............................. 15
NEXT MONTH IN HRT ............................ 42
Free Readers Ads .................................. 61
Emporium Guide .................................. 64
Classified ......................................... 65
ADVERTISERS INDEX ......................... 66
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HAM RADIO TODAY APRIL 1985
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QTR-24D World clock  34.50
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HAM RADIO TODAY APRIL 1985 5
MORE ON THE FT102

Sir, Reference my letter which you published in July issue of Ham Radio Today and in reply to 'Got an FT102' by Sean Quinn, G14PCQ, in 'Letters' HRT November 1984 regarding the problem with my FT102 and the missing R84. Placing a 100K resistor in the empty holes did improve selectivity. In reply to my query to Yaesu, they did state that R84 had been replaced by a 120K resistor on the underneath side of PCB. Yaesu also stated that there should be a 12mV reading in test point 10. Mine read between 3 and 4 volts. Replacing the 120K with a 1.2M improved selectivity, but I could only obtain a reading of 26mV.

Broad selectivity still prevailed and adjusting the IF/Shift/Width would not improve matters. Installing a 455 CW filter helped. Finally, after months of frustration, I took off bottom panels to modify the 'Sep/Norm' switch so I could operate a loop antenna on 1.8MHz without affecting the main input antenna (contrary to what it states on page 10 of Instruction Manual). Completing the modification, I switched on the set to check that it worked OK, when lo and behold, the selectivity was sharp and could be controlled by the IF/Shift/Width controls.

I can now make the selectivity such that I do not need to use the CW filter. Switching R84 from 120K to 1.2M does not appear to affect the selectivity as noticeable as before, but the 1.2M drops the internal receiver noise level by at least 6dB. With the 'improved' selectivity operating, that pleases me. If I ever find out why it suddenly came good I will advise. Can anyone explain why at times one has to de-select the noise blanker to stop poor selectivity?

C H Castle, VK5KL

The above letter originated from a condition in an early batch of FT102's (2M71000-2M71100). R84 is apparently missing from its rightful place but this is because it has been relocated between the 'cold' end of T09 and J15 on the solder side of the PCB. According to Yaesu in a letter to GHPCQ, "fitting one (a 120K resistor) on top of the board in the holes marked R84 will seriously degrade the rig's performance."

It very much sounds to me as though VK5KL's FT102 suffers from an intermittent fault - a 'dry' joint or poor connection, perhaps - which causes a lack of selectivity and was (temporarily) cured by movement when modifying the antenna switch. If you have an FT102 within this batch and you are concerned about its performance, by all means check to see that R84 is in place between T09 and J15 as above. Otherwise, rest easy!

ANGRY SWL

Sir, I felt I must write to point out the deplorable attitude of some amateurs towards SWLs. Notice I state some amateurs. Thankfully not all of the amateur fraternity treat SWLs like the dunce in the corner. Possibly, it does not occur to this amateur minority that the SWL that is treated disparagingly today maybe the amateur of tomorrow. And even if the SWL wanted to stay a listener till the day he dropped, more power to his elbow. There is too much nepotism amongst some amateurs. If they think that some of us are without knowledge, then consider this - I have been involved in the radio hobby in some way or another for 22 years. I admit I have only just got involved in the construction side of it, but this was through sheer laziness, not lack of knowledge.

I am teaching myself the RAE theory which is hard going but I feel better for it because if I pass, I've only myself to thank. Hardly the work of a moron, and I'm sure there are thousands, yes, thousands, of other SWLs that are in the same boat.

D J Burton

AMATEURS AND CBERS TOGETHER?

Sir, Being a relatively new licencee and coming up from 11m after four years of it, I am appalled at the state of the band and how it has deteriorated over the years since legislation.

My own thoughts on the subject are that if the CB community were given a better system as regards aerials and height, callsigns were issued and the Radio Society of Great Britain 'accepted' them - instead of treating them as a 'no go' area - things would improve. Then, if licenced amateurs had this band written into their licence too, 11m could be used as a novice band and breaker cum novice aspect like operating procedure and (even) some radio theory could be learnt over the air.

This way, the next generation of licenced amateurs won't be dumbfounded like some of us were when our call signs dropped through the letter box.

Peter Copeland, G1JBS

DATA COMMUNICATIONS FOR THE BLIND

Further experimentation has prompted me to write again to you some more details of further capabilities available in the Braid speech synthesizer (See 'RTTY and AMTOR now possible for the Blind' in 'Radio Today', March '85).

Firstly, may I state that we have found out that there is available an interface that can convert from Centronics parallel to RS-232C serial for those particular users of computers that have only the parallel port for the printer. This should be readily available from most computer hardware retailers, although I must add that the Centronics port can be fitted as an option on the synthesiser from Braid Systems Ltd but these would be a delay in delivery if required.

One particular question that we have been asked by the various people who have visited us so far to see a demonstration of this unit is, "Can it read CW?" The answer to this is YES!, providing that you are using a MODEM that converts the CW into ASCII code. Possibly the best system that can do this is the ICS Electronics model AMT-2 because it is data compatible with the "Braid synthesiser" ie, the speed of input and output data being 300 baud.

However, the receiving of this particular mode does have one or two disadvantages; firstly, because you do have to lock perfectly onto the signal you are trying to de-code (which could
take up quite some considerable time; Secondly, at the moment there is not a computer available that can de-code perfect 100% morse because of the various differences in sending from one station to another and also the conditions of propagation, QRM, etc.

There is one great advantage however, for those SWL's and 'B' licenced operators that wish to study morse using their home computers. If the particular computer has an RS-232C printer port, then quite simply all you have to do is just connect the 'Braid synth' to the output port and set up the speed and parity levels (details of which come with the handbook of the computer, usually). Upon loading of the appropriate software for CW, all you do is press the particular letters numbers, or text you require, the unit will the convert it into speech (each letter or number is spoken after a return key is pressed) 'say' it.

You may perhaps want to write a small program that can convert text to be spoken after every word upon receipt of space code, which is fairly simple to do.

The idea of this particular unit was basically to de-code all data communications which are transmitted, from Amateur Radio through to general coverage stations ie, Reuters News and Associated Press etc. The other main useful feature is not only can it help with regards to the facilities mentioned, but the whole purpose of the unit originally was to help those individuals interested in the art of computer programming, (incidentally, our dear (blind) friend Steve (G4VWW-IK3CSU) has successfully written a program in BASIC, converting Miles to Kilo's, fahrenheit to centigrade etc, and has only been learning to program for two weeks(!) — totally independently).

Literature can be obtained from myself at 67 Clapham Rd, London SW9 OHY (enclosing a stamped addressed envelope) or if you are interested in purchasing the equipment contact: Braid Systems Ltd., 130, Buckingham Palace Road, London SW1W 9SA. Phillip Stanley

MICROWAVES IN A MUSTARD TIN

Sir, I was interested in the novel 'Microwaves from a Mustard Tin' by Frank Ogden (January '85 HRT).

However I've tried five local stockists for the BFT95. It seems a rare one (and apparently has no equivalent).

Could you kindly point me in the direction of a supplier? I'd be most grateful.

A Coleman

HRT have received a number of letters similar to the above. The BFT95 is available from Cirkit Holdings PLC, Park Lane, Broxbourne, Herts. EN10 7NQ (0992 444111) for £1.59 including postage — the stock no. is 58-10095. Those of you who possess a current Cirkit catalogue and can't find it may have been confused by the transistor being misprinted as BTP95.

Please address correspondence to: Ham Radio Today, 1. Golden Square, LONDON W1R 3AB.
Dirty Rumours On The High Seas

According to an account in 'Marketing Weekly' (Vol 7 No 44), ILR station boss Eddie Blackwell (that’s Independent Local Radio) has admitted discussing a plan to put the North Sea pirate radio ship off the air by a raid on the ship to remove various vital parts of the transmitter.

Paul Rusling, who helped set up Laser and whose recently published book 'The Lid Off Laser 558', is reviewed in next month’s HRT, was apparently the other party in Blackwell’s discussions. Paul, who seems something of a (successful) self publicist, has alleged that a group of five “powerful names in broadcasting” are still plotting to get rid of Laser. Pirate radio gets more like ‘Dallas’ every day!

Even better, the piece then goes on to say that Blackwell contends he had no intention of actually carrying the action out but was in reality acting as an “agent provocateur”, hoping to persuade Rusling to name his former employers (with whom Rusling is somewhat less than enamoured I! by our reading of ‘The Lid Off’!) No, it’s not ‘Dallas’ after all, but ‘Dynasty’...

Retailers Donate Antennas To Aid Medical Research Council

The Medical Research Council’s Dunn Nutrition Unit in Cambridge has for many years now been carrying out research into the causes and effects of malnutrition at their research station in the remote village of Keneba, in The Gambia, West Africa.

Over the years, maintaining staff morale during difficult circumstances, has been helped by daily communications between the unit’s amateur radio club station G4DUN at Cambridge, and licensed staff members in Keneba (See item in Radio Today, December ’84). A potentially dangerous epidemic of meningococcal meningitis was also averted by the unit at Cambridge being able to trace a source of drugs and despatch them to The Gambia on the same day as the disease was diagnosed. Amateur radio was used to send the diagnosis from Keneba to the UK and inform Keneba that the drugs were on the way.

The link up consisted of a Yaezu FT1012D Transceiver at each end. Until last year, daily voice contact had been maintained, but with the drop in sunspot activity, this became progressively difficult, and so two AMTOR teleprinter units were purchased, enabling information to be passed with certainty of receipt at the other end.

During the filming of a recent programme by BBC EAST, on the units work in Keneba, propagation conditions had continued to deteriorate, and it was evident that a further ‘upgrade’ of the system was essential if the link was to be maintained. The BBC approached Dr. Tim Thirst G4CTT, of Eastern Communications, in Norwich, and an appraisal of the system showed that the weak point was the use of ‘mini-beams’ at both ends of the link. Although it was felt that a change to large mono-bander beams would be ideal, this lost the ability to change band, which would also become necessary as conditions continued to deteriorate. It was decided that a large tri-bander would be ideal for installation at Cambridge, and a smaller one for Keneba. As this would involve a large expenditure by the unit, two TET beams were donated jointly by Eastern Communications and Amateur Electronics UK.

Within a couple of days, one beam had been flown out to Keneba, and when the other was presented recently to Dr. Tim Cole, G4RHQ of the Cambridge Unit, by Dr. Thirst, the smaller beam had already been installed in Keneba and was making a considerable difference to the signal.

Working Halley’s Comet?

British Telecom are now providing a telephone news service on Halley’s comet. Called the ‘Halley Hotline’, the recorded information will be updated weekly to begin with, then more frequently as the comet draws near, the info being provided by Mr Brian Harpur of the Halley’s Comet Society.

The comet will become visible from Britain by the end of the year and become brighter during the following months before departing during 1986. Six spacecraft are set to intercept the comet on scientific missions during its ‘once in a lifetime’ visit.

The Halley Hotline is available on...
the following numbers: London 01-790 3400; Glasgow 041-552 6300; Cardiff 0222 399855; Belfast 0232 230505; Liverpool 051-236 8474; Bristol 0272 279494; Birmingham 021-355 6144; Leeds 0532 8013; Manchester 061-246 8061.

Morse Tests at 1985 NEC

Mr G H Williams, G3YCP, of BTI Radio will be holding Morse tests at the 2985 RSGB Convention of the NEC. These will be available on pre-booking for the duration of the exhibition, both on Saturday and Sunday. A limited number of places will be reserved for RAIBC members, should any wish to apply. To book your place, please contact Mr C V Astley, Worston Road, High Bridge, Somerset TA9 3JY.

Club News

The Harlow DARS have informed us that they now meet every Tuesday at 8.30pm in the Mark Hall Barn, First Avenue, Harlow. Anyone wanting to know more can ring Keith, G3WRO, on Harlow 30609.

The Bromsgrove ARS sent us considerable details of their society which seems to include interests covering virtually all aspects of amateur radio. Visitors and new members are very welcome and can find out more by contacting the Secretary, G4OJS, on 021 445 3207.

Verulam ARC based in St. Albans, are holding their annual G3PAO Memorial Lecture on the 26th March which, as usual, has an educational theme. This year the lecture is given by Jim Bacon, G3YLA, who will be drawing on his experience at the London Weather Centre for his lecture entitled "There's A Bit Of A Lift On".

All visitors are welcome. The meeting starts at 7.30pm and there will be a talk-in from 7pm on S14. Further details can be obtained from Brian, G4DUS, on Rickmansworth 720616.

Repeater Latest — Meet The RMG In Scotland

The Repeater Management Group (RMG) are holding an open meeting in the Scottish Borders on Sunday 31st March. The meeting will start at 2.0 pm after the hosts, the Scottish Border Repeater Group, have held their AGM. The meeting will be held at the Lilliardsged Caravan Park, which is on the A68 between Jedburgh and St Boswells. Further information can be obtained from Bruce McCartney, GM4BDJ, of the Scottish Borders RG or Colin Dalziel, GM8LBC, of the RMG.

Chris Lorek, G4HCL, reports that GB3PS, the 23 cm repeater/beacon is on the air from Barkway, Cambridge. He goes on to say, "The repeater transmits on 1297.075 MHz continuously, radiating an FSK (inaudible on FM) callsign every fifteen seconds. To place it into 'talkthrough' mode, you must transmit a 1750 Hz toneburst (at 5kHz deviation recommended maximum) on 1291.075 MHz. Remember when using a tripler to reduce your 70cm deviation to 1.66Hz or you're going to have problems! When you drop carrier, the box will immediately reply with a low frequency 'courtesy pip' to confirm you have successfully accessed.

There is a 'time-out' period of the minutes, the reason for this will be obvious to stations operational on 23cm who may suffer from radar interference, appearing as burst of noise every few seconds. Luckily we have not suffered this annoying effect on PS but we have not taken chances!

When in talkthrough mode the box radiates a 100Hz sub-audible tone, to enable user stations to have a tone operated squelch if they wish to avoid receiving a carrier at all times, especially useful if at the fringe range of the repeater or when operation mobile. The repeater employs horizontal polarisation which is the standard on 23cm, and uses a single Alford slot aerial fed by LDF550 Heliax coax. A circulator is used to enable single aerial operation.

GB3PY on RB14 had recently been moved to a new location on the north side of Cambridge. The coverage has apparently improved considerably as a result. If you could hear 'PY' before but not access it, now is the time to try again.

On a lighter note, anyone who visited the South coast at Christmas and accessed GB3 ES on R4 was in for a surprise. After ES announced its location in CW, a bar from one of four well known Christmas carols was played, in sequence. Nice touch, folks.

Trio For Arrow

A very pleased Peter Clarke of Arrow Electronics recently informed HRT that they are now official dealers in Trio equipment. Adding Trio to their franchise list gives Arrow a virtually complete range of all the major amateur radio manufacturers.

Trio equipment in stock at Arrow's Hatfield Peverel showroom includes all the latest Trio models — TS711E with CD10 call sign decoder unit, TM211E, the miniature FM mobile transceiver with the tilting head and digital coded squelch, TR2600 the latest keyboard entry handheld for 2m and the TH21E, the smallest FM 'handy' for 2m yet seen, and apparently popular too, according to Arrow. Arrow report "marvellous co-operation" from the Trio distributors, who were able to meet almost all Arrow's stock requirements off-the-shelf. Within a few days of their appointment Arrow had apparently sold out of several lines and received replacement stock within 24 hours — no wonder Peter Clark was pleased!

Any customers wishing details of the Trio range are invited to send a stamped-addressed envelope for details. Arrow are located at 5, The Street, Hatfield Peverel, Near Chelmsford, Essex.

Latest in the line of transverters from Microwave Modules is their MMT 144/28-R 2m multimode transverter. Features include 25W Tx output repeater shift, high level balanced receive mixer and GaAsFET RF stage. Claimed receive performance in particular is excellent: better than 2db noise figure and a 3rd order intercept of +19dBm. Further details from MM on 051-523 4011.
SARUG (the sale of which benefits the Radio Amateur Invalid & Blind Club, amongst others) or directly from the addresses given in the new SARUG software list. Some worthwhile discounts are available on certain major software items.

A recent innovation in the SARUG newsletter is the inclusion of software reviews which in Paul's words, "are being recognised as reliable and informative by many members". The group offers opportunities for world-wide exchange of news, views, ideas, SARUG having members in over 25 countries.

UK membership of SARUG is £5.00 and overseas £8.00. Further details from Paul at 3, Red House Lane, Leiston, Suffolk and enclose an SAE please.

**Did You Know...**

<table>
<thead>
<tr>
<th>No. of amateurs</th>
<th>Population</th>
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<tbody>
<tr>
<td>USA</td>
<td>400 000</td>
</tr>
<tr>
<td>UK</td>
<td>50 000</td>
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Therefore, the USA has twice as many amateurs per 1000 people as the UK. Interesting, eh.

Commercial radio stations worldwide have been discussing ceasing Morse transmissions from 1990. Philips, who are celebrating their 60th anniversary this year, claim to be "the first to make a worldwide short wave radio broadcast"; to produce a practical (commercial) all mains radio receiver; and 30 line TV set, which was "used to test the first transmissions from the BBC in London". Is there anybody who would dispute any of the above?

BT are building a new satellite earth station near Aberdeen with an 8m diameter dish. Using the European Communications satellite EUTELSAT 1-F2, this will enable satellite communications to the North Sea oil and gas platforms.

IBA engineers have received the first pictures transmitted using the European satellite ECS-2 and the C-MC/packet system. The programmes were transmitted by the Norwegian Broadcasting Corp., NRK, who are providing the service for communities in the Svalbard Islands in the Arctic Circle.

**A Vintage Award Without QSLs**

The world's first and oldest radio society, the Wireless Institute of Australia, celebrates its 75th Anniversary during 1985. One of the many planned activities is the WIA 75 Award which will be available during the period March 1 to December 31, 1985.

To qualify, radio amateurs (and shortwave listeners) need to contact (log) 75 members of the Wireless Institute of Australia. A contact will only be valid if the WIA member's individual membership number is logged. No more than 30 WIA member's individual membership number is logged on any one call sign area.

Claims should include a log extract of the 75 WIA members contacted, $2 (Aust.) to cover certificate, handling and postage costs, and be sent to: WIA 75 Award Manager, Wireless Institute of Australia, 412 Brunswick Street, FITZROY, 3065, Victoria, Australia.

**Sinclair Amateur Radio User’s Group**

A letter was recently received at the HRT offices from Paul Newman, G4INP, editor of the SARUG newsletter and general driving force, informing us of the continued existence of SARUG and giving an update on their activities. Perhaps this is stating the obvious, but SARUG are a group of radio enthusiasts who use the Sinclair range of computers (ZX80/81, Spectrum and QL). A substantial amount of new software is now available either through SARUG (the sale of which benefits the Radio Amateur Invalid & Blind Club, amongst others) or directly from the addresses given in the new SARUG software list. Some worthwhile discounts are available on certain major software items.

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**Did You Know...**

| USA  | 400 000    | 220 000 000 |
| UK   | 50 000     | 55 000 000  |

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**WPO COMMUNICATIONS**

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Custom Finished Case with mobile bracket etc etc. Join the standard of the design, which 'Very pleased with the kit, and you must be congratulated on

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**WE SPECIALISE in kits for the home constructor. Why not try something from us soon? Many kits are suitable for beginners and come with comprehensive instructions, drilled tin/pcb and pots and pots, wire etc. Our products are used worldwide and can help you get on the air and work the world. Each kit contains enough parts for production and is a kit for any scenario. You can choose from everything to suit your needs, from the basic to the advanced.**

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Books for radio amateurs
Anyone listening or operating on the HF bands these days cannot help, sooner or later, stumbling across someone pleading for a contact or a QSL card "for a new DXCC country". What is DXCC? What are DXCC countries? How many of them are there? Who decides what is and what isn't a country? This article answers all these questions and more.

Ham Radio Today readers may remember a recent article by G3ZAY on mishaps which befell DXpeditions visiting remote islands. The information below, explains the reasons why a particular island may justify an expedition by becoming that most curious of places - a separate DXCC country.

What Is DXCC?

DXCC stands for DX Century Club and is a comprehensive awards programme administered by the American Radio Relay League (ARRL), the national society of the USA, from its headquarters near Hartford, Connecticut. The general idea is that to win any award in the programme, you have to make contacts with, and get QSLs from, at least 100 different countries. The ARRL official list is used to determine what counts as a country, but more about that later.

There are separate awards for contacts that are mixed-mode, all on CW, all on RTTY, all via satellites, and all on 160 metres. And there is even an award for working 100 countries on each of the five bands between 80 & 10 metres. At the time of writing, all but the satellite award are "endorseable". That's to say, if you work more than 100 countries (out of the 315 possible at present) you can apply for stickers to upgrade your basic certificate so that it shows your exact total. The satellite award is likely to become endorseable in the near future.

Like something to show for your HF operation? Why not try DXCC! Martin Atherton, G3ZAY, profiles the most popular amateur radio awards programme in the world.

Don Search, W3AZD, ARRL staff member responsible for administering the DXCC programme.

A further refinement is that if you get to within 10 of the maximum score on any of the endorseable awards, you become a member of the appropriate "Honor Roll". At present, with a maximum of 315, a score of 306 or more is required. The UK members in June, 1984 were: Mixed Mode - G3AAE G3FKM G3FXB G3HCT G3IVJ and GW3AHH (315 countries), G2FSP G3JAG G3KMA G4CP G5VT (314), G2FYT (313), G3LQP G3UML G5RP (312), G3JEC (311), G3IOR G3M3TN G13OR (310), G3HTA G3KDB G3RCA (309), G2BOZ G3GIQ G3ZAY G3TOE (308), G2DMR G4DYO G3RUX (307), G3DOG G3MCS G3SJH (306); Phone Only - G3FKM (315), G5VT (314), G3IVJ (313), G3NLY G3UML (312), G3JEC G5FAA (311), G3TW G3ZBA (310), G3KMA (309), G3TOE (308), G3RCA (307), G3SJH (306). The CW Honor Roll is for scores greater than 300, a lower level because the CW only award has only been going since January, 1975. There are no UK stations listed in this at present.

The entire DXCC programme is taken quite seriously in the USA and at any amateur gathering, a large proportion of the participants will be wearing badges proclaiming their country scores. A frequent ritual is for the Chairman of a meeting to ask people with scores above a certain level to stand up. He then calls out gradually increasing numbers and people sit down as their score is reached. When only one or two are left on their feet, they get a round of applause, a prize, or both.

Getting on to the Honor Roll is a long term project! Even though the basic 100 countries can be contacted in a weekend (say, in a large scale contest), it will usually take 6-10 years of hard work to find the remaining 206. At any one time, there always seem to be a dozen or so places where government attitudes are so hostile to amateur radio that nobody ever gets on the air. From time to time, various DX publications compile lists giving the date each country was last heard, and an examination of these lists shows that nobody licensed since 1977 could possible have achieved Honor Roll membership - even if they had been on the bands continuously from the moment their licence dropped on the mat!

Once on the Honor Roll, it's still not possible to relax because the ARRL is continually deleting old countries from the list and creating new ones as world affairs re-draw geographical and political boundaries. If you just retire from DXing once you have 306 countries con-
firmed, your appearance on the Roll is likely to be very brief.

Full details of the DXCC programme including application forms can be obtained from the ARRL HQ, 225 Main Street, Newington, Connecticut, 06111 USA, or alternatively, the author would be pleased to answer any questions himself (SASE please). The starting dates for the awards are as follows: Mixed, Phone, RTTY, 160m — November 15th 1945, Satellite — March 1st 1965 5 Band DXCC — January 1st 1969, CW — January 1st 1975.

So What Is A DXCC Country?

To put it simply, a DXCC country is whatever the ARRL says it is! At present, the list includes:

* Single, fully independent, countries eg Germany, Austria, Sweden, etc.
* Parts of an independent country which have some political or administrative autonomy, eg England, Wales, Scotland, Northern Ireland, Jersey, Guernsey, Isle of Man; North & South Sudan; all the individual provinces in the Soviet Union; etc.
* Offshore reefs/rocks/islands which count separately for DXCC because they are further than some arbitrary distance from their parent country.

Over the years, the criteria for separate country status have changed. The current rules, which apply only to new candidates for country status and not used to decide whether a place should be deleted, are displayed in the box (inset), and are moderately strict. However, not so long ago, a place could count on the grounds of having a "distinctively separate administration" and it was only when application for large numbers of nature reserves, Indian reservations, etc., began to flow in that the rule was changed to its present form requiring a separate government.

"Countries" which qualified under the separate administration rule and are still on the list include: Sable Island, and St Paul Island — both administered by the Canadian Federal Government instead of the local province; Desecheo Island — administered by the US Dept of the Interior, and Kingman Reef — administered by the US Navy and the Dept of the Interior.

The criteria for new country status are interpreted by the ARRL DX Advisory Committee, which also considers potential deletions. Final decisions are taken by the ARRL Awards Committee. Global politics are taken into consideration, and in recent years there seem to have been a decision not to recognise the South African "Homelands". Thus, although Venda, Bophutatswana, Transkei, etc have all issued licences with distinctive call signs prefixes, the QSL cards count only for South Africa as far as DXCC is concerned.

At the moment, the whole question of DXCC countries criteria is under review and it is possible that the situation will change in the near future.

The official DXCC countries list (totalling 315) is the one produced by the ARRL and may be obtained from their HQ. However, at present the Radio Society of Great Britain list is identical to the ARRL one, and copies can be obtained from the RSGB for a small fee. Another useful RSGB product is a nine band countries check list, which contains a table enabling you to mark off the countries you've worked and the one's you have cards from. Both these products are held on the Society's computer and are updated regularly to allow for prefix changes and additions or deletions to the ARRL list.

When Is A Contact Valid?

Another vexed question dealt with by the staff at the ARRL HQ is the question of the validity of a particular QSO. There were a number of DXpeditions in the past which, to say the least, raised considerable doubts about whether they were actually in the country they claimed, and whether they had valid licences.

Nowadays, the ARRL may require proof, in the form of passport stamps or sworn statements, that an operator actually reached his claimed operating point, and may also require a photocopy of his licence. Yet even when both these conditions are satisfied, there can be problems.

G3JKI/5A was active from Libya on several occasions in the early 1980s and received written operating permission from a local militia commander as there was no mechanism for issuing licenses on a national basis. However, the ARRL refused to accept his QSL cards for DXCC on the grounds that his "licence" did not specifically say it was for the amateur bands.
ARRL headquarters near Hartford, Connecticut

Further complications arose when stations started to operate from guerrilla enclaves in Kampuchea (Cambodia) and Burma. Because the Association of South East Asian Nations, and most members of the UN, recognise the Kampuchean guerrillas as the rightful government, their cards (XU1SS & XU1KC) were OK for DXCC. But the Burmese cards (129A & 129B) were rejected because the UN recognises the central government and not the guerrillas! Even more problems arose over Burma when a couple of German operators came up on the bands from Rangoon. The telecommunications authority was giving verbal operating permission, but was not prepared to put anything in writing that would satisfy the ARRL. Burma remains a blank in most people’s check sheets, despite the fact that almost everybody has a QSL card from the place!

Because of this stringent control over standards, it is necessary to physically send QSL cards to the USA when applying for the DXCC awards. Only the ARRL apparently has a complete list of legal and illegal operations as well as the expertise to detect forged cards. An alternative, if you are not prepared to entrust your QSLs to the mail, is to get someone to take them to the ARRL HQ in person as it is usually possible to have them checked on the spot.

A common misconception is that some minimum signal report is required for DXCC QSOs. This is not the case. As long as the QSL states that a 2 way QSO has taken place, that is all that is required. Other awards are rather more strict on this point.

What Does The Future Hold For DXCC?

There are a number of changes to the DXCC list in the offing. The Antarctic island of Peter the First will be added — if anyone ever manages to operate from there(!) — and the country presently defined as “Baker, Howland, & American Phoenix Islands” may soon be deleted and replaced by “Baker & Howland Islands” because the Phoenix Islands have been handed over to the Republic of Kiribati. This will mean that all of us who worked the old country will have to start searching for the new one. In addition, the DX Advisory Committee will vote shortly on whether to add the Pribilof Islands (off the Alaskan Coast), the United Nations Centre in Vienna (4U1VIC) and the UK Sovereign Base Areas on Cyprus to the list. A recent vote on the Pribilof question was tied.

So there in brief is the ARRL DXCC Programme, one of the most respected awards systems in the amateur radio world. There is an award for everyone, ranging from the basic certificate requiring 100 confirmed countries, through to the 5 band DXCC award and Honor Roll lists. See you in the pile-ups?

ARRL CRITERIA FOR COUNTRY STATUS
(To be applied to new candidates. Not applicable to possible deletions)

1) Government/Administration. An area by reason of Government constitutes a separate entity.
2) Separation by Water. An island or a group of islands, not having its own government is considered as a separate entity under the following conditions:
   a. Islands situated off-shore from their governing area must be geographically separated by a minimum of 225 miles of open water. This point is concerned with islands off-shore from the mainland only. This point is not concerned with islands which are part of an island group or are geographically located adjacent to an island group.
   b. Islands forming part of an island group or which are geographically located adjacent to an island or island group, which is a common government, will be considered as separate entities provided there is at least 500 miles of open water separation between the two areas in question.
3) Separation by Foreign Land. In the case of a country, such as that covered by Point 1, which has a common government but which is geographically separated by and which is foreign to that country, if there is a complete separation of the country in question by a minimum of 75 miles of foreign land, the country is considered as two separate entities. This 75 miles of land is a requirement which is applicable to land areas only. In case of areas made up of a chain of islands, there is no minimum requirement concerned with the separation by foreign land.
4) Unadministered Area. Any area which is unadministered will not be eligible for consideration as a separate entity.
5) a. Any area which is classified as a Demilitarised Zone, Neutral Zone, or Buffer Zone, will not be eligible for consideration as a separate entity.
   b. Embassies, consulates and extra-territorial monuments will not be eligible for consideration as a separate entity from the host country.

STOP PRESS! The DX advisory committee have formally added the UK Sovereign base areas in Cyprus to the DXCC list. This will come into force on 1st June '85 and contacts with UK bases since 1960 will then count for the award.
ATTENTION ALL WRITERS...

...or just those of you who sometimes think “I could do better than that!”

We want to hear from you!

The magazine you hold in your hand is part of ASP’s electronics group of titles. These include ETI, Ham Radio Today, Digital and Micro Electronics, and our new magazine, Electronics. All these magazines are looking for new authors, so if you’ve designed something for yourself that you think may be of interest to others, or if you’ve a subject you’d like to write a feature article on, then drop us a line with an outline of what you have in mind.

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- Projects for the Commodore Vic 20 and 64, the Amstrad, the BBC A and B, and the Electron computers;
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This unit provides the facility of MCW (Modulated Continuous Wave) Morse transmission for VHF and UHF "FM" Transceivers which are not normally equipped to send CW Morse. MCW is classified in the present licence schedule as F2E if used on a true Frequency Modulated emission, or G2E if used on a Phase Angle Modulated emission. The schedule defines these as "A single channel containing quantized or digital information with the use of a modulating subcarrier". In simple terms (!) this means a radio frequency carrier wave, modulated by an interrupted audio tone; the interrupted tone we are interested in generating being the Morse Code.

Many Class 'B' licencees will be wishing to take advantage of the new legislation allowing them to use Morse code on the bands allocated to them, as of 1st April '85. Now, a fairly good percentage of 'B' licencees - and Class 'A' for that matter - have FM only equipment for 2m and 70cm. The obvious and unfortunately expensive answer for our would be CW operator is the purchase of a 'multimode' transceiver for the desired band. Let us say that you are saving hard for such a piece of equipment, but would like to try your hand at CW first. Well, in the interim, there is always MCW...

The editor recently spoke to a prominent member of the licencing branch of the DTI with regard to the legality of Class 'B' licencees using MCW. Whilst the official pointed out that MCW was not as efficient as CW in terms of communicating ability and, more importantly, in our overcrowded cities, frequency space (remember that a MCW transmission using FM will take up as much space as an FM phone signal, more or less), in view that the mode would help develop the Morse skills of Class 'B' licencees and encourage them to use 'real' CW - with all its concomitant space saving advantages - he thought MCW was permissible. All Class 'B' licencees will be receiving a letter of variation of their licence terms and a copy of a leaflet entitled 'Guidelines for Class 'B' licencees using Morse' in the near future. Unfortunately, both were not available at the time of going to press.

The prototype unit was designed to work in conjunction with a Trio TR2300 transceiver for 2 metres, but can be easily adapted for use with other transceivers simply by using the particular type of microphone input plug-and-socket arrangement, as well as adapting to the different microphone and PTT (push-to talk) connections. In use, the unit is merely connected to the transceiver microphone input socket, no internal modifications to the transceiver or microphone being necessary. The mic. and morse key are plugged into the unit, which...
will provide either “phone” or MCW at the literal flick of a switch. The unit is self-powered by an internal volt battery. When not being used as a MCW device, the unit doubles as a morse practice oscillator, simply by using the sidetone monitoring facility.

Circuit Description

As can be seen by referring to Fig.1, the block diagram, the unit comprises five circuit operations, all of which except the changeover system are contained on a single printed circuit board. Looking at the circuit diagram, Fig.2, this shows the circuit comprising a keyed audio oscillator, in this case a stable (free-running) multivibrator, based around the NE555V, IC1. Keying is provided by Q1, which is in series with the positive supply rail to IC1. Q1 is normally in the ‘off’ state, by virtue of R4 between base and emitter. When the key, connected via JK1, is closed, Q1 is based ‘on’ through R3 being grounded, thus supplying current to IC1. When key contact is broken, Q1 tries to switch off immediately, but is delayed by the charge in C15, which imparts a slowed down turn-off of a fraction of a second. This produces a better keying characteristic.

The frequency of oscillation of IC1 is determined by the values of R1, R2, and C1. The values chosen in this application allow IC1 to oscillate at approximately 700Hz. D1 and D2 are included to produce a symmetrical squarewave output from IC1. The output at Pin 3, being square, and consequently rich in unwanted harmonics, is passed through a lowpass filter formed by R5, C4, R6, R7 and C6. The resulting waveform is nearly sinusoidal. From the filter, the signal follows two separate paths. C7 couples part of the signal through C15, which imparts a slowed down turn-off of a fraction of a second. This produces a better keying characteristic.

The attenuated signal appearing at VR1 slider is fed via an RF filter, comprising C10, RFC1 and C13, to one side of an MCW/PHONE changeover switch, SW2A. The function of SW2A is to permit normal microphone signals to be passed through to the transceiver when in the PHONE position, but allowing only the...
keyed audio tone through when switched to MCW. Switch SW2B provides PTT (push-to-talk) override. In MCW mode, normal PTT facility, available at the microphone, is overridden, the transceiver being put into the transmit mode. With SW2B in PHONE position, normal PTT is restored.

Construction

This part of the proceedings should not prove too difficult, but details will be given to help where thought necessary. Basically, all components are mounted on a single circuit board, except the loudspeaker, volume control, function switch, key jack and microphone socket and transceiver plug. Printed circuit board component layout and trackside pattern are shown in Fig.3.

Once the board has been prepared and drilled, the 11 terminal pins should be inserted and soldered. The resistors should follow, then the capacitors. The choke, RFC1, should then be inserted, together with the two diodes, transistor and two integrated circuits. Ensure when inserting the two electrolytics C12 and C14, as well as the transistor, diodes and ICs that they are orientated into correct positions as shown on the diagram of the board layout. All leads should be bent over, cropped to length and soldered. VR1 is fitted last, with the lugs protruding through to the trackside of the PCB carefully bent over and soldered.

At this stage, the board should be checked for any unsoldered, dry or bridged joints. Any shorts due to copper turnings from the drilling of the PCB should also be removed. Afterwards the completed board can be put aside.

The unit is housed in an aluminium box with lid, Norman Rose Type BA9, which measures 6 x 44 x 4 inches. The printed circuit assembly is mounted on four 6BA screws with ¾ inch spacers to stand the board off, in the bottom of the box. The function switch, volume control/ on-off switch, key jack and microphone socket are mounted along one 6 inch side of the box. The lead terminating in the transceiver plug passes through a small grommet in a hole in the rear side.

The loudspeaker is mounted to the underside surface of the unit lid. A piece of fine expanded aluminium grill is cut to size and fixed to the back of the lid by means of 'Araldite' epoxy resin of the quick-setting variety. The loudspeaker is carefully applied to the back of the grill in the same manner, care being taken not to smear the resin onto the loudspeaker cone. Full drilling details for the box and lid are given in Fig.4. After drilling, these can be given a professional-looking finish by spraying with car-type cellulose aerosol paint.

Setting Up

After the adaptor unit has been completely wired up, a careful check should be made to ensure all the wiring is correct. Using a multimeter set to the lowest resistance range, or a simple continuity tester, check out all the wiring point-to-point, as well as testing out the switching actions continuity wise of SW2A and B. If all seems correct, proceed to the next stage.

With the volume control/on-off switch VR2 knob in the fully anti-clockwise position (ie 'off'), plug in a morse key (preferably a 'pump-handle' type for this application during testing), via jack JK1. Connect a multimeter, set to read 100mA DC or higher full scale deflection, in series with one side of the battery and the battery connector. The other side of the battery connector should be coupled straight to the battery. No current should be flowing at this time.

Rotate VR2 knob clockwise to the 'on' position. A reading of approximately 11mA should be observed. If the reading is higher, say about 25mA, then something is wrong. A re-check of the wiring
Fig 4. Drilling details for the case.

Assuming everything is alright, remove the meter and restore the battery connection. Turn down the sidetone volume to a comfortable listening level. This level of tone should take about 20mA drain from the battery. Keep the key closed. The preset tone level which feeds the transceiver now requires setting. The ideal way to do this is to use an oscilloscope, valve or FET voltmeter, or any other high-impedance AC voltage measuring instrument. If such an instrument is available, then take the microphone normally used with the transceiver, or intended to be used with it, and connect it across the input terminals of the instrument, ensuring proper 'earth' and 'live' connection of the signal leads, to avoid possible pickup of hum which would give incorrect readings. After connection, hold the microphone at the normal position for operating, and produce a whistle or tone by mouth

Fig 5. Wiring details between PCB and case mounted components.
of a level comparable to that of the normal operating level of your voice. (This is easy, just sounds of a level comparable to that of the type. Leave VR1 at the correct set- ing instrument in use, rotate VR1 monitoring the level on the measur-

(minimum

earth of scope etc. Set VR1 preset

correct connections ie screen to the oscilloscope or whatever, and,

peak

in its place connect to the contact

the oscilloscope.

peak, as measured on the proto-

approximately 200mV peak -to-

should revert back to receive.

Plug in the key, and then switch on the 'keydaptor'. Turning VR2 knob, hold down the key and set VR2 to a normal listening level. Release the key. Set the function switch to MCW. The transceiver should change over to transmit as before, but this time without pressing the PTT. RF should be indicated as before. Looking at the meter in- diator, close the key contacts.

Testing, Testing

The unit can now be connected to a transceiver. Remove the microphone from the transceiver, and insert this into the microphone socket on the unit. Insert the plug on the flying lead from the adaptor unit into the transceiver microphone input socket. An antenna and power should be con- nected to your transceiver. Ensur-
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Issued by the Periodical Publishers Association, London
This month, Dave Bobbett, G4IRQ, looks at ways of screening your micro, coping with small VDUs and BASICode and gives an update on his satellite predictor program.

The agony aunt or uncle replies that of course you didn't and besides, all micro-computers generated interference so it was just one of those things that you have to live with.

Needless to say, readers of HRT, being radio users, will know that this is totally incorrect and that interference can, at the very least, be reduced to bearable levels in the majority of instances. In this particular case, the complainant was not trying to work Fiji on a watt, or anything exotic - all he wanted to do was to listen to Aunty Beeb on VHF and compute at the same time!

Whilst thinking about this question of RFI, it occurred to me that there was a tremendous disparity between levels of regulation found in, say, the amateur radio field and that of 'accidental transmitting stations such as TV sets, light dimmers and the humble micro-computer. The really strange thing in the case of the micro' is that identical machines are being sold abroad, except that they have had either metal cases or foil screening added, so as to comply with the relevant national RFI standards. Back here in the UK, town dwellers are expected to sit in a veritable fog of TTL generated rubbish simply because nobody seems particularly bothered about the problem. It strikes me as being highly illogical to closely control transmitting stations (be they CB, amateur or broadcast) but allow manufacturers to produce equipment, by the thousand, which pollutes the very radio spectrum such legislation seeks to protect.

**Raising The Standard?**

On a number of occasions where domestic hi-fi equipment has been found to have AFI 'faults', manufacturers have agreed to correct this design 'fault' by fitting the suppression components which should have been there in the first place. Just as our previous hypothetical hi-fi user had the equipment modified because the unit was bought as an amplifier and not as a radio receiver, it would seem reasonable to require computer manufacturers to correct the design faults which result in micros functioning both as radio transmitters and computers. I would be most interested to hear from readers who have had any success in arguing along these lines!

Earlier this year, the British Standards Institute issued BS5527 which defines acceptable radio emission levels for computers. It will be interesting to see how these compare with American and European standards and also what sort of impact will be made on the micro-computer industry. For those who are interested in getting to grips with the definitive item, a copy of the new standard is available for a mere!! £1 or so from the BSI! details are in the address box. The more canny readers will already be on their way to the local library!

**Get Stuck In**

In the meantime, some stalwarts are leveraging the lids of their computers and trying to cure the RFI problems themselves - one of these is John Pile (GW4EPF) of Swansea who contacted me with a number of ideas for Dragon 32 computers. Essentially, John's experiments were based on making what amounts to a Faraday cage out of perforated alloy mesh (see Fig.1) and protecting the underside of the PCB from inadvertent shorts by placing a piece of cardboard between the board and the 'cage'. Now this may seem to be a rather primitive way of going about it; but in view of the fact that Commodore, in the Vic 20, use a piece of cardboard with silver foil on one side to reduce RFI, a hi-tech approach isn't really necessary.

Due to the limited clearance of the PCB inside my own micro, I opted for a slightly different approach which uses a home-made laminate. This sandwich consists of two layers of adhesive-backed plastic which enclose a single sheet of aluminium cooking foil (see Fig.2a and b). Fig.2a uses the plastic film's own adhesive to attach the laminate to the case and has the advantage of being removable at a later date if required. Figure 2b, on the other hand, uses an adhesive between case and screen. I would not recommend the use of a contact adhesive unless you are absolutely sure that you can get everything in the right place at the first attempt - here I am speaking with the voice of bitter experience!

A far better idea would be to use a thixotropic type of adhesive which allows the laminate to be positioned precisely and only sets when pressure is applied to it. The important thing to bear in mind when using a laminate is to draw an accurate plan of the required...
shape beforehand and to try and have as few joins as possible. Don’t be tempted to cover ventilation holes, otherwise your micro may cease causing RFI permanently!

As for earthling the laminate shield, I carefully removed a small section of the uppermost plastic film and bolted a shake-proof washer down onto the exposed metal foil. The same bolt carried a Lucar type connector, which served as a connection point for the screening inside the lid and a single common earth connection was made to the main earthing point inside the machine. Although this solution only seeks to cure the directly radiated component of the RFI problem (I have yet to get to the RFI suppression which may be of use to others, please do drop me a line as I’m sure that any such ideas would be greatly appreciated.

**Back To Basicode**

When designing Basicode the authors decided that a reasonable compromise for a standard screen format would be 40 columns by 24 lines. Unfortunately this means that for some users, whose machines have ‘smaller’ screens, problems can arise when text is printed out during a program run. However, the subroutines which take care of the conversion of Basicode programs into the host micro’s dialect of Basic also provide us with a means of solving the screen-size compatibility problem.

In Basicode, the cursor may be moved to any position on the screen simply by first defining the horizontal position (HO) and vertical position (VE) which is required and calling GOSUB 110, which will move the cursor to the appropriate place. Thus the top left-hand corner would be HO = 39, VE = 23 which are the maximum values each variable is able to adopt (see Fig.3). Whilst GOSUB 110 allows us to move the cursor, GOSUB 120 makes it possible for us to find it, if the cursor’s position isn’t known. By using GOSUB 120 and then printing the values of HO and VE we can discover the unknown co-ordinates.

By using these two sub-routines, it is possible to write a short program which repeatedly moves the cursor one position to the right across the screen and reads the new position by use of the GOSUB 120 ‘find-the-cursor’ routine. In this way the value read-back in HO will always be 1 greater than the previous value of HO until the edge of the screen is reached. Whereupon HO will assume a value of 0 as the cursor ‘wraps around’ to start the line again. This is precisely the method used in the program (Fig.4) to measure the screen width. The current cursor position is stored in CO and the cursor is in
ccremented one space, if the new cursor position is greater than the old then the cycle is repeated. When the last cursor position on the screen is reached however, the next increment will result in the wrap-around effect, HO will be 0 and CO will be 39 — so as soon as HO becomes less than the value of CO, the edge of the screen has been reached and the total number of columns is the same as the value held by CO.

The same method is applied in order to find the number of lines on the screen, with VE being the cursor’s vertical position and LI the number of lines. By using this screen measuring technique any computer is able to measure it’s own screen size and store the information as CO (Columns) and LI (Lines) ready for further use in other programs.

Printing Horrors

The second part of the program illustrates how screen-measuring can be used to overcome the problems associated with printing text on machines with varying screen formats. In this particular case the text has been stored in the form of DATA statements from line 25000 onwards and operates by measuring the length of each word prior to printing; if there is sufficient space remaining on the current line then the word is printed, if not, the printing commences at the start of the next line. By keeping track of the number of free lines still remaining on the screen, the program is able to call a separate subroutine when the screen is about to be filled completely, which prevents the display from scrolling the top lines out of sight.

Thus when only one free line remains the computer will print a prompt (“any key to continue”) and wait until a key is pressed, giving the user time to read the text. Once a key is pressed, the screen is cleared and the printing commences following the same rules until the end of text marker is encountered. In this particular case, the end of the text is marked by ‘.’ ‘*’ but of course any combination of characters which is unlikely to occur in normal text would be suitable. In larger programs, the marker would be used as a link from a section of explanatory text into the main program.

An alternative approach would be to use ordinary strings to hold the text required in a program and use the Basicode ‘LEN’ command to measure the size of each word within the string. Individual words could be extracted from the text string by looking for the ‘space’ character (ASCII code 32) which would mark the end of each word. The limitation of this method is that no more than 255 characters (about 40 words) are allowed in one string. This may or may not be a problem depending upon the volume of text and the number of string variables required by the rest of the program.

And Now The News

Owners of the Tatung Einstein computer may be glad to know that they will soon be able to make use of Basicode programs as a translation program is currently under development for this machine. I have no further details, at the moment, but by the time this edition of Micro Net appears it may be worth contacting your supplier.

For those micro radio users who dabble in land-line computing (shame on you!), there is the Hamnet Bulletin Board System which is located in Hull. Details are in the address box, but please note that this BBS is not a 24 hour service but, rather sensibly, is available during the cheap-rate phone periods.

James McKnight (SW Scotland) dropped me a line asking for more details on the DATA lines contained in the satellite prediction program (October Micro Net). As it is about time for the orbital information to be updated here are the details. As 1984 was a leap year, line 25000, which contains ‘days-in-each-month’ information will need updating too. For convenience, the up-dated lines appear at the bottom of Fig.4 following the same rules until the end of text marker is encountered. In this particular case, the end of the text is marked by ‘.’ ‘*’ but of course any combination of characters which is unlikely to occur in normal text would be suitable. In larger programs, the marker would be used as a link from a section of explanatory text into the main program.

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Radio amateurs have played a crucial part in ensuring the success and safety of exploration teams. Pith helmeted John Heys, G3BDQ, will now take us on a passage of discovery through his radio archives...

The Schooner ‘Bowdoin’

The first recorded instance of a radio amateur operator going along as part of an expedition to enable reliable communications with the ‘civilised world’ concerns the MacMillan Arctic Expedition of 1923-4. Captain Donald B MacMillan, an American, had already made eight previous journeys above the Arctic Circle and he readily told of his fears that isolation could spell disaster for an expedition. In the spring of 1923, MacMillan visited ARRL HQ in Hartford to discuss the possibility of having two-way radio communications available when he led a team north again on a small schooner, the ‘Bowdoin’.

His visit resulted in the equipping of the schooner with a complete 200 metre amateur station, kindly donated by the Zenith Radio Corporation, who also provided an amateur operator of no mean ability. The latter was Donald H Mix, who held the call W1TS (later to be WI TS). The venture was a complete success and between June 23rd 1923 and their return on September 20th 1924, hundreds of messages had been sent to and from the ‘Bowdoin’ to the North American Press Alliance, to the back-up organisation at home and, not least, to hundreds of American amateurs. The expedition’s callsign was WNP (Wireless North Pole) and whilst on the trip, they set up a new world DX record too! Ironically, whilst Don Mix was away, the great ‘DX revolution’ had erupted and the wavelengths used by radio amateurs fell below 100 metres (up to this time, these ‘short wavelengths’ had been generally regarded as useless). This resulted in much long distance ‘working’, and even inter-continental contacts became commonplace.

The 200 metre band was soon abandoned for DX working but Mix and his station WNP had proved that explorers and adventurers travelling to distant parts, anywhere on the earth’s surface, need never again endure the dangers of isolation inherent on earlier journeys. Don Mix, as W1TS, was listed in the 1952 Call Book as living in his home state of Connecticut.

In 1925, the ‘Bowdoin’ once again carried a MacMillan expedition to the far North. This time WNP, using more up-to-date gear, was operated by one of the legendary figures in amateur radio, John L Reinartz (calls 1QP and 1AXM). His work in the devising of new and better circuits for the new ‘Short Waves’ was a major factor in the great leap forward in consistent long distance working by amateurs. Reinartz invented a detector circuit which will be remembered in the history of amateur radio, for it enabled reliable regenerative reception down to very short wavelengths (Reinartz had gear working on 10 metres in 1924) using the rather inadequate valves then available, which had poor amplification and high inter-electrode capacities.

Also aboard the ‘Bowdoin’ was Lt Commander Richard Byrd, who, a few years later as Admiral Byrd, led two famous expeditions to the Antarctic. Byrd’s first expedition South will be described later in this article.

Around Africa

Between March and August 1927, an Italian Motor Vessel, the ‘Perla’, was engaged upon a voyage of scientific discovery around the coast of the continent of Africa. There was no real danger attached to this trip, but it is noteworthy that the Perla had on
board an amateur to operate the ship's 600 watt 'Short Wave' rig and call XEI1FP. This was Senor Franco Pugliese, whose home QTH was in Milan where he held the call 11FP. The trip began in Venice and after passing through the Suez Canal, the Perla stopped at eighteen ports before her return to Genoa on August 5th. The receiver used on board ship was a superhet — very unusual and 'advanced technology' for that date! During the 1920's, the Italian Navy had several ships with operators on board who worked the amateur bands. This was useful in determining communications limits for their Navy!

The Byrd Expedition of 1929-30

This famous and well documented expedition set sail in the summer of 1928 and included six radio operators. These included four amateurs; three American and one New Zealander. On the journey South many 'skeds', using the callsign WFA, were successfully kept with amateur stations and the ice base was reached during the Antarctic mid-summer in January 1929. Three tall towers supported a variety of antennas down at their base, 'Little Amaranth' in the Bay of Whales. A simple self-excited power oscillator in a TPTG (tuned plate-tuned grid) circuit running a pair of 204A tubes (valves for the un-initiated) was used as the transmitter. This simple but powerful rig could be almost guaranteed to work, even in the most rigorous conditions (a long, long way below freezing) and although unstable by today's standards — and also no doubt 'chirpy' — it could be easily received. Its 500Hz self rectified HT supply from a generator would also impart a certain 'music' to its note!

The receiver was a General Electric type AR 1496-B which used the then latest 'state of art' design and included a screened grid (tetrode) valve as an RF amplifier stage, followed by a detector and two stages of audio.

I consider myself more than fortunate in having a WFA QSL card in my collection. This card confirmed a QSO with J Kyle, Scottish G6WL (at that time there was no GM prefix) living in Ayrshire near Glasgow. It was written out and signed by 'Pete' alias Carl O Peterson, one of the non-amateur expedition operators. The front of the card has small line drawings showing penguins and the base with its three mighty towers and three grounded aircraft. The expedition handled more than 2 million words of copy, most of this traffic going through amateur stations who could maintain contact with the Byrd Expedition even when the commercial 'Big Boys' lost out!

The Indefatigable Krenkel

Ernst Krenkel, unfortunately now no longer with us, was undoubtedly the most famous and lauded amateur in the Soviet Union. He first worked as a wireless operator in Arctic Russia from 1927 when based on the island of Novaya Zemlya. It was whilst there and using 250 watts of power that he contacted Byrd’s expedition (WFA) in January 1930. The 7 MHz band, a favourite for DX in those days, was used for this contact and it was the first time that such a long-haul North/South contact had been achieved.

July 1933 saw Krenkel as chief radio operator on the SS Chelyuskin, an icebreaker used to explore arctic waters and find paths along the northern Siberian coastline. On February 13th 1934, she was crushed by pack ice off the coast and soon sank. The survivors, which included women and children, took what they could salvage from the stricken vessel before she went down and then made camp on the ice. For two months, the survivor's only contact with the outside world was through Krenkel's radio gear. He used the Chelyuskin's callsign RAEM during that time and eventually the survivors were rescued by Russian planes. The last six people, which included Krenkel and some husky dogs, were picked up on April 13th 1934.

For this exploit, which saved the lives of everyone from the Chelyuskin, Krenkel was made a Hero of the Soviet Union, the highest honour that that nation bestows, and was remarkably allowed to take the callsign of the Chelyuskin as his own personal
The amazing Ernest Krenkel. Top card is an ‘artistic’ illustration of Krenkel’s work on the ice cap after the Chelyuskin sank. Note that the Chelyuskin appears to be beached rather than sunk! The postcard at the bottom right shows Krenkel (2nd from top) and the three other men who made up the expedition to the North Pole in 1937.

amateur call. A QSL card received from the Russian amateur U3Di by G6MU in 1936 shows the ill-fated Chelyuskin trapped in the ice, some Russian aircraft fitted with skis, and an inset portrait of Krenkel wearing his ‘phones.

This was not to be the final chapter in Krenkel’s adventurous life story, for on the 21st May 1937, the Soviet Union announced to the world that four men and a dog had been landed by plane on to the ice of the North Pole! The expedition leader was Ivan Papanin. There were also two scientists and the fourth man was Ernest Krenkel.

Krenkel soon set up his radio station and using the call UPOL was kept extremely busy handling traffic and amazingly also finding enough time to contact amateur stations.

His first such QSO was with a Norwegian station on June 24th and this was soon followed over the months by contacts with DX all over the world. His little 20 watt transmitter received its power from lead-acid accumulators which could be charged by a wind generator. During the rare calm periods, a pedalled ‘bicycle-like’ contraption was used for this purpose – which needed two men to work it properly. Krenkel’s antenna was a simple 76 metre ‘long wire’, held up by two poles.

The ice drifted rapidly and by December the party were almost 1300 km from the pole and were reaching warmer seas which would soon melt the ice floe they were ‘travelling’ on. The expedition eventually had to move camp, pulling all their equipment and supplies on a sledge. Krenkel kept up an almost constant contact with the ships which were racing to effect a rescue before the ice floes all melted, and it is said that he often operated in the open with bare fingers on his key. At such times Krenkel could only work for ten minutes at a time because of the intense cold.

The expedition was eventually rescued on February 19th 1938 after their epic journey which took them to a point off the east coast of Greenland.

Krenkel’s QSL cards in later years showed in colour the UPOL Polar Ice Station. One of them, sent to old timer G6VC in Kent in 1958, has on its back the interesting information that all cards for Russian amateurs with the sole exception of cards for Krenkel were to go via Box 88 in Moscow. Krenkel’s private home address in Chapligin Street, Moscow was given, together with a short explanation for his having the callsign RAEM.

UPOL was just the first of a long series of drifting Polar Ice Stations. A later one was UPOL-9 which was set up during 1960-61. G6VC worked this remote station too and received an interesting QSL card from the operator Victor Boronin, who was using 70 watts input and a 9 tube receiver. The ‘picture’ side of this card shows the Ice Base with its huts, antenna masts, a helicopter and a fine display of the Aurora Borealis, the Northern Lights, overhead.

A final highlight from Krenkel’s amazing story was his appointment, when no longer a young man, as the Commander of an Antarctic Expedition in 1968-69. A trip to the Antarctic was something he had long desired, it is said.

Some Minor British Expeditions

The late Lt Col A B ‘Brownie’
Whatman, MBE, G2BQ, was the radio operator for the Oxford University Arctic Expedition back in 1935-6. He went with them to North East Land (80 degrees N and 20 degrees E) and used the call GVX. 'Brownie' held the call G6BW in the 1920's and at various times had worked as VS6BE, MJL in Spitsbergen (1942/3) VU2BC, MD2BC (Tripoli) and MD2BC/SU in Egypt during 1951. He certainly got around during his life in the Army! Another and earlier Oxford University Expedition which went to British Guiana in 1929 had relied upon amateur radio and used the call VP5OUX.

Each year, the Public Schools' Exploring Society sends a small party of lads and masters to explore remote places, often in colder climes. Their trip to Newfoundland in 1938, using the callsigns G8 XY and G8XZ, had G6DW as chief operator. Their simple and rather dull looking QSL card tells us that they had a crystal controlled 150 watt transmitter and a simple 0-V-1 'straight' receiver. The card in my possession was sent to G3OH for a contact on 20 metres and locates the expedition at Lat N 49°30, Long W 57°20.

The British North Greenland Expedition during 1952/4 must not be forgotten, for they had numerous contacts with amateurs and used the call G3AAT/OX. I once received a card from this expedition but like so many things that are accumulated it seems to have vanished. It will hopefully 'resurface' one day!

More Recent Times

The year 1952 saw a spectacular astronomical event; a full eclipse of the Sun which was observable from sites in the Sudan and across to French Equatorial Africa and also Saudi Arabia. Radio amateurs accompanied the scientists to a site near Khartoum in what was then known as the Anglo-Egyptian Sudan, and these were Messrs. W3PBZ, K6FAL and K6FAW. I have two QSL cards from this expedition which was located on the banks of the Blue Nile and both were for their contacts with the late G3BID. One callsign used was ST2AB and the other was the American MARS callsign AJ4AB/ST. This expedition has many contacts world-wide and examples of their QSL are not rare.

A much scarcer card comes from VQ9GU, which was the call of a station set up on the Island of Mahe in the Seychelles in August 1958. The expedition to Mahe was organised by the East African Film Services and the radio operator was VQ4GU from Nairobi. Commercial gear was used during the trip and this is perhaps an indicator of the rapidly changing face of amateur radio in more recent times, the simple transmitters and 'straight' receivers of the earlier days could no longer cope with the QRM and band conditions induced by hordes of fanatical DX chasers!

Signing Off

This article has only scraped the surface of the topic of amateur involvement in expeditions and exploration, for there were perhaps several hundreds of occasions between Don Mix's efforts in 1923 and the present day. Over the last thirty years, there has been a succession of expeditions to the Polar regions and many semi-permanent bases have been established in Antarctica. A detailed account of amateur operations from these bases is beyond the scope of this article which has only tried to tell something about the 'old days'.

I have also quite purposely not mentioned the so called 'DX expeditions' to rare and wanted locations over the world, for I feel that such stations belong in quite a different category. They are set up for the sole purpose of giving a new country to the hundreds of thousands of DX 'hounds' everywhere and are not incidental to a more important purpose. If you have any QSL cards for QSO's with 'real' expeditions, hang on to them; they are going to be interesting and perhaps even valuable research material for future historians!
GOT A GOOD FIST?

Down To Brass Keys

The point of my previous history lesson/sermon is as a trailer for a celebration of KISS communication to be held on the evening of the 30th May. The brain child of John Bluff, G3SJJE, chairman of Edgware DARS (G3ASR), who has been teaching newcomers to amateur radio morse code for some eighteen years via slow morse transmissions on 160 and 2m, the celebration takes the form of an evening of simple CW communication at the low end of the 80m band. In John’s words, “an opportunity for newcomers and old timers alike to get together on 80m CW and ragchew”.

The brass and slate based ‘GW Morse Key’ is available from GWB8WND at 4 Owen Close, Rhyl, Clwyd, N. Wales

The few hours of relaxed and chatty contacts at whatever speed suits you has one important condition attached — it must be done with that most basic of operating instruments, the ‘straight key’. Once more, over to John, to put the case for the straight key.

’SKE was started with the idea of encouraging the new licencee to get on CW; reviving the spirits and interest of those who didn’t take easily to the electronic CW age, and providing the chance for the elbug whizz kids to show they could still use the hand pump. Above all the idea was to have fun on the key.

“It is one thing to help people through the morse test. For many actually going on the air on CW is a daunting prospect. Although anyone batting away to surmount the 10wpm mark may hardly think so, the morse test is really rather rudimentary. It has little relation to CW as used on the air. The trepidation of the newcomer is all too apparent: electronic keyers battling away at what seem to be prodigious speeds — whether under control is something else; and a whole new world of operating procedures and seemingly endless abbreviation.

“Even coping with letters and figures mixed together can be quite a task. The Edgware Club has tried to provide the kind of CW instruction that goes beyond the morse test requirements and helps the learner to use CW as a language. One that is both enjoyable and stimulating to use once some degree of proficiency is achieved. For those who haven’t tried it, it is hard to convey the pleasure in the rhythm of the mode that begins to be felt as speed increases.

“Having circulated various magazines and clubs, there was little indication of how well the first SKE in April 1982 would go down. Not being a contest, there were no formal entries to submit. Nevertheless the response was much bigger than expected and very enthusiastic.’”

I should add at this point that John disclaims any originality for the notion of a ‘straight key evening’, pointing out the ARRL (American Radio Relay League) have been holding one for years — on New Year’s Eve, would you believe (hic).

In order to give everyone the flavour of the event, a potted and amusing report of SKE in 1982 is
given nearby. G3MCK well and truly got into the spirit of the evening with his crystal oscillator/PA and old HRO receiver. Participation in the SKEs since has spread over the UK and on the Continent.

By the way, those of you who haven’t got the Morse test can still participate in the evening. Speeds of sending can be slow and there is a chance to get — practice at actually listening in to real Q5s and be able to read some of them. Hearing (relatively) ancient G3’s like myself grappling with a ‘straight key’ for the first time on air for far too many years could also prove a source of considerable amusement!

The Key To The Evening

Most people usually have some kind of straight key kicking around the ‘shack’. Many of these are ex-forces ‘surplus’, and frequently change hands at radio society junk sale — perhaps too many times! Springs lose their spring and contacts wear down.

If you are reasonably practical, these may be simply reconditioned — the editor has an WW2 RAF key which was given a new lease of life by a spring taken from a ball point pen!

If you can’t find a good surplus key, are not particularly practical and have a bit of cash to spare, you could always purchase a new straight key. The continual demand for straight keys coupled with the virtual drying up of war surplus key supply has tempted a number of manufacturers into this area. SMC of Southampton market a range of straight keys made in Japan by Hi-Mound. These range for the very basic HK700 (£16.95) to the swish, expensive brass HK802 (£85.85). There is also a very nice Swedish model, whose name escapes me (Ingrid? — Ed. Asst) at present, but which you can see advertised from time to time at around £75. Although the cheaper models of Hi-Mound work reasonably satisfactorily, they are rather plasticly.

At a rally during the Autumn, I met John Wilkes, GW8WND, who manufactures straight keys (in Britain!) under the banner of GW Morse Keys, John’s key, illustrated nearby, is made of solid brass with silvered contacts, has a base made of ¾ inch Welsh slate to minimise slippage and sells at a very modest £37.50 inclusive.

GW8WND is a keen vintage radio enthusiast and possesses a very large collection of vintage keys. Impressed with his enthusiasm — and the quality of his key — I started to tell him about ‘Straight Key Evening’. He immediately offered to donate a key as token of esteem for the person with the cleanest, steadiest fist.

The Final Key

The conditions for the evening are given in a box nearby. There are no rules as such — other than the type of key to use — as the box says, “finish as late as your arm holds out”. We don’t care if you’re QRO with an 807 or QRP with a BFY51 or just QRU with a TS930S (although we’d prefer the former two for sentimental reasons). Please send your comments on keys (oddest key, eldest key), ‘fists’ (best fist, worst fist?), equipment and the evening in general to John Bluff, G3SJE, 52 Winchester Road, Kenton, Harrow, Middlesex HA3 9PE. A panel of CW friends including John and the editor will decide on the best ‘fist’. Oh yes, and there will also be a chance to work GB4HRT — although the editor is not sure how long he can managed to send the callsign!

All that there is left to say is get those keys polished and see you there! G3ZZD

Those of you who listen to or work 2m or 160m SSB and feel left out, will have the chance to take in a totally frivolous competition in the Autumn, with a prize or two (I hope). Watch HRT for details.

STRAIGHT KEY EVENING 1982

The evening of 29th April seems to have produced a good deal of rummaging in drawers and cupboards. Fancy electronic wonders were pushed aside as a multitudinous variety of straight keys emerged into the light again. The first event ever in the UK exclusively devoted to the gentlemanly art of pumping the brass was getting under way: not a contest but an opportunity for newcomers and oldtimers alike to get together on 80m CW and 3.520-3.580MHz, QRP.

The response far exceeded expectations, from G2+2s to the latest G4s; from some who hadn’t touched any sort of key in years to at least one keen contest man finding it was actually fun to talk to people again. No hassle of streams of ill-controlled, electronically generated dot and dashes, but a relaxed atmosphere in which all could work at their own pace.

Later in the evening a few fists were beginning to lose some of their initial crispness as little used muscles began to complain. As to quality of fist, particularly honourable mentions were made of G6JJ, G300J, G3RXP and G4HIU, with a special mention of G4NVM licenced BFY51 or just QRU with a 807 or QRM with a TS930S.

The following comments on the evening are just a sample; “It’s been 17 years since I used one of these in anger” - G3HIU: “only time I use this thing is for very QRS DX working”

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- G3PEK: “this will do our arms a lot of good” - G3H0M: “this key has platinum contacts which will handle several amps!” - anon: “should be one a week” - G4ITP.
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Planning for the future with Ham Radio Today.

Ham Radio Today has been going for some time now and we think it is time we asked our readers what they want in a direct fashion. We have our own ideas, of course. We think that we are going to be more informative, more up to date, more entertainingly creative and offer more straightforward, practical projects. We want to know what you think. Overleaf, we have our readers survey. We want to receive — at least 25,000 replies. This means you! It's fully post paid; all you have to do is fill it in, tear it out, fold it up and stick it down. Oh yes, and post it. All replies received by 1st May will eligible for a prize draw — we will be giving away 10 twelve-month subscriptions to Ham Radio Today to the lucky winners. Rumours that the draw will be made from the editor’s hat are purely malicious and probably spread by the editorial assistant (ouch!).

The questions cover the next two pages, but if you have any comments of a general nature, put them here — just so that we have been warned!

Please write your name, address and callsign (if any) here, along with any comments you may have, eg, suggestions for articles you’d like to see, etc.

Now turn overleaf for our custom-designed, user-friendly questionnaire.
1. Sex: are you?  
   Male □  Female □

2. What age range are you in?  
   Under 15 □  15-19 □  20-24 □  25-29 □  30-39 □  40-49 □  50-64 □  64+ □

3. Marital status: are you?  
   Married □  Single □

4. Do you own:  
   (a) Your home Yes □  (b) A car Yes □

5. In which independent TV station area do you live? (This information is used to code the area.)  
   LWT/Thames □  TVS □  TSW □  Scottish □  Granada □  Yorkshire □  Central □  Harlech/MTV □  Anglia □  Tyne-Tees □  UTV □  Channel □

6. Occupation — please bear with us, this is a little complicated!  
   (a) Are you studying full-time? Yes □  If ‘No’, please go to part (b)  
   School □  FE College □  University (TT/CHE/Poly/ etc □
   Are you sponsored in your studies? Yes □
   Please go to part (d)
   (b) Are you employed, either full or part-time? Yes □

7. What level of education have you reached?  
   No formal qualifications □  CSE □  ‘O’ Level/SCE □  ‘A’ Level/Scottish Higher □  ONC □  HNC □  Degree or above □
   Are you still studying, full or part-time? Yes □
   Did or does your course of study involve radio or electronics? Yes □
   Was or is your main subject radio or electronics? Yes □

8. How did you obtain your copy of Ham Radio Today? Was it:  
   Subscription □
   Through a regular order at a newsagent. □
   Bought from newsagent’s shelves. □
   From a radio shop □
   From a friend □

9. Do you have any difficulty in finding ‘Ham Radio Today’?  
   Yes, some difficulty □
   If so, where do you live (nearest town)? □

10. How many people read your copy?  
    Just you □  You and one or two others □  You and three or more others □

11. Do you own any of the following makes of equipment?  
    (Tick those you own if this is large in value eg a transceiver, and cross if something small eg ATU or microphone.)  
    Yaesu □  Tri□  Icom □  Other Japanese □  KW □  Drake/Collins/American □

12. Do you use CB 27.934MHz? Yes □

13. Are you:  
   (a) a short wave listener □  (b) studying for the RAE □  (c) a class ‘B’ licensed amateur □  (d) a class ‘A’ licensed amateur □

14. (a) Do you belong to the Radio Society of Great Britain (RSGB)? Yes □  (b) If no, do you intend to join the RSGB? □

15. (a) Do you belong to a local radio or electronics club? Yes □  (b) If no, do you casually attend any clubs? □

16. Please rate the following types of article on the list below; please score from 1 (poor) to 5 (brilliant).
17. Do you intend building any of the following projects that appeared in HRT in the past year?  
   - Project Omega
   - Alpha Transceiver
   - DSB 80
   - 'Mighty Mouth' processor
   - Simple iambic keyer
   - SWL active antenna
   - Mustard tin microwave transmitter

18. Do you intend building any other projects from previous issues of HRT? 
   - Yes
   - None

19. If yes, which one(s)?

20. How many projects do you build a year? 
   - None
   - Only just got interested
   - 1-3
   - 4-12
   - 12 or more

21. Do you have problems in finding the components for your projects? 
   - Yes, some problems

22. (a) Do you usually build projects: 
   - Exactly as printed with a few mods 
   - With a large number of mods 
   - Designed from scratch yourself (with a few sections borrowed) 

   (b) Do you usually use: 
   - PCBs 
   - Veroboard or similar 
   - Other form of construction 

   (c) Do you make your own PCBs? 
   - Yes

23. How much do you intend to spend on equipment of projects this year? 
   - £50 or less
   - £50-£100
   - £200-£500
   - £500-£1000
   - More than £1000

24. Do you own a home computer? 
   - Yes
   - No

25. (a) Do you read the advertisements in HRT? 
   - Yes
   - No

   (b) Do you buy items mail order from HRT advertisers? 
   - Yes
   - No

   (c) Do you buy items mail order through advertisements in other magazines? 
   - Yes
   - No

   (d) Do you buy items from the same supplier(s)? 
   - Yes
   - No

26. Do you prefer the advertisements spread evenly through the magazine, or all in the front and back of the magazine? 
   - Spread through
   - Front and back

27. Would you like to see a job/recruitment section in our advertising pages? 
   - Yes
   - No

28. What national newspapers do you read (if any)? 
   - Mirror
   - Star
   - Sun
   - Telegraph
   - Guardian
   - Times
   - Express
   - Mail
   - Other

29. Which other magazines do you read, how often, and what do you think of them? 

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"I'd like to try 70cm but my main priority is 2m. After all, that's where my mates are and I've only got so much time and money..." Listening around, on the air, at rallies and radio club meetings this editor has heard these or similar words many times; from newly licenced amateurs and confirmed emporiums who traded in government surplus gear, a device (or rather devices) called the Pye 'Pocketphone'. Consisting of a separate UHF transmitter and receiver, these could be purchased for a tenner or so, and, with a pair of crystals and a little tweaking, got going on 'seventy'.

In those days, the 'Pocketphone' suffered from many disadvantages. They only gave a few milliwatts of RF, ran off batteries which ran down rather quickly and there were very few repeaters to boost their small signals. Many of these ended up in the back of cupboards or buried under shack benches, brought out only to be sold off at a society junk sale.

Well, the Pocketphone was ahead of its time. With the growth of 70cm repeaters, the Pocketphone came out of the closet, to become a fairly sought after piece of equipment and can change hands today at three or four times the original surplus price. Not very elegant but for value (probably under 1/4 price of an IC4E for example) the Pocketphone is hard to beat... if you can find one.

Another cheap solution, also well under the £100, is the purchase of a varactor tripler — see Hugh Allison's excellent 'A Single Channel Transverter for 70cm' in July '84 HRT. Used in conjunction with your 2m multimode and a separate crystal oscillator, this will generate a 70cm signal by mixing the incoming 144MHz with 288MHz. Although originally designed as a transmit only device, if modified as per Hugh's article the varactor tripler will perform on receive as well.

Back in the early 1970's, the days of 2m AM, this means of generating 70cm RF was very popular. Many of these triplers were 'home brewed' and Microwave Modules produced a successful commercial design. Both can occasionally be found for sale in the second hand columns of the various radio magazines but, like the Pocketphone, have become fairly sought after because of their relative cheapness (£10-20).

OK, we can't find or don't like a pocketphone or a tripler and a hundre...
the selectivity. The 2nd IF is 455kHz.

The transmit section is similarly straightforward. A 12MHz VXO is multiplied up to 432MHz by a four stage multiplier chain. The frequency modulation is produced by a single stage mic amplifier driving a varicap diode and the PA, a 2SC2644, is followed by bandpass and low pass filtering to make any spurious radiation negligible. A small electret microphone is located at the lower RHS of the speaker enclosure.

**Top panel**

**In Action**

I decided to test the Micro-7 out over the Christmas holidays, whilst staying on the South Coast. The Micro-7 was a crystalled up for RB14 and RB4; the former to give the GB3HE, the Hastings repeater and the latter to give GB3NK, as I had originally intended testing the rig from a location in Kent.

My first sortie was to a local hilltop, 600' ASL and some 14 miles west of GB3HE. In addition to the set mounted 1/4 wave, I slipped a ‘Slim Jim’ antenna into the rucksack to give a little boost to the 200mW. Reaching the top of the hill, I switched the Micro-7 on and selected RB14 with the top mounted channel switch. On pressing the transmit switch (a small circular press button on the RHS) and giving a quick ‘blip’ to the toneburst (micro push button on the LHS) the repeater came up, fully quieting the Micro-7. I then gave a few calls requesting a report, all in vain. I decided to swap from the 1/4 wave to the ‘Slim Jim’ in order to maximise my transmitted signal. Still no luck!

More out of curiosity than anything else, I idly flipped the channel switch onto RB4. To my surprise I could hear an FM signal about S6/7. The received audio was crisp and clear and the 200mW output more than adequate despite a strong and rather noisy wind. When a callsign was given out in morse identifying the signals as emanating from GB3NK, over 40 miles distant, I was very pleased indeed. An attempt was made to break into the contact by my 200mW was not enough to access the repeater.

Setting down to listen to the QSO on GB3NK (as much as you can on a hilltop in December in a strong wind) I discovered that one of the stations was intending to QSY to GB3HE. Five minutes later I was having my first QSO.

The transmitted audio was pro-
nounced as being ok but the station I was in contact with noted that it seemed about 5kHz off-channel, which made the audio seem weak.

A second contact confirmed this. In order to compensate for any small errors in transmit and receive frequency (remember, that the crystal oscillator governing the transmit frequency is being multiplied some 36 times and a 5kHz difference at 432MHz means less than 0.15kHz difference at the fundamental frequency) each crystal position is equipped with a small trimming capacitor. A small adjustment to the appropriate trimmer whilst listening to the output on a receiver set to the correct frequency would soon cure this problem, I thought.

Regarding the battery consumption, I was on my second pack of HP7s at the end of the Christmas holiday and would estimate the Micro-7 had well over 6 hours use on the first pack.

**Conclusion**

As a local talkbox, the Micro-7 is excellent. The sensitivity of the receiver from the strength of the signals received seemed to me to be up to the claimed response, which is based on a signal producing around 18dB S+N/N, although no laboratory tests to check this were performed. With a handheld, or any transceiver for that matter, the main concern about receive sensitivity is that it at least matches the potency of the transmitted signal and the Micro-7 does this and more — as the on-air tests illustrated.

The Micro-7 is light (420g) but very rugged in mechanical construction and should stand the knocks. The standard of the electrical construction is well up to that of the big 3 Japanese manufacturers we all know and love.

Four criticisms, none of which are serious. The major one I think, is the power supply, which is provided by 4 HP7 dry or NiCad batteries. With a transmit current of around 180mA, dry batteries are not going to last long. NiCads seem like the best idea but you will have to spend some extra money on these — and a suitable charger, of course.

If you are going to want to take the Micro-7 around the country, the 3 channel capability may cramp your style. Either 2 repeaters and 1 simplex (the calling channel?) or two simplex and the appropriate repeater channel would seem to be the most useful combinations, depending on how many repeaters are close to your QTH. My third criticism concerns the action of the channel control switch which seemed rather less than positive but in practice, the switch seemed to function all right.

The final gripe concerns the error in the transmitted frequency discussed earlier, which was largely my fault. If you’re buying a Micro-7, get the retailer to fit the crystals you want and check the transmit and receive frequencies before you take it away.

The review sample was collected in rather a hurry and I did not allow time for the exact output frequency to be checked.

Right then, if you want to have a cheapish dabble on seventy and have a repeater near to you, the Micro-7 could well suit your purposes. I enjoyed using it very much.

Many thanks to Amateur Electronics UK of Birmingham, who are the Tokyo UK importers, for providing the review sample.

**STOP PRESS.** Since this review was written, the demand for the Micro-7 has severely depleted AE UK’s stocks. AE UK have requested new stock from Tokyo but due to the increasingly poor state of the exchange rate (1) they doubt if the present price of £99.50 can be maintained...
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PLUS

CINDERELLA DID GO TO THE BALL

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A LOOK AT BBC 'OUTSIDE BROADCASTS'.

DON'T PANIC!
LAST MINUTE TIPS FOR THE MAY RAE
WIN A TOKYO MICRO-7 70cm HANDHELD!
About 20 years ago Jocelyn Bell, a brilliant young radio astronomer at Cambridge, became the first person to detect pulsing radio waves from the sky. Most of the analysis was apparently done by her, but it was the head of her department, Professor Hewish, who was given the official credit and won the Nobel Prize for the discovery of the pulsing stars as 'pulsars', as they became to be termed. Those were less liberated times than today and many have suggested that if she had been a man she would probably have jointly won the Prize. That is another story though, so let us resume this one.

Following on from this discovery was the remarkable BBC television series of the later 60's, 'A for Andromeda' by Sir Fred Hoyle. This began with scientists searching the skies for alien signals using radio telescopes tuned to the frequency, or rather wavelength, of the most common hydrogen line (hydrogen is the most common element in the known universe). The scientist then discovered radio signals on this wavelength which turned out to be alien binary coded transmissions.

For a few days after the first 'pulsars' were received, the Cambridge team actually considered the possibility that the pulses were, in fact some form of communication. They were even referred to half jokingly (!) at the time as 'LGMS' — standing for little green men.

Throughout the professional scientific world can be found the belief that there is alien intelligence out there somewhere, and many serious meetings have been held to discuss possibilities and probabilities, such as Project Ozma, for example. This article deals with my own ideas on this subject and some facts which cause me to suggest that a radio amateur could well be the first person to pick up a signal from space from other living beings.

Radio amateurs could be the first to communicate with alien intelligence. Angus McKenzie, G3OSS, puts forward an argument for the close encounter to end all QSOs.

Let's have a look at a few basic ideas, and some rather 'hairy' assumptions that I believe many scientists would agree with, and which form the basis of this article. If there is alien intelligence, then there will either be quite a lot of it around, in which case sooner or later, it will communicate with us; if it is rather rare and perhaps far away, even if the intelligence is developed far in advance of us, they may not know about us at all.

If we look over the three to four
thousand million years that some form of life has existed on earth, it seems reasonable to assume — unless there were previous intelligent civilisations that we do not know about — that only in the last fifty years, or so, have we had the scientific knowledge and practice to transmit and receive electromagnetic waves other than heat and light. In terms of the span of the history of life on earth then, we are dealing with only one part in an atomic or hydrogen bomb explosion!

If really high energies were first transmitted around 40 years ago, then we might expect to have seen a reply by now, if there had been an intelligence higher than ours within 20 light years of us. One light year is approximately 10,000,000,000,000 kilometres. To help you grasp distances, the sun is around 8 light minutes away (150 million kilometres) whilst the next nearest star is 4.25 light years away (Proxima Centauri). Sirius, the brightest star in the sky from earth, with its companion white dwarf star, is 8.6 light years away and there are thousands of stars, many of them of similar composition to our Sun, within 50 light years. Quite a few of them are invisible to the naked eye as they are too dim to see.

The number of stars in our region of the Milky Way varies as the cube of the radius to be considered. This means that as every year passes, the chances of finding ETI, if it exists, increase. In the next 40 years, assuming that we use equipment no better than at present, the chances of receiving ETI are eight times better than they have been. Our radio transmissions will have reached eight times the number of possible star/planetary systems than they have so far, assuming World War II was the first time that we transmitted radio waves detectable outside the solar system.

It should be realised that frequencies as we express them in amateur radio are numbers directly related to the time taken by the Earth to revolve. One second, ie 1Hz, is a division of one day. However, there are also frequencies which must be the same anywhere. A typical example is that of the lowest resonance of the hydrogen atom — known as the hydrogen line — at 21cm. This is at approximately 1420MHz. This 'fre-
quency’ varies slightly depending on doppler shift — the line frequency of hydrogen line radiation coming towards us will slightly increase. If the radiation is going away from us, the frequency will be decreased.

In exactly the same way, light radiation from the star shifts to the colour red as it goes away from us. Since the universe appears to be expanding, the further away an object is, the more is its light ‘red shifted’.

The most distant sources of energy, ‘quasars,’ actually have their light frequency halved and can be subject to a shift of up to 3.4 times. However, the hydrogen 21cm line is normally fairly narrow and can be easily defined.

What type of transmission?

We now have to consider what type of transmission might be sent to us in reply, and at what frequency it might be. However, this is where we start the fun, for unfortunately we have an inconvenient number of fingers and thumbs. This has caused us to use the decimal system, which, to scientists, is a complete bore because 10 can only be divided by 1, 2, 5 and 10. Man’s creator, perhaps, made one little error. It would have been so much more convenient to have had six digits on each hand.

If this had been the case, we could have used the duo-decimal system, 12 being divisible by 1, 2, 3, 4, 6 and 12! This is all rather unscientific, and in basic science, the binary system might well be more to the point — numbers such as 1, 2, 4 and 8, or \(\frac{1}{2}, \frac{1}{4}, \frac{1}{8}\) and multiples of these fractions could be more likely.

The characteristics of any alien transmissions are likely to be directly related to a binary division or multiplication of the hydrogen line frequency. ETI would be unlikely to transmit to us on 21 cm itself, because the QRM coming from stars etc, at this frequency can be high. It is not impossible that 21 cm would be the frequency. If it is not, the transmissions are likely to be at a spacing reasonably close to it, but far enough away from QRM to be very low — ie plus or minus 10% or, to use a binary sequency multiplication, between 7/8 and 1\(^{1/4}\) times the frequency.

ETI would certainly avoid frequencies below 250MHz and probably below 1GHz because they would know that low frequencies would either be absorbed by a (our) planetary atmosphere or intensely disturbed by it. Furthermore, normal VHF frequencies would be subject to a high degree of atmospheric noise. Such noise though, is at a much lower level above 1GHz.

Having received our earliest transmissions, they might come to the reasonable conclusion based on the aforesaid that they should send to us on a frequency between 1GHz and 1.420GHz. Higher frequencies would be less likely (but not impossible) because these require higher and higher technology to be used effectively. If they received signals sent between 1940, or so, and 1945, they could see that frequencies we were using were gradually increasing. But they might well appreciate that we could not use very high powers and also might not have extremely sensitive receivers for the higher microwave frequencies. They would also know that higher gain antennas, at frequencies over a few GHz, require much higher technology in the accuracy with which the dishes are made, especially the larger ones.

Therefore, I feel that the chances are high that a frequency between 1GHz and 1.4GHz would be used. A reasonable area around one-eighth lower than the hydrogen line falls slap in the middle of the 23cm amateur band. So, here we come to the big crunch. Radio astronomers do not use this band very much and we have to share it with some amazingly powerful radar stations such as the recently established chain putting out around 1000MW ERP at London Airport at around 1 270MHz (which could in time attract attention to this area also? — Ed)

How about the mode of transmission? I have to ask myself here what I would do if I was an egghead on a planet going round a star in the Sirian sector of the universe who wanted to communicate with earth. I would vote for binary digital keying of some type, and I would use a spread
spectrum and a lot of power. Such a spectrum might occupy around 10MHz of bandwidth with actual transmissions every 1200kHz or so, thus allowing any of them to be received. (Whoops, 12MHz and every 120kHz, I forgot I had just ten digits!).

Optimum reception would be with 100 (120?) different receivers picking up the entire spectrum and adding it together. However I don't think power would be a problem, although I have a hunch that extremely high power - such as 1 million MW into an 80dB gain antenna - would be fairly difficult at a frequency of 100MHz or so. Our LGMs might realise that they could select an unfortunate frequency which would be clobbered by terrestrial transmission, even with spread spectrum transmissions. Despite this, we should all be ready though for "who's that down there saying 'who's that up here'."

What Could Happen!

Let's look at the scenario that just could happen on April 1st 1985. I could imagine myself turning round my antennas on 1296MHz activity night (Monday) and coming across a strange and fairly wide digital transmission to the west. I suppose my curiosity is as good as anybody else's, so having adjudged the direction of the transmission, I might note that it had shifted just slightly in direction (thinks "perhaps it's G8TFI/P on the move?"). I would then contact another amateur on the band, preferably well beyond the horizon, a 100km away at least, and to my surprise he comes up with the same direction as me, let us say, due west. Our initial conclusion would be: somebody is having some fun on a large pimple in South Wales. But then another amateur to my north calls in and says he is getting it in the same direction. "'Curiouser and curiouser', said Alice". So, is it an artificial satellite gone berserk?

Finally, one by one, all the stations now listening would note down the exact time that the signal begins to QSB violently and then completely fade. It might strike someone that these times were related to the longitude of the listeners. The band would soon be buzzing with the news that a satellite had gone wrong, in exactly the same way as actually happened on the 13cm band a few years ago. A few amateurs heard a whistling noise somewhere near 2304MHz which proved to be a Russian satellite that had gone wrong.

Almost one day later, when we were all sitting comfortably at our rigs, there is again a digital signal in the same direction. This time the signal disappears around four minutes earlier, thus revealing that it was keeping sidereal time (ie measured by the stars) rather than earth time. It was, therefore, ETI and not a satellite!

Telephones would start ringing, tape recorders going, using miles and miles of tape. I would most certainly telephone my friends connected with JPL in the States and Jodrell Bank in the UK. The game is up and the headlines would soon come out with "British radio hams discover ETI".

Ridiculous QSOs?

We now enter the realms of ridiculous QSOs (conversations or quasi-stellar objects, take your pick!). It will be far worse than meteor bounce, and it will be more like an unbelievably slow AMTOR system. If there are space ships coming, at a probable acceleration of 1g, they could approach the speed of light within eight months or so, and so, in twenty years' time, we would be able to have a fine time talking them in on 23cm.

A few more facts have come to light as a result of very helpful radio astronomers, who are also radio amateurs, whom I have talked to since beginning this article. The hydrogen line frequency is 1420.405751MHz. The very quietest part of the electromagnetic spectrum, which would give the best signal-to-noise ratio for inter-stellar communications, is the band 1 to 2GHz, excluding the area around 1420MHz. Our old friend 1296MHz is getting more and more probable!

Keep Watching!

Just to keep the 24cm ATV enthusiasts looking or LGM, they can feel encouraged by the knowledge that their frequency is just about seven-eighths that to the hydrogen line - ie 1249.9 - just in the middle of a lurking video lower sideband. So, keep watching for LGM, and listening for ETI, for, also, don't forget that 1420 less one twelfth (duodecimal equivalent of 10%) is 1301.7MHz which, with a spread spectrum transmission, would cover 1296MHz beautifully.

Of course, I fully expect someone to send out a digital transmission from Wales in the general direction of London on April 1st. Would it not be unfortunate if this QRMed the real thing?! My attitude to the whole situation is the same as that of flying saucers: I don't believe there have been any real lurking ones for the last century or so, but in no way could I say that there will never be or never have been any.

Don't forget that there are thousands more 23cm radio amateurs than radio astronomers listening in this band, which makes you think, doesn't it! If we had a QSO with an ET we will, of course, be breaking our licence regulations - unless the IARU will give them a reciprocal licence!
How long is a piece of 'wet string'...

To many of the amateurs of today the idea of putting up a length of wire as an antenna may be considered ludicrous. However, it is an established fact that any length of wire can be tuned to any frequency, in theory. The problems start when one tries to carry out this apparently simple operation and attempts to match the antenna to a typically low impedance transmitter output of, say, 50 ohms.

Our odd length of wire, perhaps chosen to fit the confines of a suburban garden, is going to display a different impedance on each band, made up of differing amounts of capacitive and inductive reactance and, of course, resistance. To bridge the gap between the impedance of the wire and the transmitter output a matching unit is required. Now we could be unscientific about this and spend a lot of money on one of those commercial ATUs that are advertised with slogans like 'match any wire on any band'. On the other hand, we could try and work out the values of a suitable matching network ourselves using a bit of commonsense and some reasonably basic radio mathematics and build one ourselves — and maybe learn a little about impedance into the bargain.

A Little Theory

All antennas, depending on their length (and also, to some extent, height above ground), will exhibit impedance. The antenna can be considered to be formed of lumped quantities of resistance, capacitance and inductance (Fig.1). L and C exhibit forms of reactance *, normally represented by XL and XC respectively, whereas R shows resistance(!) and the effective impedance is built up from the impedance triangle shown below (Fig.2) where $Z^2 = X^2 + R^2$ (Remember Pythagoras's theorem? — Ed.).

$$Z = \sqrt{R^2 + (WL)^2}$$

where $R$ = resistance (ohms)
$W = 2\pi f$ = frequency (hertz)
$L$ = inductance (henrys)
$C$ = capacitance (farads)

where X is made up of XL and XC.

Now, Z can also be regarded as a vector quantity and re-drawing the triangle as follows shows that the vector Z can move along the arc A-B so (Fig.3a). We can also alter our equation in terms of vector quantities to read $Z = R + X$.

By looking at Fig.3b we can see

---

* (By the way, reactance can be defined as the term given to the opposition to AC current flow in a capacitor or inductor, dependent on the frequency of the current and is stated in ohms — Ed.)
that, for any value of Z there is a large variety of values of R and X which can give Z. Unfortunately, this means practically that a simple impedance bridge connected between our aerial and low power transmitter will be able to give the value of Z but not those of X and R. X and R can have any value within the limits shown by the arc of the circle.

In the course of work on aerials it has been established that a direct relationship existed between the resistive component of the aerial and its SWR or standing wave ratio. By artificially varying the resistive value, it is possible to shift the SWR to another value and the relationships between the two values of SWR will show the variation in the Z=R vector equation. Without going into details, the technique involved was to measure the SWR at the transmitter end of the aerial feeder cable, then insert a 27 ohm resistor in series with the coax inner and repeat the measurement. Without going into details, the aerial feeder cable, then insert a 27 ohm resistor in series with the coax inner and repeat the measurement. Without going into details, the technique involved was to measure the SWR at the transmitter end of the aerial feeder cable, then insert a 27 ohm resistor in series with the coax inner and repeat the measurement. Without going into details, the technique involved was to measure the SWR at the transmitter end of the aerial feeder cable, then insert a 27 ohm resistor in series with the coax inner and repeat the measurement.

The object of the exercise is to denote the direction of the vector Z, i.e. which quadrant it is in. We need only concern ourselves with the two RH quadrants so that R+jX will show a point somewhere in the upper RH quadrant and R−jX will show a position in the lower RH quadrant.

Since R and X are the sides of a right angled triangle, the position of the impedance point can be established and by joining this point to the centre, the value of the impedance can be measured.

Since the upper quadrant indicates a positive value of reactance, the aerial whose vector quantity of impedance is shown in this quadrant will have an excess of inductance (and thus inductive reactance) and will require added capacitance to cancel this. The reverse will apply (ie too much capacitive reactance) if the result is in the lower quadrant.

This type of presentation is a simplified form of an Argand diagram and j is known as a complex number. A further elaboration of the above technique is used in Smith Chart Analysis where impedances are matched in graphical form. This is the standard chart used in calculations of aerial impedance by broadcasting companies or people professionally concerned with aerial design.

Back to reality: we have now found an easy way of separating the two types of reactance present in the equation. The only remaining problem is that the method used does not indicate whether the reactance X is positive (the aerial is showing an excess of inductance and is therefore too long for resonance) or negative (capacitive aerial or too short for resonance). A simple check by clipping a short length of wire to the end of the aerial, thus lengthening it slightly, and repeating the test will soon show which of these two conditions the aerial is in.

By the above technique we have now established that vector Z=R±jX and put figures to R and X so that Z can be calculated. Due to the active assistance of Professor Murphy, it can be forecast that Z will be nowhere near the 50 ohms of the transmitter output we are looking for and some compensating network will have to be introduced. This network (ie an
ATU can be very simple to construct and consist only of a coil and a capacitor. To establish the values of the components in question, simple formulae have been derived and these will be discussed shortly. Before going into these formulae the general idea of shifting a reactive impedance up or down in value and finishing with a pure resistive load (a resonant antenna) will be demonstrated.

![Fig.5](image)

The simple L network shown nearby in Fig.5 will transform a low impedance to a high impedance if connected as shown. By reversing the input and output a high impedance will finish as a low impedance. The observant reader will spot something straight away (See Fig.6 for an extra hint).

![Fig.6](image)

If the two series elements are considered and made as inductors and the two parallel elements are made as capacitors we have the Collins or pi output network (Fig.7) used in many valve output transmitters.

![Fig.7](image)

The idea is to transform the typically high output impedance of the valve down to about 25 ohms and then step it up to between 25 and 500 by making the capacitors variable and the coil tapped. The centre transformation point varies along the coil with frequency and finds its own balance point. The value it transforms down to in the centre of the coil is about 25 ohms. Look further into this arrange-
This worked out (at 14.1 MHz) (In those days the writer had a first class citizens licence and sharp pointed ears, a long nose and whiskers and used to squeak at his fellow men.) I think this means Bill had a class 'A' licence and used 20m CW — Ed.)

We cannot divide by J so we have to remove it from the bottom line by cancelling

so \( 5.300 \times -J = -J5300 \)

\[ J70.2 \quad J \quad 70.2 \]

\[ = \quad J75.5 \]

Once again, the element needed is again capacitive

— so the value of the parallel element is

\[ C = \frac{1}{2\pi f R} \]

= 150 pf

Thus, the unit inserted in feeder will be seen as shown in Fig. 13

By putting a small variable capacitor across part of the parallel capacitor a small degree of adjustment can be made. These units are very simple to make and it is an easy job to make one up for each band you wish your piece of ‘wet string’ on. These may be simply swapped over when changing bands, safe in the knowledge that on each of these, your antenna is properly resonant.

For those interested, the circuit diagram my original impedance bridge and construction details of the series resistor are given below in Fig. 14 and 15.

Most of the foregoing was carried out in the late 1950s and early 1960s. Anyone with a computer and some (albeit fair) knowledge of programming could probably put my programme of calculations into program form. That being said, in our age maybe too much reliance is placed on the computer and it is a good idea every now and again to get back to basics and do a bit of mathematics yourself. Good luck!
A number of magazines have published articles on the conversion of both illegal AM and legal FM CB rigs for use on the 10 metre amateur band using frequencies from 29.300 to 29.700MHz. Most tend to use the system where the CB units original channel 1 counter for the voltage controlled oscillator, see Fig. 1. A few comments should be made about the PLL circuit since it contains some unusual features. The divide by n counter receives from the channel switch binary 168 to 207 to control the receive VCO over the necessary frequency range. This range is 10.695MHz below the received frequency. The output frequency of the VCO is too high to be connected directly to the MC145106 chip. Hence the output is mixed with the receive crystal oscillator output to produce a frequency in the acceptable range - these frequencies are 1.68 to 2.07MHz.

On transmit, the transmit-receive switch causes a number of changes to the PLL loop. First, the transmit VCO and transmit crystal oscillator are brought into use; but as the output of the transmit VCO is doubled before being amplified a number of other changes to the loop need to be made. The transmit-receive switch also doubles again the division ratio of the 10.24MHz reference oscillator to give 5kHz frequency steps. The divide by n counter is increased by the addition of 256, ie from 424 to 463.

By changing the transmit and

You can make your converted CB rig give a direct frequency readout on 10m. David Silvester, G4TJG, tells how.

represents 29.310MHz, easing the calculation of frequency from the channel number. The author felt that for a small outlay, the display could be made to read the frequency directly, ie the calling channel of 29.600MHz becoming 60 on the display.

The PLL System

The CB rig chosen for conversion was the DNT M40FM, since this was freely available at all of the radio shows the author visited. This rig uses the MC145106 phase-locked-loop chip, containing not only the phase detector but also the counter for the reference frequency of 10.24MHz and the divide by n

Fig. 1 Block diagram of PLL oscillator circuit.
receive crystals, it is possible to change the frequency range of the rig. For anyone wishing to alter the DNT rig these changes are:

1. Receive oscillator from 15.2262 to 16.935MHz
2. Transmit oscillator, for simplex from 11.6806 to 12.535MHz, for duplex (-100kHz on transmit) to 12.485MHz.

Because of circuit capacitances, the frequencies of the crystals required are 16.932, 12.533, and 12.483MHz but they are finally tuned to the frequencies given above. The rig will also need to be retuned slightly but this is easy to do given the excellent diagrams supplied with the standard rig.

**The Display**

With these alterations, a receive frequency of 29.600MHz shows as 30 on the display. To obtain a display of 60, we need to add 3 to the 'tens' 7-segment display. However the problem is more difficult than expected, as the channel switch not only gives the binary input to the PLL chip, but drives the display directly. Fig. 2 and Table 1 show the LED display with the segments lettered and the output from the switch. The LED display is of the common anode type so that in Table 1, a '0' will illuminate the segments shown for each of the blank, 1, 2, 3, and 4 possibilities of the 'tens' display of the original CB unit. The problem is to select the switches or combination of switches which can be used to identify the five display possibilities, and to arrange that the input to the display driver IC3 will give outputs over the newly required range of 3 to 7.

**Circuit Design and Operation**

It was decided that the easiest way to convert the switching of the 7 segments of the original display was to select specific combinations of the lines a to g and to use these to supply the inputs of the 4543 display driver, Fig. 3. The author chose the following combinations:

- f at '0', identifies old 4 and with b at '0' gives new input of 7.
- b, c and a all '0', gives old output 3 equals new input 5.
- b and f at '0', gives old output 2 equals new input 4.
- b = '1', indicates old blank and gives new input of 3.

The circuit is extremely simple and uses the outputs from the a, b, c, f switches to drive the inputs of the display driver. The display driver selected was the 4543 since no other circuit was easily available, which will drive the display directly and produce a 6 with segments a, c, d, e, f, and g illuminated to match the display produced by the unconverted unit's 7-segment LED. Both of the original switch sections operate the display by shorting the LED cathodes to earth through 1.5k ohm resistors. To achieve the necessary voltage drive to the logic chips, all of the inputs ie the a, b, c, and f lines are connected to the positive power supply by 10k ohm resistors, which hold the inputs positive when the switch elements are open circuit. These are not shown in Fig. 3. A secondary problem is that the 4543 display driver is designed for use with low power LCD displays, and, for safety, the driver's outputs were connected through seven resistor, transistor, resistor combinations to prevent overloading of the IC's output.

The PCB was mounted in the prototype with the trackside upwards in the upper part of the DNT M40 FM, near the front panel.
Fig. 4 shows the completed PCB layout which was sufficiently small for placing inside the converted rig. After constructing the unit, the following conversions will need be made to the display area of the rig.

Installing The Unit

The switch positions corresponding to the LED display lines a to g will need to be identified. In some cases, the lines a and d will be connected together — as when displaying blank to 4 in the original CB application these display elements will be illuminated at the same time. This applies only to the switch — there are two resistors for the two display element (ie one each). Also the wires for the a to f lines to the 'tens' 7-segment display will need to be identified. Remove the resistors between the switch and all of the tens LED elements and replace with wires to connect the LED to the new PCB's output connections. A fine pointed soldering tip is almost essential for this work. In addition, add an additional 4 wires to the a, b, c and f switch positions, to give the input to the PCB. The 'pull-up' resistors are on the PCB so no components need to be added to the rig.

Final Comments

There is no reason why any ex-CB rig converted to 28 MHz so that old channel 30 equals 29.600 MHz and having the display driven directly from the channel switch cannot be modified in this fashion. It would be possible for a more enterprising amateur to add the 29, decimal point and final 0 to give a full 29.600 frequency display. The only other change necessary will be the alteration of R12 to R18 to the same value as that used in the directly driven display.

Components Listing

<table>
<thead>
<tr>
<th>RESISTORS</th>
<th>SEMICONDUCTORS</th>
</tr>
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<tbody>
<tr>
<td>R1-4</td>
<td>1.0k ohm</td>
</tr>
<tr>
<td>R5-11</td>
<td>10k ohm</td>
</tr>
<tr>
<td>R12-18</td>
<td>1.5k ohm</td>
</tr>
<tr>
<td>All resistors are carbon film, 0.33W 5%</td>
<td></td>
</tr>
<tr>
<td>IC1</td>
<td>4093 CMOS logic</td>
</tr>
<tr>
<td>IC2</td>
<td>4075 CMOS logic</td>
</tr>
<tr>
<td>IC3</td>
<td>4543 CMOS logic</td>
</tr>
<tr>
<td>Q1-7</td>
<td>BC547 or any TO92 plastic transistor with Vce more than 15V and Hfe more than 10</td>
</tr>
</tbody>
</table>
As those building Omega will be aware, the existing circuitry for the solid state antenna switch proved incapable of handling 100 W of harmonic rich energy from the PA. The modifications detailed here will overcome this and allow the PA to be operated at its full 100 W power rating with full break-in. The mods are simple to make to the existing PCB and involve no major circuit modifications.

**Logic Switch Modifications**

The mods involve the substitution of Q1, which was originally a BF259 (rated at 300 V), for a BUX87 (rated at 1000 V) and the removal of D8 (BA379 PIN diode) for a BF259, driven from the existing bias line. The latter diode is in the circuit as a 'safety' precaution, designed to remove any RF which might leak past Q1. The new transistor, Q10, acts more efficiently in this respect.

To make the changes, remove the existing BF259 and replace with a BUX87. The latter has a different case and pin-out to the BF259 (see drawing) and the leads will need re-orientating before insertion. It also has somewhat thicker leads and the PCB holes will need enlarging to 1 mm or so. Then remove the existing D8. A new BF259 is recommended as a longish lead from the emitter is required. Insert the collector lead into the position previously occupied by the cathode (banded end) of the diode and the base to the anode end. The emitter lead goes to earth - either make a new hole adjacent to the earthed end of RFC1 for this or solder the emitter to the actual wire coming from RFC1.

You can now wire the logic switch up as per the original instructions using as direct connections as possible.

**Warning:** If during tests any problem arises which causes the logic switch to fail, even if only temporarily; (such as a high SWR causing self-oscillation of the PA) it is possible for the RF to be applied directly to the input of the QRP PA and the SBL-1 in the CIFPU. Thus causing failure of the QRP PA input buffer and the mixer. To prevent this, solder a set of back-to-back diodes from the input of the QRP PA to earth and from the pre-selector input to earth. This will limit any such voltage to safe proportions.

**Other Modifications...**

**QRP PA**

As mentioned in the Newsletter, the QRP PA needs to be moved from its present position inside the QRO PA enclosure, as we found that there is some possibility of RF feedback with it positioned close to the amplifier. It now sits to the right of the Tx/Rx SSB adaptor, on top the VCO box, with its input facing the CIFPU, and mounted as far forward on this box as the screw holes...
The Accessory PCB

This board adds a number of extra facilities to Omega - ALC and metering, thermal protection, FWD/REF SWR, power metering and supply voltage monitor.

The required DC voltages for the power, SWR and ALC facilities are derived from a standard current transformer circuit, T1 and associated components. This type of circuit has the advantage that it is virtually frequency independent, providing the correct core is used in the transformer. In this case, ferrite - powdered iron will not work satisfactorily.

The primary is simply a single turn - consisting of a short piece of coax placed straight through the centre of the core - with the secondary wound from a number of turns of insulated wire wound evenly round the core itself. The outer braiding of the coax is earthed at one end only, so that coupling to the transformer is by magnetic leakage current from the line. This improves the null obtainable on reflected power compared with that using a single unscreened wire primary.

A resistive centre tap (R1 2) is used as the secondary load. This produces equal voltages at each end of the secondary winding but 180 degrees out of phase with each other. A small proportion of the RF voltage present on the line is sampled by C1 /C1 and fed back to the centre tap. If this is set to be
equal to one half of the secondary voltage under matched conditions, then the out-of-phase voltage at one end of the winding (REF) will be cancelled and the in-phase voltage (FWD) doubled.

D1/2 and the capacitors form peak detectors, giving two DC outputs proportional to the forward and reflected currents present on the line. The RF chokes and decoupling capacitors remove any RF from the line. This part of the circuit is also screened on the PCB from the rest of the circuit. The transformer windings are arranged so that 100W of RF gives 5V DC.

The reflected voltage is applied directly to the meter (via the meter switch and logic board) via VR1 (calibration).

Buffering

As the forward voltage is used for a number of applications, it is first buffered by IC1a (1/2 CA31240E) so that the resulting loading does not affect the calibration of the circuits. The forward voltage is then obtained for metering from pin 12, via R4 and the meter switch etc.

A simple peak detector circuit, consisting of Q1 and associated components, allows metering of the forward power directly. This requires calibration against an existing known power meter. Like most simple power meters, the overall accuracy is unlikely to be better than +/− 10/15%.

ALC

The purpose of the ALC is to prevent the transceiver being overdriven past its 100W design level. Many people use ALC as a form of signal processing, driving hard into the ALC and effectively achieving RF compression. With most circuits, this also results in distortion — this circuit is no exception! Thus, its use should be confined as an indicator of the drive level and not as a processing circuit. On CW, if driven hard into the ALC, the waveform will become extremely distorted.

A further op-amp (IC1b) is used as a comparator for the ALC function. VR3 (set ALC) is used as a preset threshold control such that the voltage at pin 7 of the op-amp is equal to the voltage at pin 6, when the latter is deriving its applied voltage from 100W of RF. Above this point, the output of IC1b goes high, turns on Q2, and thus progressively short out the slider of the drive control via D5, reducing the power output back to 100W. A time constant is also introduced into this circuit, via R15/C11/R16, to give acceptable results on SSB.

The ALC metering is derived from the collector voltage of Q2. Normally this is at around +12V and VR4 is pre-set so that the meter reads full scale. As soon as Q2 conducts, this voltage will drop and cause a corresponding decrease in the meter reading. In use, the meter is never allowed to drop more than 1/3 of full scale, either on CW or SSB.

Thermal Protection

One of the killers of RF power transistors is overheating of the junction, so we have added a thermal protection feature to avoid this catastrophe. The actual sensor, TS1, is a small tab mounted semiconductor device, bolted close to one of the output devices on the rear of the interface plate. Under normal conditions the resistance of this device is very high, so that Q3/4 are both turned off. As the temperature reaches 75 deg C, the device undergoes a rapid drop in resistance to around 100 ohms, turn on both Q3 and 4. Q3 then removes drive (via the same mechanism as the ALC), and Q4 illuminates the thermal trip indicator (this is the spare LED on the front panel — see part B). This low drive condition will persist until the temperature has dropped again.

Supply Metering

This simple circuit permits the existing meter to read from 10-15V for supply voltage monitoring. ZD1 provides a reference voltage for the –ve side of the meter, with preset VR5 set so that 15V is equivalent to full scale deflection.

Meter Switching

Up to this part, the metering on Omega has consisted only of the ‘S’ meter and RF Out from the QRP PA. The latter function is now no longer required and the wiring for this can be removed. Part 8 described the logic switch and the solid state meter switch. This gives the S meter function on receive, but on transmit allows metering of the functions controlled by the meter switch. The full wiring for this is given here (the letters and numbers immediately adjacent to the switch contacts correspond to the actual markings on the 2 pole 6 way meter switch). VR1 allows the full scale deflection of the meter to be set in the SWR mode.

Meter Scale

In the next instalment, dealing with this construction of the accessory PCB, we will also give a new scale for the meter to replace the existing one, covering all the functions described.

Preselector

The previously reported problem with a loss through this unit on 80 and 160m will be overcome with a small additional PCB, mounting on the side of the existing unit, which will switch in a separate low pass filter for these two bands. This will be published as soon as possible, first details will be in the next Newsletter.
Your at-a-glance guide to what’s happening around the clubs, on the air and in general radio-wise.

1 Mar
- Loughborough ARC: social evening.
- Radio Society of Harrow: Multichannel Networks by G3 YXZ.
- Coventry ARS: mini lectures, including one on computers.
- Dunstable Downs RC: Software Protection by G8 PTP.
- Clifton ARS: meeting.
- Maltby ARS: The Novice Licence Debate G3 ZHI vs G4 BVV.
- Axe Vale ARC: Talk by Spectrum Communications rep.
- Doncaster Amateur Radio Show at the Doncaster Institute HE Annexe, Ellers Road, Bessacarr. Admission by programme, 30p, doors open 11 am. Talkin on S22. Further details from G8XTU on Doncaster 531365.
- Horndean DARC: Space Technology by John Bennett.
- Dudley ARC: natter nite.
- Rhyl DARC: Antennas and Propagation 3 by G3 LEQ.

2 Mar
- Coventry ARS: night on-the-air.
- Clifton ARS: meeting.

3 Mar
- Doncaster Amateur Radio Show at the Doncaster Institute HE Annexe, Ellers Road, Bessacarr. Admission by programme, 30p, doors open 11 am. Talkin on S22. Further details from G8XTU on Doncaster 531365.
- Horndean DARC: Space Technology by John Bennett.
- Sutton and Cheam RS: natter nite.
- Worcester DARC: club night.
- Loughborough ARC: constructors group.

4 Mar
- Doncaster Amateur Radio Show at the Doncaster Institute HE Annexe, Ellers Road, Bessacarr. Admission by programme, 30p, doors open 11 am. Talkin on S22. Further details from G8XTU on Doncaster 531365.
- Horndean DARC: Space Technology by John Bennett.
- Sutton and Cheam RS: natter nite.
- Worcester DARC: club night.
- Loughborough ARC: constructors group.

5 Mar
- Doncaster Amateur Radio Show at the Doncaster Institute HE Annexe, Ellers Road, Bessacarr. Admission by programme, 30p, doors open 11 am. Talkin on S22. Further details from G8XTU on Doncaster 531365.
- Horndean DARC: Space Technology by John Bennett.
- Sutton and Cheam RS: natter nite.
- Worcester DARC: club night.

6 Mar
- Doncaster Amateur Radio Show at the Doncaster Institute HE Annexe, Ellers Road, Bessacarr. Admission by programme, 30p, doors open 11 am. Talkin on S22. Further details from G8XTU on Doncaster 531365.
- Horndean DARC: Space Technology by John Bennett.
- Sutton and Cheam RS: natter nite.
- Worcester DARC: club night.
- Loughborough ARC: constructors group.

7 Mar
- Loughborough ARC: 160m DF Receivers — bring along your old MW portables for the constructors group to modify to 1.9MHz.

8 Mar
- Loughborough ARC: 160m DF Receivers — bring along your old MW portables for the constructors group to modify to 1.9MHz.

9-10 Mar
- Radio Society of Harrow: activity night on 80m.
- Coventry ARS: night on-the-air.
- Clifton ARS: meeting.
- Maltby ARS: Home-brew Test Gear by G4 BVW.
- RSGB Commonwealth Contest. 1200-1200 GMT. A1A only in the 3.5, 7, 14, 21 and 28MHz, lower 30 kHz unless working a novice.

10 Mar
- Dartford Heath DFC: club hunt.
- Components Fair, organised by Pontefract DARS, based on the Mobile Rally but with the emphasis on the home constructor and DIY enthusiast. Traders are invited to sell only components, surplus equipment, instruments and antennas. New black box equipment is not allowed. It runs from 11-4.30 at the Carleton Community Centre Pontefract. Contact G4ISU, 7 Ridgedale Mount, Pontefract, (0977) 792784.

11 Mar
- Antrim DARC: AGM.
- Dudley ARC: meeting.

12 Mar
- Loughborough ARC: constructors group.
- Bury RS: film show.
- Bristol ARC: CB to 10m FM conversions by G4 TRN.

13 Mar
- Radio Society of Harrow: activity night on 80m.
- Coventry ARS: night on-the-air.
- Clifton ARS: meeting.
- Maltby ARS: Home-brew Test Gear by G4 BVW.
- RSGB Commonwealth Contest. 1200-1200 GMT. A1A only in the 3.5, 7, 14, 21 and 28MHz, lower 30 kHz unless working a novice.

14 Mar
- N Wakefield RC: The RSGB — all you ever wanted to know with John Nelson.
- Edgware DRS: Counterpoise Systems by G4 UBB.
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>17 Mar</td>
<td>Glenrothes DARC: Computing with GM4 ANB.</td>
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</table>
12 Apr
Wolverhampton ARS: 144MHz DF Hunt.
Coventry ARS: night on-the-air.
Dunstable Downs RC: Solar Facts by G8AFN.
Clifton ARS: meeting.
Maltby ARS: Licence Rules and Regulations — Questions and Answers.
13-14 Apr
RSGB National Convention at the NEC,
Birmingham.
14 Apr
Dartford Heath DFC: club hunt.
15 Apr
Rhy DARC: activity night.
Worcester DARC: informal.
16 Apr
Bristol ARC: night on-the-air.
Wolverhampton ARS: meeting.
Chester DRS: Installation of PMR Equipment by G1ATZ.
Wolverhampton ARS: Wolverhampton Repeater Group and its Repeaters.
Midland ARS: Surplus Equipment Sale.
Baton ARC: group night.
17 Apr
Three Counties ARC: Kit Construction with Wood and Douglas.
Wimal ARS: QRP Working with Rev Dobbs, G3RJU.
S Bristol ARC: computer night.
18 Apr
Cray Valley RS: AGM.
N Wakefield RC: Pool Doubles competition.
Chichester DARC: club meeting.
19 Apr
Sutton and Chem RS: Tape Recording by Malcolm Cunnings.
Coventry ARS: PCBs and a small project.
Clifton ARS: meeting.
Maltby ARS: Short Wave Listening by G8NVS.
20 Apr
Southend DRS Mobile Rally at the Rocheway Centre, Rochford, Essex. Stands cater for black boxes, components bring and buy and much more beside. Ample parking nearby on site. Rest room for the weary, bar food and drink. Talk-in on S22. For more info call Bryn, G4DEZ, on 0702 617749 or Brian, G4RDS, on 03745 50494.
21 Apr
Worcester DARC: club night.
Bristol ARC: meeting.
Chester DRS: outside activity evening.
Wolverhampton ARS: Home Built Equipment Competition.
Wakefield DRS: Amateur Radio In SE Asia.
22 Apr
Three Counties ARC: Horizontal FM by G4RRA.
Wirral ARS: DF Techniques.
23 Apr
Baton ARC: computer night.
Wolverhampton ARS: Wolverhampton Repeater Group and its Repeaters.
Midland ARS: Surplus Equipment Sale.

Will club secretaries please note that the deadline for the June segment of Radio Tomorrow (covering radio activities from 1st May to 1st July) is 17th March.

Contacts

<table>
<thead>
<tr>
<th>Club</th>
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</tr>
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<td>Bristol ARC</td>
<td>G4YOC</td>
<td>Bitton 4116</td>
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<td>Loughton DARS</td>
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<tr>
<td>Maltby ARS</td>
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<td>Southam 4765</td>
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<td>Rhy DARC</td>
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<td>Tiverton (South West) RC</td>
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<td>St Albans 59318</td>
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<td>Wakefield DRS</td>
<td>G8PBE</td>
<td>Wakefield 37872</td>
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<td>Welland Valley ARS</td>
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<td>Westmorland RS</td>
<td>G. Chapman</td>
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<td>Willenhall ARS</td>
<td>G4LIW</td>
<td>0902 782036</td>
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<tr>
<td>Wirral ARS</td>
<td>Cedric, G4KPY</td>
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</tr>
<tr>
<td>Wolverhampton ARS</td>
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Signature ..................................................
Date ..................................................

HAM RADIO TODAY APRIL 1985
WANTED
HRT wanted by collector. Following issues: Jan 83, Aug 83, Sept 83, Nov 83, Dec 83 and June 84. Also wanted the first issue of Amateur Radio (who?). I will pay your price. G1MRT T. Smith 0326208470.

WANTED YAESU FT780R and 934 MHz FM CB. Consider 790R cash waiting. 0217453429.

WANTED. Ham International multi-mode or equivalent. Will swap President Markon home base, AM, FM, SSB or will arrange part exchange. Telephone Stoke-on-Trent 516213. Evenings.

WANTED Murphy type 618 HF Tx, API00333, and power unit, API00336. Also Marconi Kestrel Tx and any other Marconi marine gear. G4FUY QTHR, Reading 736333.

WANTED The following TOR Bulls to complete collection: Mar '57, May '54, Jan, Mar '42, May, June '40, Mar, June, July, Dec, '30 and earlier. SWM's pre war, Mar '46, Jan '48 have various TOR Bulls from '31 QST from '32 CQ from '45 sell/exchange. Write Baker, Tarn-Flynnon, Penuwich, Tregaron Dyfed.

WANTED 2M transverter for use with FT7 transm must be able to take 10 watts input. Homebrew OK, must be cheap. 0723366360.

WANTED old ARRL handbooks. Marris 35 Kingswood House, Farnham Road, Slough, Berks. SL2 1DA.

WANTED FTV-901R 2m transverter or microwave modules 144.28 transverter. Also FC-901 ATU. Phone Danny G1EER 026652 56657 after 6pm. Until pair of 813s and/or bases at reasonable price. Tel 0265 823464 G1CSV QTHR.

WANTED Atari computer information on amateur radio associated software, etc. Are there any other amateurs with Atari computers? Contact, Joe, G4WJR, 3, Willow Drive, Skelmerdale, Lancs, WN8 8PR. Tel. (0695) 22242. 

WANTED URGENTLY service manuals for Microcell Electronics type 400 and Telequipment S32A singlebeam oscilloscopes. Also have for sale/exchange advance UHF millivoltmeter type VM79. Require full range or testgear DVM/AV08 AF/SIG-GEN dualbeam scope 10-20 MHz. WHY, Phone Luton (0582) 593564.


WANTED Sept, Oct, Nov, Dec, 1984 issues of Ham Radio Today. Five pound the lot. Phone Edinburgh (031) 453-1282 4-11pm only. Also need simple transceiver project, even photocopies will pay.

WANTED Yaesu memory unit for FRG7700. Complete and good working condition. Will collect. Send details to L Leung 82 Beech Avenue, Beeston, Nottingham NG9 1TD.

WANTED: wartime or pre-war "Radio Times", "Listener", and radio magazines. Please write or phone Douglas Byrne 52 West Hill Rd, Ryde, IOW. (031) 576665.

KW 109 ATU WANTED must be in good condition. Also Drake desk mic type 7075 and LPF type 3300 LP Phone Pete Nuneaton 3436360.

WANTED NATO 2000 and FRG7700. 0283 221870. Mr. Tarleton, 499 Burton Road, Midway, Burton on Trent.

WANTED six or eight digit frequency counter. G3VXS 56巴斯ford Park Road, Maybank, Newcastle under Lyme ST5 OPS 0782 625661.

WANTED Yaesu Musen FL5OB transmitter and cables with handbook. First class condition only, Contact Mr. James, 2 Marian Road, Llandudno, Gwynedd. LL30 1HL.

COILS WANTED to cover 26-30 MHz, AE, HF, and OSC. etc. Denco, or similar. GBSB, 290 Priory Road, St. Denys, Southampton SO2 1LS.

WANTED Kenwood Tri digital display DGS. Cash waiting Phone 061 653 8530. G4Z-QL.


INFORMATION Wanted on quad spider. Where can I get one from? Write to M. Sales, 17 Chestnut Grove, Lancaster LA1 5RJ.

WANTED non-working HRO receivers or parts for spares. Condition unimportant also original HRO power supply units and speaker units. Tel St. Albans 393333.

WANTED inexpensive AM low band transceiver, suitable for 86 MHz. Prefer Pye Motofone 0602 256178.

WANTED ICZ81, FT2121(D) or any good 2m multi-mode or SSB Rig. Must be in good condition, BWT not too expensive!!! Phone 0277 220428. Tel. after 6pm. Also need simple transceiver project, even photocopies will pay.

WANTED Yaesu memory unit for FRG7700. Complete and good working condition. Will collect. Send details to L Leung 82 Beech Avenue, Beeston, Nottingham NG9 1TD.

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MICROWAVE MODULES converters 70cm to 2m and 2m to MF Y18 each Phone 01 500 7073 after 8 pm.

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SCANNER REGISTRY M100 FM covers 47.7 MHz plus much more, keypad entry sell for £60 or swap for ATV transmitter. Phone Paul G6DQK 061 338 8507 after 6 pm or weekends.

FT101E good condition, exchange for 2M mobile or sell £250 original packing. CW filter, fan, etc. Phone Notting 874235.

MONOBAND BEAM cuscush 15.2/3C unused £85. Integrated amplifier Yamaha CA 2010 60 watts / A 240 watts / B 250 Thorens TD125MK2 electronic turntable TP16 arm Ortofon/MOF 6 £40 loudspeakers IMF/FL professional Monitors modified 25 Hz suit enthusiasts 20 x41 x17 ins. £50 each other hi-fi car speakers cheap. Ring 055932 2333.

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VHF/UHF receiver type PRO2003 Covers 4m, 2m, 70cm and intermediate frequencies, Digital display, memories and scanning. 7 month old orig. packing, only £160 ono or might exchange for 2m handheld or mobile. Bristol (0372) 719163.

RTTY MICROWAVE modules MM4400 with keyboard £150, 10 FM, MM2 to MM10 transverter £75 FT290R, Ni-Cads charger, case, mods £180. All as new. Exchange 70cm FT708 or WHY. Tel. 01 882 5292 G3TXA QTHR.

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2. Advertisements will be inserted as and when space becomes available.

3. The insertion of advertisements will be on a first-come, first-served basis, subject to condition (2). As a result, it will not be possible to guarantee the insertion of a particular advertisement into any particular issue of the magazine.

4. Readers should either write out their advertisement in BLOCK CAPITALS or type it, underlining any words that are to appear in bold.

5. The magazine cannot accept any responsibility for printers' errors in the advertisements; however, we will do our best to ensure that legibly written advertisements are reproduced correctly. In the event of a gross error, at the Editor's discretion, a corrected version of the advertisement will be printed (at the advertiser's request) at the earliest issue in which space is available.

6. The magazine or its publishers will not accept responsibility for the contents of the advertisements, and by acceptance of these conditions, the advertiser undertakes to indemnify the publisher against any legal action arising out of the contents of the advertisement.

7. The magazine reserves the right to refuse to accept or to delete sections of advertisements where this is judged necessary.

8. Advertisements are accepted in good faith; however, the publisher cannot be held responsible for any untruths or misrepresentations in the advertisement, nor for the activities of advertisers or respondents.

9. Advertisers must fill in their names, addresses and (if available) telephone number on the form provided, and sign the form to indicate acceptance of these conditions (forms returned without a signature will not be used).

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### Advertisers Index

- **Allweld Engineering** ........................................ 15
- **Amateur Electronics** ........................................ 4/5/41
- **Armstrong Kirkwood Developments** ......................... 15
- **BNR & ES** ....................................................... 15
- **Bredhurst Electronics** ........................................ 11
- **Elliott Electronics** .......................................... 11
- **Farnborough Communications** ................................. 25
- **G3RCQ (Used Equipment Centre)** ............................. 65
- **Microwave Modules** ........................................... IBC
- **Modular Electronics** .......................................... 65
- **Pinehurst Data Studios** ...................................... 65
- **PNP Communications** .......................................... 65
- **R.A.S. Nottingham** ............................................ 11
- **Rainbow Communications** ..................................... 21
- **Scarab Systems** ................................................ 25
- **South Midlands Communications** ............................. 32/37
- **Spectrum Communications** .................................... 21
- **Technical Software** ............................................ 25
- **Update Computer Systems** .................................... 65
- **Wood & Douglas** ............................................... 21
- **WPO Communications** ......................................... 11

Don't forget, when calling an advertiser, mention Ham Radio Today — it helps them and us.

73's Dave Gadsden, G4NXV, Advertisement Manager.
2 METRE MULTIMODE TRANSVERTER
MMT 144/28-R

DESCRIPTION
This new transverter has been designed to allow users of existing HF band transceivers to establish a first-class transceive facility on the 144 MHz band.

The MMT144/28-R incorporates many new and exciting features which combine to make this product simply superb.

RECEIVE SECTION
An NEC GaAsFET is employed in a noise-matched configuration feeding a high level double balanced mixer via a handpass filter. IF gain is achieved by a JFET post amplifier. This combination produces a good signal to noise ratio, excellent immunity to overload and cross modulation, resulting in a rugged receive system having a third order output intercept point of +19dBm.

Two separate low-noise oscillators, operating at 116.00 and 115.40 MHz are included, running from a regulated 8.2 volt supply. Selection of the wanted oscillator is achieved by a quad op-amp circuit, controlled by the front panel mounted 'MODE' switch. This provides simplex, repeater and reverse repeater operation. The output of each oscillator feeds a JFET buffer amplifier via the quartz crystal which acts as a filtering element to reduce amplitude noise and reciprocal mixing products. The resultant high level injection is extremely pure and free from harmonics.

TRANSMIT SECTION
The incoming 28MHz signal, in the range 1/4mW to 300mW, is initially fed to the RF VOX circuit, ALC control circuit and the input level control. This signal is then fed into a pair of MOSFETs in a balanced mixer configuration, together with the local oscillator injection, to produce the wanted signal in the range 144-146MHz.

This signal is then amplified by several linear stages up to the specified output power of 25 watts. A visual indication of relative output power is provided by a front panel mounted LED bargraph display.

A rear panel mounted level control allows the user to adjust the sensitivity of the transverter to suit the transceiver in use, and a front panel mounted RF VOX delay control allows adjustment to suit SSB/FM modes.

The ALC circuit has a 20dB dynamic range and has been incorporated to ensure that a particularly clean signal is produced by the transverter. This is an important feature which will virtually eliminate compressed signals and the resultant problems caused to local stations.

PRICE: £215 inc. VAT (P&P £3.50)

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To receive your MORSE COURSE simply fill in the coupon below and return it to: 'HRT MORSE COURSE', Argus Press Software, No. 1 Golden Square, London W1R 3AB.

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