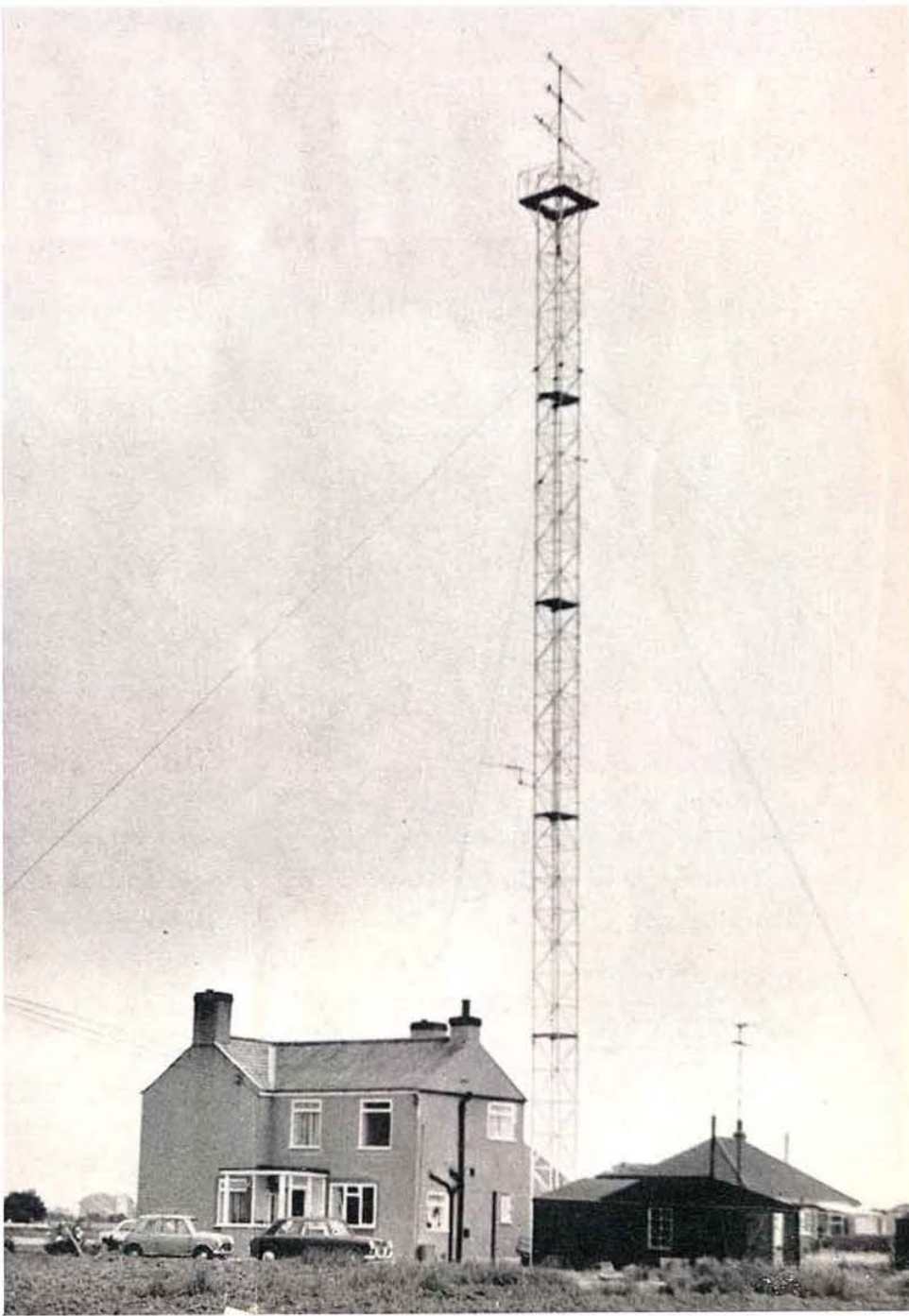
SEPTEMBER 1969

RADIO COMMUNICATION

Journal of the Radio Society of Great Britain



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RADIO COMMUNICATION

Incorporating RSGB Bulletin

FRONT COVER: The home built tower of Henry Neale, G3REH at Sutton St. James in Lincolnshire. The top aerial is 120ft above ground level.

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VOLUME 45 No. 9

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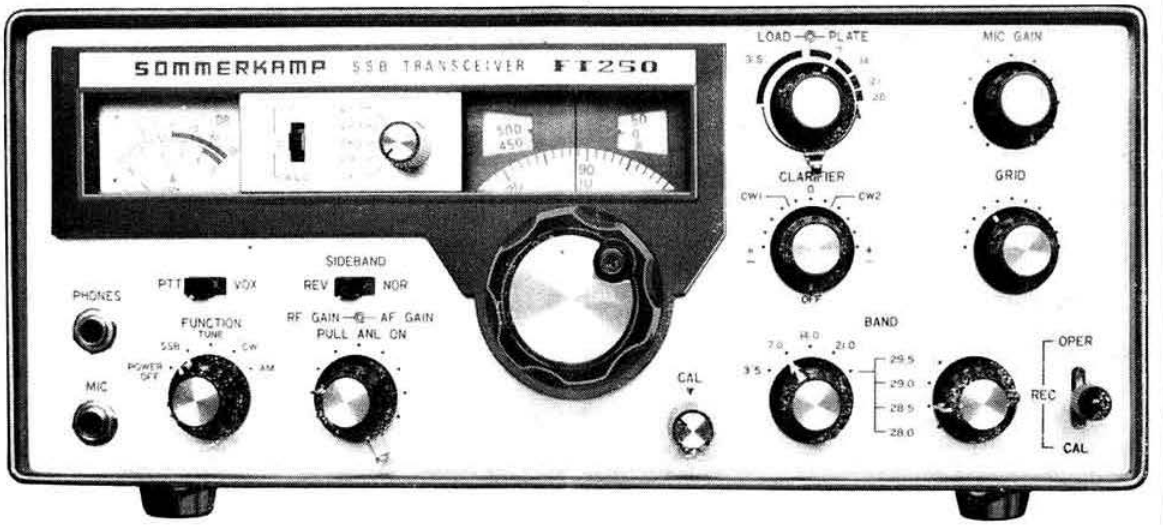

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73 de
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QTC

AMATEUR RADIO NEWS

Society Awards

The Council has accepted the recommendations of the Technical Committee concerning the following Awards:

The Norman Keith Adams Prize: awarded to C. Sharpe, G2HIF, for his article "A Semiconductor VHF Power Amplifier using a Pi Tank Circuit" which appeared in the October 1968 issue of *Radio Communication.*

The Bevan Swift Memorial Prize: awarded to S. F. Weber, G8ACC, for his article "A 70cm FM Solid State Transmitter" which appeared in the October 1968 issue of *Radio Communication.*

The Courtney-Price Trophy: awarded to P. J. Skirrow, G3UJP, for his Miniature High Performance Tunable IF, a description of which appeared in the October and November 1968 issues of *Radio Communication.*

The Wortley-Talbot Trophy: awarded to M. Walters, G3JVL, for outstanding work in connection with radio propagation.

The Ostermeyer Trophy: awarded to R. J. Pearce-Boby, G3JLE, for his article "Direction Finding and D/F Receivers" which appeared in the April 1969 issue of *Radio Communication.*

Radio Amateurs' Examination December 1969

The Society will be providing a centre at University College, London, WC1 for this examination. Applications to sit this examination must be sent to the General Manager, RSGB, together with a remittance for 35s for members or 45s for non-members. The closing date for the acceptance of entries is 31 October, 1969.

Knokke Convention

News has been received from Victor Clays, ON4UM, that the traditional International Ham Convention at Knokke, Belgium, will not take place this year. It is hoped to hold the next Convention in 1971.

The Cheshire Homes Amateur Radio Network Fund

The success of the Memorial Fund led to a number of Homes making enquiries as to the possibility of obtaining a receiver. The previous Fund closed with a balance of £3 17s 1d which was too small to be of use and therefore another Fund was launched with the approval and interest of the Cheshire Foundation. In the UK and Eire there are 57 Homes, and of these, three Homes have a licensed operational station, four Homes have a receiver with a fifth acquiring theirs in the near future. The launching of the Fund coincides with the 21st Anniversary Year of the Cheshire Foundation by Group Captain L. Cheshire, VC, DSO, DFC.

As before the *Heathkit* RA1 amateur band receiver kit will be supplied, together with a speaker and aerial, and construction arrangements are already in hand. There could be as many as 20 applications for a receiver and there is a pressing need for adequate funds. Banking facilities have been arranged under the title of the Cheshire Homes Amateur Radio Network Fund. The balance of the previous Fund will be set aside to meet the postal charges of the preliminary notices. In view of this donations will only be acknowledged by request. *There will not be any other charges on the Fund.*

Members of the Committee are G3WDQ, G3WOB, G8QO, G3PKO, G2YM and G3VUC.

It is hoped that there will be a generous response to this appeal so that all Homes requiring a receiver can be accommodated.

The pleasure that is derived from the use of this equipment will be appreciated by all radio amateurs. There is no time limit to the Fund and it will remain open as long as there are unfilled applications for receivers. Donations should be made by postal order or cheque, crossed and made payable to the CHARN Fund and sent to W. M. Clarke, G3VUC, Fillace Park, Horrabridge, Yelverton, Devon.

Society Representatives

Following the resignation of GM3VEI, V. W. Stewart, **GM3OWU**, of 9 Juniper Avenue, Juniper Green, Midlothian, will take over the duties of Regional Representative for Region 13 until 31 December 1971.

The following Area Representatives have been appointed:

Edgware: R. H. Newland, G3VW, 10 Holmstall Avenue, Edgware. **Maidenhead:** R. J. Rodding, G3VMR, September House, Cox Green Lane, Cox Green, Maidenhead. **Torbay:** L. H. Webber, G3GDW, 43 Lime Tree Walk, Newton Abbot, Devon.

Affiliated Societies

The following Societies are now affiliated to the RSGB:

Flint and District Radio Society. Secretary: H. Jones, GW3TMP, 3 Bryn Clyd, Leeswood, Mold, Flints.

Leicester Royal Signals Amateur Radio Club. Secretary: W. G. Heaton, 33 Linden Avenue, Countesthorpe, Leicester.

Maldon Youth Centre Radio Group. The Maldon Youth Centre and Senior Evening Institute, The Friary, Chequers Lane, Maldon, Essex.

University College of S. Wales and Monmouthshire Amateur Radio and Electronics Society. Secretary: P. Jones, GW3YLV, Students Union Society, University College Union, Dumfries Place, Cardiff.

The following changes of Secretary have been notified:

Bradford Radio Society. R. J. Cockerham, G3WTF, 56 Brantwood Road, Heaton, Bradford 9, Yorks.

Lothians Radio Society. W. Marshall, GM8BPL, 15 Craigleith Hill, Edinburgh, RH4 2EF.

Oxford University Radio Society. S. Watts, G3XXH, St. John's College, Oxford.

Stratford-upon-Avon Radio Club. I. R. Cutler, G3XFV, 84 Sharmans Cross Road, Solihull, Warks.

Silent Keys

It is with sorrow that we record the passing of the following radio amateurs:
V. S. Alexandersen, formerly ES3CX, of Palma de Majorca.
Noel Burnitt, G8HI, of East Boldon, Co. Durham.
C. A. Simmons, G3SV, of Ingatestone, Essex.
Miss K. Bell, BRS22375, of Carlisle, Cumberland.
R. Grant, BRS23203, of Southminster, Essex.

Scottish Mobile Rally

This will take place on 5 October at the Beach Ballroom, Aberdeen. Talk-in and Exhibition Stations will be operated by members of the Aberdeen ARS and the Moray Firth ARS. The call-sign GB3ABB has been allocated by the GPO. There will be demonstrations by the Ayrshire RAEN Group and of closed circuit tv by GM6TDK/T. There will also be displays by HM Services and commercial firms.

There is ample parking space and admission to the Rally and Exhibition is free. GM3AEL or GM3PIP will be pleased to supply further information.

Special DARC Postmark

The Saar district of the DARC (the German National Society) are holding a tenth anniversary club meeting at Blieskastel/Saar, and the German Post Office will be using a special postmark on the two days of the meeting, 18 and 19 October. Colour covers with the special postmark can be obtained from: G. Nierbauer, DJ2XP, PO Box 202, D-6680 Neunkirchen/Saar, W. Germany. The cost for three covers is one dollar or ten IRC.

Frequency and Time Broadcast Services

The 1969 Edition of the National Bureau of Standards special publication 236 is now available at a cost of 25 cents from the US Government Printing Office, Washington, DC 20402, USA. This booklet gives full information on the various standard frequency stations operating under the calls WWV, WWVH, WWVB and WWVL.

Wanstead and Woodford Radio Society

Would all who are interested in re-establishing the Wanstead and Woodford Radio Society to be again active in forwarding the hobby of Radio/Electronics in the London E11/E18 area, please contact Ken Smith, G3JIX, at 82 Granville Road, E17 or at the Electronics Laboratory, The University, Canterbury, Kent.

Crystal Ball

The VHF Contests Committee is now noted for the speed at which they produce contest results, but they are not psychic. We therefore apologize for the inference on last month's front cover that the results of VHF NFD would be published in the August issue. The bell in the Editorial Department is still ringing!

The RSGB Show

International Radio Engineering and Communications Exhibition

Wednesday, 1 October to Saturday, 4 October, 1969, 10 am to 9 pm, at the Royal Horticultural Society's New Hall, Greycoat Street, Westminster, London, SW1.

This year the Exhibition will be formally opened on 1 October by Mr R. J. Halsey, CMG, FCGI, DIC, BSc(Eng), FIEE, FIC, who is a Director of Cable & Wireless Ltd. The special exhibit on the stage of the Hall will be provided by Cable and Wireless.

Once again the Society will be taking the largest stand in the exhibition.

The **ENQUIRY AND RECEPTION AREA** will be in the charge of M. J. Wallace (G8AXA) and Mrs Eileen Vaughan (BRS26612), who will be assisted by Council members and members of the RSGB Committees. Orders will be taken for American magazines, call-sign and car badges and in addition, subscriptions may be renewed. Stand staff will do their best to answer enquiries from members. Another important part of their duties will be to welcome, and assist in any way possible, the many overseas visitors.

The **RSGB BOOKSHOP** will be in the charge of Stand Manager, Ron Broadbent (G3AAJ). A full range of RSGB publications will be on sale, including the 1970 edition of the *Amateur Radio Callbook* and the reprint of the 4th edition of the *Radio Communication Handbook*.

The **DISPLAY OF HOME CONSTRUCTED EQUIPMENT** is being organized by M. Elliott (G3VWS) of 23 Filbert Crescent, Gossops Green, Crawley, Sussex, to whom enquiries regarding the display of equipment should be directed. See page 656 of this issue of *Radio Communication* for full information.

GB3RS and GB2VHF will be operational from the Hall under the direction of Station Manager, Ron Vaughan (G3FRV). GB3RS will operate direct from the Hall on 80 metres ssb. GB3RS will also operate on 20, 15, 10 metres from the Imperial College Radio Society Club Station at South Kensington, and will be linked to the Hall by duplex operation in the 440–450 MHz band. GB2VHF will operate from the Hall on 4 and 2 metres.

The **BRITISH AMATEUR RADIO TELEPRINTER GROUP** stand, managed by Peter Balestrini (G3BPT) will have access to the Society's transmitters and operation will take place on 20, 15 and 10 metres using the call-sign GB3RS. Speed will be 45·5 bauds fsk and both 850 and 170 Hz shifts can be used. On 4 and 2 metres, GB2VHF will be pleased to have rtty contacts at 50 bauds using 850 Hz afsk.

RECEPTION FOR OVERSEAS AMATEURS

The Society is organizing an informal Reception for overseas visitors, on the lines of that held in previous years, for Friday, 3 October at 7.30 pm. Between 7.30 and 8.30 pm entry will be restricted to overseas visitors and invited guests, but Society Members may obtain tickets for this period at a cost of 7/6d. The Society hopes that all visiting amateurs will make themselves known at the reception area, when arrangements will be made for them to attend the reception.

New Techniques for Amateurs

By G. M. WARD, G3BOB*

IN a number of recent *Technical Topics*, Pat Hawker has referred to the need for new techniques in amateur practice, mentioning that the average station has changed little over the past 30 years or so. While the last 10 years has seen the rise of ssb techniques, the actual equipment required has changed little. Transmitters still have an exciter and pa, and receivers are virtually unchanged except for improvements in selectivity and stability. CW techniques have hardly changed in 40 years, although the argument of cw vs phone has gone on unabated without resolution. In this connection, it is interesting to meditate on the fact that if the sending speed is raised from 12 to 24 wpm, it will be necessary to double the transmitter power to obtain the same signal/noise ratio in a receiver equipped with the optimum bandwidth for the operational speed. DX buffs might consider this when contemplating rattling off a CQ at a high rate of knots. Perhaps the GPO had a point when it came up with the 12 wpm call-sign limit.

About the only new technique has been the introduction of teleprinter transmission using frequency shift keying, although this scheme has the disadvantage that it is restricted to people having suitable receiving gear. It is not compatible with the receiving equipment found in the average amateur station—you can't receive it with a pair of headphones.

This article is an attempt to suggest three techniques which seem very applicable to amateur use and which allow improved performance over present methods of operation.

In view of the comments made about frequency shift keying being incompatible with ordinary receiving arrangements, all of the techniques proposed can be received on receivers that do not incorporate the special circuitry needed to implement the techniques. All that happens is that the improvements produced by the new techniques are not obtained, although with one system, any receiver will net an improvement. This approach was deemed a prerequisite for any new system since if it meant that only specially equipped stations could use it, the number of contacts obtained would be small for a long period.

It is interesting to note that all of the systems proposed have been around for some time, but only one of them has been exploited commercially to the writer's knowledge. It is possible that the first two techniques have been neglected because nearly all the literature on them has been published in French or German. There was an article in *QST* about the first technique, but it missed some of the important details because the author appeared unaware of the most important papers on the subject.

Two of the techniques involve phone transmission, the third can be used with any mode of transmission.

* 10, Bromwich Ave., London, N6.

Sideband Limiting

Nearly all phone operators are well aware of limiters to improve the " talk power " of their rigs and many are well aware of what happens if the degree of limiting is too great—objectionable distortion occurs and the intelligibility suffers. The object of limiting is, of course, to increase the average power of the transmitter so that instead of operating at an average power about one-tenth of the peak power, operation can be obtained at closer to 100 per cent of peak power. The limitations of audio clippers prevents this desirable situation being reached.

It is convenient first to discuss briefly the reasons for the failure of audio limiters.

It is well known that if any signal is passed through a non-linear circuit, the signal will be distorted and harmonics produced depending on the degree of non-linearity. A diode clipper is the ideal harmonic generator and the more it clips, the more it distorts the signal. The effect is easy to see. Assuming a voice bandwidth of 300–3000 Hz into a clipper whose output is filtered by a low-pass filter with a sharp cut-off at 3000 Hz, only those frequencies lying above 1500 Hz will not produce audible harmonics. Unfortunately, most voice energy is contained in the remaining spectrum and in the lower part of it to boot. The result is multiple harmonics of the most important speech frequencies accompanied by a large number of frequencies that were not there in the first place. These are the sum and difference frequencies of the original speech, plus those caused by the many harmonics. The only way to solve this problem is not to use a limiter, but to use a syllabic compressor which is quite a complex device, or the scheme to be described.

With sideband limiting, all the advantages of limiting are retained, but the disadvantages are removed leaving a voice signal which has almost no amplitude variation.

It may be thought that speech without any amplitude variation would be unintelligible, but it has been shown by many workers that the amplitude component contains no element of intelligibility, all of which is contained in the zero crossings of the phase component. Thus, no amplitude information needs to be transmitted.

The sideband limiter is very simple to implement. It consists of a normal sideband modulator followed by its normal filter. The output of this filter is fed to a limiter circuit which should, for optimum performance, be adjusted to give 25 to 30dB of limiting. The design of this limiter may be of any normal design. The output of the limiter is fed to a second sideband filter which, although it does not have to be as good as the normal sideband filter, may conveniently be another of the same kind for the sake of simplicity, the output of this second filter is fed to the normal transmitter circuitry which usually follows the sideband generator. A typical block diagram is shown in Fig 1.

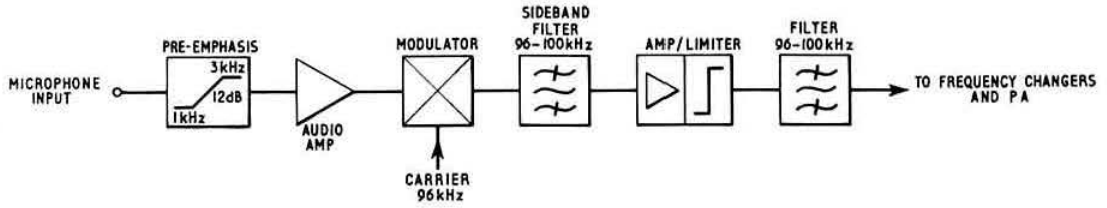

Fig 1. Block diagram of a sideband limiter.

Examination of the block diagram, which uses frequencies around 100 kHz for convenience only, makes the operation fairly clear.

If a 300 Hz tone is inserted in the input to the sideband generator, it will produce a sideband at the input to the limiter of 96·3 kHz. The input to the second filter will be a square wave at the same frequency and, at the output of the second filter will be a sine wave. The second harmonic of 96·3 kHz is 192·6 kHz, so far away as to present no problem in filtering it out. Thus, no harmonics of the 300–3000 Hz speech band fall into the wanted sideband spectrum of 96–100 kHz. Obviously, if the sideband is generated at a higher frequency, say 5 MHz, the harmonics will be even further away and easier to filter out.

Intermodulation products are also reduced because sum frequencies again fall outside the wanted band and only some of the difference frequencies fall back into the band and at relatively low levels. Subjective tests show a signal of excellent intelligibility and full speaker recognition. There is no sign of the distortion associated with audio limiters.

Reference to the block diagram, Fig 1, shows a pre-emphasis network at the input to the microphone amplifier. This network is to modify the audio characteristic so as to compensate for the energy spectrum of the voice (which falls off at the higher audio frequencies) and present a uniform amplitude response to the limiter so all frequencies are limited an equal amount. This is extremely important for good intelligibility. The actual network used was a compromise with a slope of 12dB between 1000 and 3000 Hz. No de-emphasis is needed at the receiver.

It may be wondered why the degree of compression is held to 25–30dB. In fact, it is a compromise between theory and practice. If the amount of limiting were, say, 70dB, it would be impossible to hold the background noise at the microphone to an acceptable level since during speech pauses, the gain would rise 70dB and fully modulate the transmitter. The difference between the system gain with 25dB and 70dB of limiting is negligible. Obviously a close speaking or noise cancelling microphone works best with any high compression scheme.

The fact that the output from the limiter/filter is of constant level has several advantages. First, if the subsequent transmitter is set-up properly, there will be no problem with overmodulation since the drive is always constant. Second, since the drive is of constant level, it is not necessary to follow the exciter with linear amplifiers and a class " C " power amplifier can be used.

The constant level signal is now similar to a cw signal with respect to amplifier operating conditions and spurious outputs will be no higher than with cw. Of course, the pa power supply must be able to support the cw output on a continuous duty cycle basis.

It now remains to see what improvement such a system produces in practice.

First, with a speech signal into the exciter, the output power averaged over a long time shows an increase over the non-compressed case of 8–9dB. Second, on a subjective basis listening through steadily increasing noise levels on a normal ssb receiver, the improvement is about 13dB. This is a very worthwhile gain and corresponds to increasing the normal pep output from 100 watts to over 1 kW.

No work seems to have been done into possible improvements in receivers to match the transmitter, but it seems possible that if the receiver were fitted with an if limiter, it might have interference rejecting features and it is certain that no agc would be required. The idea of having a limiter in an am receiver is unusual enough anyway, but it is obvious that once the signal has been " mangled " the process can be continued within limits. It is a fact that the limited exciter output can be passed through a flip-flop without deterioration.

One caution to be observed in the implementation of this system is to hold carrier leak to a low value, otherwise the transmitter will transmit the carrier at full power during speech pauses. No problem has been found in reducing carrier leak at the limiter input to acceptable levels.

It will be noted that the signal emitted by a transmitter using this principle can be received on any ssb receiver, so it is fully compatible without special measures.

No constructional details are offered, since they depend so much on individual cases and the design of a limiter represents no great problem at typical amateur frequencies. The *QST* article showed a single valve stage but the exciter had a fairly high output. In general, two valves would probably be typical.

Poor Man's Lincompex

Several references to Lincompex have been made in *Radio Communication*, but only a few details have been released, although several articles have appeared in the technical press. Before going on to a brief description of the technique, it might be a good idea to mention that Lincompex is probably the greatest advance in hf voice communications in 30 years. It can take a noisy hf channel over which conversation can scarcely be carried on and turn it into a circuit little different to a land line.

The basic principle is simple enough, although the implementation is quite expensive and complicated, too complicated for amateur use and requiring special measures at the receiver.

The transmit unit consists basically of a syllabic compressor, plus an envelope detector which assesses the amplitude of the incoming speech and modulates a variable

frequency oscillator at the upper end of the voice band, to produce an fm signal proportional to the original voice amplitude. After filtering, the two signals are combined for insertion at the transmitter input.

At the receiving end, the signal from the hf receiver is passed to a constant gain amplifier so the audio is held at a constant level. The output of this amplifier is passed to a syllabic expander network controlled by a dc signal derived from an fm discriminator operated by the fm channel which is filtered off at the receiver output. Thus, the transmit amplitude variations are made to modulate the received audio reproducing the original amplitude variations with a high degree of accuracy. A simplified block diagram is shown in Fig 2.

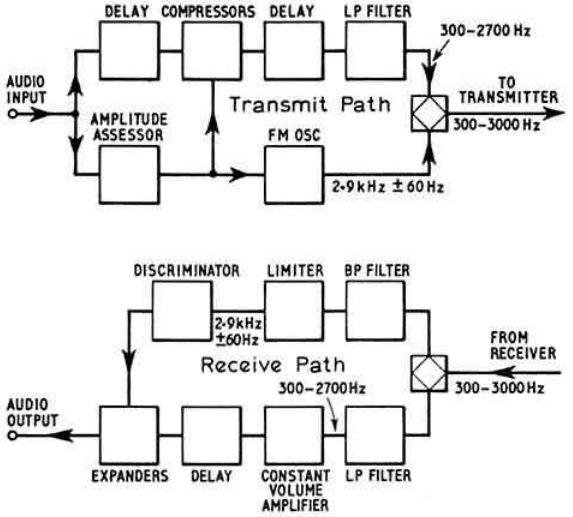

Fig 2. Simplified block diagram of the Lincompex system.

The fact that the compressor and expander operate at a syllabic rate is important because it takes advantage of a useful characteristic of the human ear, its ability to reject noise in the presence of speech because so long as the signal is varying at the syllabic rate, it tends to suppress sounds of different duration to speech. This is why speech is generally easier to follow in noise than music. In effect, the signal/noise ratio is made better than a meter reading would suggest. In effect, something for nothing for a change.

The combination of compressing the transmit voice and the compressor/expander action improves the signal/noise ratio by something approaching 50dB, a great improvement over the standard Compandor used on land lines, of which Lincompex is a relation.

More than 10 years ago the Dutch Philips Company developed an interesting system which closely approaches Lincompex in principle and seems quite suited to amateur techniques and practice, this is the Poor Man's system.

This system, called " Frena " is closely related to the preceding section and is shown in Fig 3.

It comprises an ssb transmitter equipped with a sideband limiter as described. The audio input to the transmitter is amplified and rectified to provide a signal proportional to the incoming level at a syllabic rate. In the original scheme, this control signal was used to modulate a separate fm oscillator which was then combined with the rf signal of the transmitter.

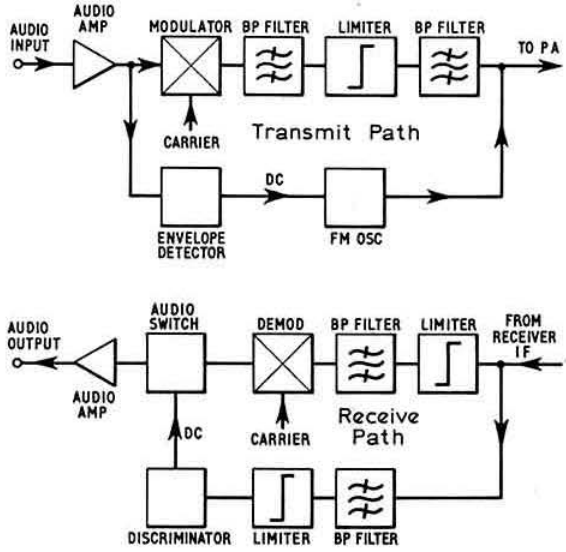

Fig 3. The Frena system.

In the receiver, the if signal was limited, filtered to extract the audio and control channels, and the audio applied to an expander network controlled by the detected fm signal. The major differences were the compression of the audio at rf rather than audio, and the use of instantaneous compression rather than syllabic—a function of the limiter. In basic principle, therefore, Frena and Lincompex are close relatives.

The use of an extra control channel would be rather difficult to implement in amateur equipment as it would require relatively complex filters to maintain the two channels within the usual audio bandwidth. Luckily, it was realized that the most important part of the system in improving signal/noise ratio was the syllabic switching of the compressed received signal, rather than the actual amplitude reconstruction. This meant that only a very crude approximation of the amplitude had to be recreated, little more than switching the receiver on and off at the syllabic rate. To achieve this, it was found that the separate control channel could be dispensed with and replaced by a pulse signal which enhanced the rf carrier at the syllabic rate, making the transmitter carrier the control channel and occupying no additional bandwidth.

At the receiver, the carrier was filtered off by a narrow crystal filter, detected and used to control a network which varied the audio level after the product detector. The sense of the control channel is always such that the receiver is muted when no audio is applied to the transmitter.

With this scheme then, the receiver is always quiet during inter-syllabic pauses, and the ability of the ear to suppress noise utilized plus the compression gain of the transmitter. This version of " Frena " was called " Frenac."

To implement this system for amateur purposes then, requires a transmitter equipped with a sideband limiter, as

described in the preceding section, a detector to detect when speech is present at the transmitter input and provide a signal of an on/off nature. This control signal is arranged to inject the carrier after the limiter, such that the carrier is about 10dB below peak power when speech is present and at its normal suppressed level when there is no speech. This arrangement of levels ensures that the control signal does not form a significant part of the transmitter output and deteriorate the effects of limiting.

At the receiver, the signal passes through the usual if chain plus agc. At the if output it is filtered by a sharp crystal filter to extract the control signal. At the same time, the if output passes via a limiter to the product detector. The control signal is processed to switch on and off a diode switch in the audio output of the receiver. Time constants of the control channel are arranged to follow the syllabic rate (about 20ms).

Construction of a receiver adaptor to provide these facilities seems within the possibilities of amateur techniques and practices, especially with solid state components.

The difference in the level of the control signal and the voice signal is made up at the receiver because the control signal bandwidth is only a fraction of that of the voice channel. For example; if the control channel were 300 Hz wide and the voice channel 3000 Hz, then the control channel would be 10dB better than the voice channel and the two signals would be effectively equal.

A block diagram of the " Frenac " scheme is shown in Fig 4.

It will be noticed that once again this system is compatible with ordinary ssb receivers, since the transmitter acts like a simple limited ssb rig and the carrier pulses have no effect, in any event, the carrier section could be switched off as required.

No doubt other versions of this system are feasible and

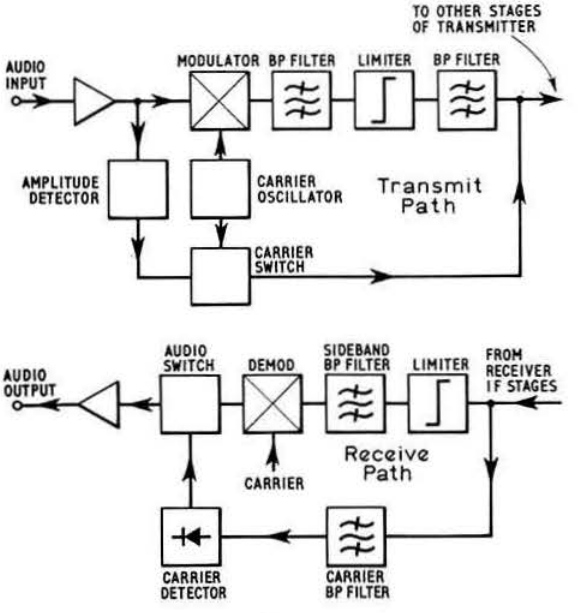

Fig 4. The Frenac system.

there seems to be an interesting area for research here.

It may well be asked why neither of these schemes has seen the light of commercial day so far as is known. As far as the writer can gather, it is because the benefits seem too great for the simplicity of the techniques and the idea of limiting seems to defy all the rules in the book as does a class " C " final for ssb. Naturally, no rules are violated in practice. Theory is still as unchanging as the laws of the Medes and Persians, which changeth not!

Diversity Combining

There is certainly nothing new about either diversity reception or combining, both have been used commercially for many years, however, this writer has never seen either principle used for amateur purposes, perhaps because in earlier days it was hard to implement and, in any event, the space required for antennas was formidable without a stately home. With vhf, things look different.

Combining can be used for two basic purposes, to combat fading by diversity reception, or to increase the available signal by combining the outputs of multiple receivers. Often these two functions are combined into one.

Several methods of diversity are commonly used, they are: Frequency diversity, Space diversity and time diversity. Equally, there are several methods of combining; the most common of which are Switching, Post-detection and Pre-detection combining.

Time diversity is mainly used for telegraph transmission and uses two send channels, one of which is delayed with respect to the other by about 1·5 seconds in a series of flip-flops. At the receiving end both signals are detected and the previously undelayed signal is delayed by 1·5 seconds so that, neglecting transmission time differences, both signals are in phase. The best of the two is then selected by a switching arrangement. Such a system would seem to have applications for cw signals. The transmitter would send out two signals about 500 Hz apart, one of which would have been delayed by 1·5 seconds. At the receiver, both signals could be received on the same receiver, detected, filtered, and applied to a decision switch after the necessary delay equalization. Since signals rarely fade out for long periods, substantial protection would be afforded against short fades, interference and noise.

The same scheme can, and is, used for frequency shift telegraphy. Here two tone channels are used instead of one and the signals processed as described. The additional bandwidth required is of the order of a few hundred cycles.

Frequency diversity is hardly suitable for amateur use and will not be discussed further.

Space diversity relies on the fact that antennas spaced apart some 100 wavelengths will receive signals with uncorrelated fading. At hf, 100 wavelengths of space are hard to come by, but at vhf, the situation is quite different. Assuming spaced antennas, each antenna feeds a separate receiver, the output of each being either combined at audio or switch selected for the strongest signal.

If switch selection is used, no advantage can be gained in the case where both receivers are receiving equal signals, however, if the audio output is combined, then the signal/noise ratio can be improved 3dB each time the number of receivers is doubled. This situation occurs because the modulation signals are in phase while the noise, being random, is not. The signals add in voltage directly while the noise adds as the square root of the sum of the squares.

Obviously, it is better to try and add the signals rather than select the best and thus try and make the best of the signals available. There are actually two methods of combining signals. The most common up to now has been audio, or baseband, combining, known as Post-detection combining. The other is rf or if combining, known as Pre-detection combining.

Post-detection combining is, like so many things, not quite as simple as it sounds, since one cannot just connect two receiver outputs together because it is very unlikely that both receivers will, in fact, have equal signals, one may be quite noisy and have only noise to contribute to the output. It is therefore necessary to have decision circuits which weight the signals to determine in what ratio they ought to be added, if at all. This requires complex circuitry to measure signal/noise ratio and via detectors, logarithmic amplifiers and ratio squared combining circuits to add the signals in the correct ratio. At hf, another problem arises in that the delay difference between channels may be large enough so that even at audio frequencies, the signals are seriously out of phase and cannot add. However, at vhf this problem does not arise and Post-detection combining is commonly used, particularly for Troposcatter systems. In general, the system seems too complex for amateur use.

Pre-detection combining, on the other hand, seems to have possibilities because of its greater potential and relatively easier implementation.

Although it has long been recognized that Pre-detection combining is superior to other kinds, it has proved very difficult to build a unit that met the theoretical performance predicted. This has been because of the problem of bringing the various channels into phase so their outputs could be added.

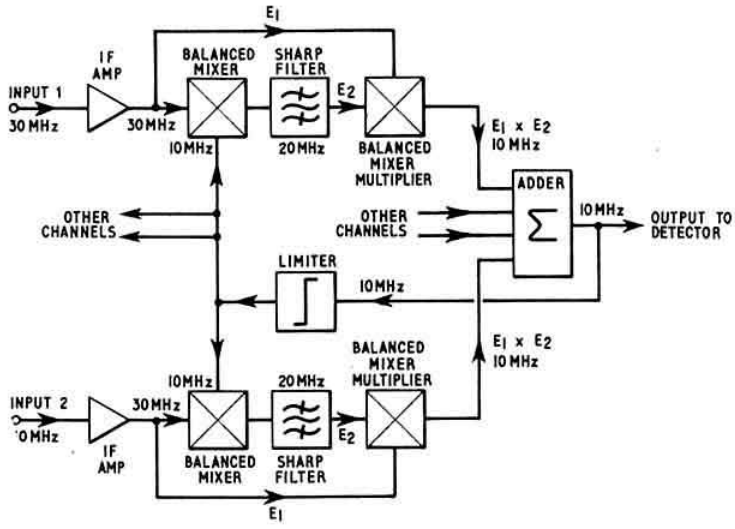

Fig 5. A Pre-detection combining system due to Granlund.

In general, Pre-detection combining takes place at if, although it could be effected at rf, but this usually makes parameters harder to control, so the lower frequency is chosen. Early combiners of this type used phase lock techniques to bring the various channels to a common phase, however, it proved difficult to maintain the lock when the signals were low, because the noise tended to control the locking circuit, and instead of locking to the signals, the equipment locked to the noise. Thus, just at the moment improvement was most needed, the combiner failed altogether and often took some time to regain lock.

It is, of course, obvious that to add together several if signals, they must always be in phase for proper addition. Recently, new techniques have been developed by Bell Telephone Laboratories and others, which solve the problem of phase locking and allow combination to continue effectively to very low levels. A block diagram of one principle due to Granlund is shown in Fig 5. All the new combiners use this basic system with minor differences of control and oscillator circuitry. The object of this system is to remove the phase of the incoming signal and replace it with a local phase, common to all receivers. Thus, even if the signals arrive via different paths of varying length, by the time they arrive at the combiner adder, they all have the same phase and can be directly added. It is obvious that if the arrival time of two signals differs by as little as 1 microsecond, it is quite a major fraction of a typical if frequency such as 10·7 MHz, although at audio it would be nothing, hence the importance of phase at if.

The method of operation is quite simple. If an input at, say, 10 MHz is applied to one of the first mixers and assuming there is a local oscillator signal being supplied from the limiter, an if will be produced. This if is filtered in a very narrow band filter (100 Hz say) and applied to a second mixer which acts as a multiplier. The original signal is also applied to this mixer and the resulting if applied to the adder. The other channels are, of course, identical. The result of this process is that the phase of the original signal is cancelled in the second mixer and the phase left is that of the local oscillator applied to the first mixer. As this is common to all channels, the modulation on the signal in each channel is related, and rides on, this new common phase. By making the local oscillator self oscillatory, minor phase differences between the narrow band filters are eliminated as the oscillator assumes a mean phase which is, however, common

to all channels. The mathematics of the process are too complex to include here.

The threshold of such a system is set by the narrow band filter and not the if bandwidth because, so long as the signal from the narrow band filter applied to the second mixer is clean, proper combining action will result ie; the phase is stable.

The importance of this technique lies in the fact that the signal applied to the receiver detector has been increased, particularly in fm reception where the overall receiver threshold will be improved by the gain of the combiner. This contrasts with the Post-detection case where an improvement will only occur if each channel is above threshold.

Fig 6 shows a simplified block diagram of a possible configuration for a diversity receiver for vhf use. The basic arrangement of this receiver follows normal practice in each of the channels up to the output of the second mixer. It will be noticed that both channels are identical, and supplied from the same local oscillators. This is to ensure that the phases in each channel are the same. The combiner section is very similar to that of Fig 5, but the common limiter is replaced by an agc amplifier which also supplies the common phase. The output of this amplifier supplies an agc detector which drives the if amplifiers in all channels to control the gain.

The sharp filter should be about 100 Hz wide and can

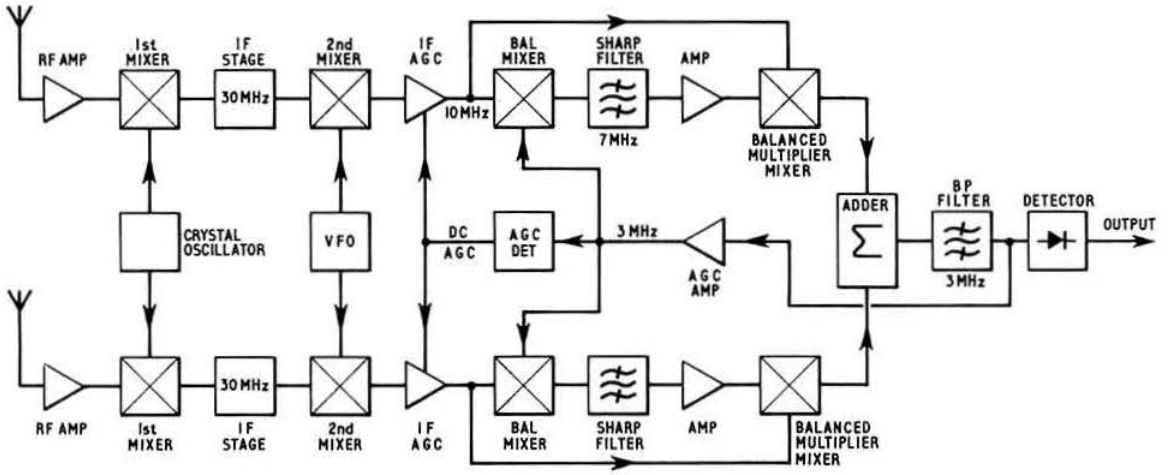

Fig 6. Suggested arrangement for a diversity receiver for vhf use.

The necessary weighting of the channels can be accomplished by applying agc from the adder output to an amplifier connected in front of each combiner input, as shown in the block diagram. Assuming that originally there were equal signals in both channels resulting in a certain signal output at the adder output and a certain signal/noise ratio, we now remove one signal altogether. The agc increases the gain of the remaining channel to obtain the same signal output as before, however, as both channels had their gain increased by the same amount, the amount of noise at the output rises as well and the signal/noise ratio worsens. A little juggling with figures shows that the signal/noise ratio worsened 3dB which is to be expected. This draws attention to one of the basic differences between Pre and Post-detection combining, especially with fm signals. In a Post-detection case, the audio always remains constant due to the limiter, while when the signal fades, the noise rises (which is why noise is used to control Post-detection combiners). In the Pre-detection case, the noise remains constant (it comes from the input stage) and the signal varies, which is why the signal is used for control. This is advantageous because interference will not appear as false noise and upset operation as often occurs with Post-detection units.

To make a complete diversity receiver with integral Pre-detection combiner it is only necessary to add front ends (of equal noise figures) and mixers driven by a common local oscillator, plus a detector circuit at the adder output. be a single section crystal filter. The amplifier which follows this filter makes up losses in the balanced mixer and filter, and ensures adequate drive to the mixer/multiplier, which can be either valves or FETs. The adder can be a resistive network, while the succeeding bandpass filter should have a bandwidth to suit the kind of signal being received. The frequencies in the combiner section are for convenience only. In practice, any frequencies can be used paying due regard to spurious responses.

Naturally, any number of channels can be used, all fed from the same sources of carrier and agc. Caution should be exercised to ensure that delays in each channel between the aerial and combiner are equal, otherwise the combiner will be so busy removing equipment defects that it will not have anything left to remove transmission phase shifts. Arrangements should also be made to trim the sharp filters to ensure they are at identical frequencies. The signal must be tuned to fall in this slot.

Where this system is used to combine the outputs of several aerials, a valuable benefit occurs. Normally, increasing aerial gain is accompanied by a decrease in beam width. This is not always a good thing, it makes searching difficult, and on long paths may contribute to fading as the incoming ray moves up and down. When aerials are combined this way, they have the gain of the sum of the aerials and the beamwidth of any one. One thus gets gain with broad beamwidth. This could be helpful for moonbounce and other

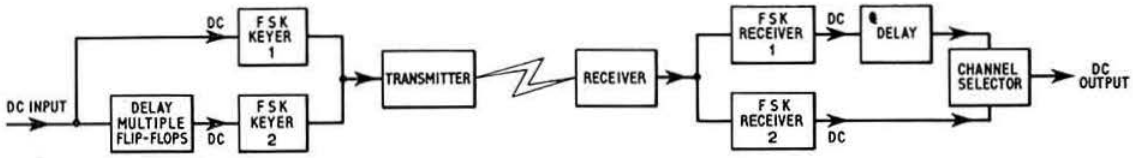

Fig 7. Block diagram of a time diversity scheme.

similar receiving problems. However, in increasing gain, it is unfortunate that vertical stacking usually gives the best protection against fading as it is usually harder to achieve.

Consideration can also be given to building a high gain, omni-directional aerial by having four aerials at right angles to each other, each connected to a quadruple combiner. Since signals from all aerials will be combined in phase, the sum of all the gains is obtained in all directions, since even signals off the back contribute their whack. Full details of the various schemes developed for combining can be found in the referenced literature.

Finally, the time diversity scheme suggested earlier and shown in Fig 7, would seem particularly applicable to those who use RTTY, since two frequency shift channels can easily be transmitted on the same carrier with only a 3dB loss. However, the reliability improvement would more than outweigh this loss.

Such a scheme is relatively easy to implement. The dc output from the teleprinter directly drives a frequency shift keyer unit as one output, while the same dc signal is used to key the second fsk via a delay network which may be made by a chain of serially operated flip-flops to build up the required delay (ideally 1·5 seconds). Such a unit requires 150 flip-flops or their equivalent. There are, however, various circuit tricks which reduce the actual number of separate stages required. The composite signal from the two fsk units is applied to the transmitter. With normal 170 Hz spacing between channels, the bandwidth required is still only a few hundred cycles.

At the receiver, the composite signal is applied to two fsk receivers and turned into dc again. The two dc outputs are then applied to a channel selector where the best is selected. One of the dc paths, that delayed on the transmit side, goes direct to the channel selector, the other goes via a delay network identical to that used on the transmit side. Both channels have thus undergone the same delay between dc input and output, but fading or delay on the transmission path will affect each differently.

Obviously there are numerous refinements to this system such as regenerators against distortion, timing clocks, etc. However, such schemes make compatibility with existing techniques difficult. As proposed here, the diversity scheme is compatible with normal RTTY practices for single channel working.

No constructional or circuit details are given for any of these schemes because it is felt there are so many possible variations. Anyway, the object is to stimulate ideas.

References

[1] "Constant level Speech in SSB transmitters" (in French). J. Daguet and K. Gilabert. *L'Onde Electrique*. May 1961.

[2] "A new method of speech transmission" (in French). J. Daguet and P. Marcou. *Annales de Télécommunications*. June 1956.

[3] "Constant amplitude modulation in telephony" (in French). P. Deman. *L'Onde Electrique*. August-September 1955.

[4] "Telephone circuits on poor quality links" (in French). P. Deman. *L'Onde Electrique*. July-August 1961.

[5] "FRENA, a system of speech transmission at high noise levels." F. de Jager and J. A. Greefkes. *Philips Technical Review*. Vol 19, No 3, 1957-58.

[6] "Optimum compression of the dynamics of speech by means of amplitude limiting." *Nachrichten Technische Zeitschrift* (English edition). October 1962.

[7] "Topics in the design of antennas for Scatter." J. Granlund. MIT Lincoln Labs, Tech Report 135, pp 105-113. November 1956.

[8] "A new forward acting pre-detection combiner." J. Boyhan. *IEEE, Trans Comm Technology*, COM-15, October 1967.

[9] Letter by R. T. Adams and H. L. Smith. *IEEE Trans Comm Technology*, April 1968, pp 347-348.

[10] "Linear diversity combining techniques." D. G. Brennan. *Proc IRE*, Vol 47, No 6, pp 1075-1102. June 1959.

[11] "Angle diversity tests." G. W. Travis, BTL. Session 33. *NEC Conference Proceedings*. Chicago, December 1968.

[12] "A signal processing technique for predetection combining." W. J. Bickford. *NEC Conference Proceedings*, Chicago, December 1968. (Session 33.)

[13] "Error protection via time diversity." Walter Lyons. *Convention Record Xth National Communications Conference*. Utica, NY. October 1964.

[14] "Optimizing HF telegraph transmission." W. Lyons. *IEEE Transactions on Communications Systems*. March 1964.

Thermostat Interference

In the matter of interference, the amateur is as much sinned against as sinning—and suffers from the increasing use of many forms of domestic appliances. A recent issue of the *Derby and District Amateur Radio Society Newsletter* (No 1, 1969) contained some very practical advice on coping with the increasing problem, particularly for vhf operators, of interference from the control thermostats of gas-fired hot-water and central heating installations. This interference often takes the form of a fairly regular buzz lasting anything up to a minute every six to ten minutes.

The writer states that a satisfactory cure may be achieved by fitting two small inductors (Radiospares, or Post Office RF17) in the leads to the thermostat, as close as possible to the unit itself. The thermostat is usually inside the boiler unit on a control box, connected by a thin capillary tube to a sensing bulb in the boiler proper (this tube is fragile and could easily be damaged when removing a thermostat unless care is taken).

When disconnecting the two control wires, note which is connected to where; then with the aid of "chocolate block" units, the two chokes can be wired in series with the leads. The Newsletter stresses the need to turn off the mains first!—and if in doubt, don't tackle the job. This type of suppression is unlikely to prove effective on lower frequency bands.

Some Notes on the G3LUB Bridge

By RUDD THORNTON, G3PKV*

THE impedance bridge described by G3LUB in the December, 1968 *Radio Communication* is a very versatile and useful piece of testgear and a real boon for the amateur constructor. To make full use of the instrument requires quite a bit of practice, and the following notes may be of interest to others who, like myself, were puzzled by some of the results.

Inductance Measurement

In particular the use of the Hay bridge arrangement for rf coils can be misleading. The formulae for inductance using the Hay and Maxwell bridges are:

	Hay	Maxwell
L (Henries) =	$R1 \times R2 \times C(1 + 1/Q^2)$	$R1 \times R2 \times C$
Q =	$\frac{1}{2\pi f \times C \times R3}$	$2\pi f \times C \times R3$

where R1 range resistor
R2 balance resistor
R3 phase balance resistor
C standard capacitor (Farads)

At 1 kHz the Q (ie the ratio of reactance to resistance) of typical rf coils is about 0·2, and omitting the correction factor $1 + 1/Q^2$ gives readings which are about 25 times too high. As an example a Wearite PA6 coil of 35 μH inductance (0·22 ohms reactance at 1 kHz) and 1·2 ohms resistance showed a null on the Hay bridge at 1050 μH. When the dial reading is corrected for the Q of 0·183 the true result is obtained.

A simple solution is to restrict the value of the resistor in series with the standard capacitor to 250 ohms, giving a Q range for the Hay bridge of 6·3 to infinity. The error on direct reading is then limited to a maximum of 3 per cent. Lower Q values can all be measured with the Maxwell bridge, using a parallel variable resistor of 10,000 ohms, which just covers the range from 0 to 6·3. However many coils will be found with Q around 0·1, needing 150 ohms on the 10 K ohm variable to give a null. This is no problem with a high grade control, but ordinary "10 K pots" can be rather rough near the end of the track. The 250 ohm variable can be switched in to cover this region. The 3-way Q switch can then be re-wired as follows:

Position	Q	Phase Balance
1	6·3 — ∞	250Ω in series
2	0 — 6·3	10K in parallel
3	0 — 0·16	250Ω in parallel

* 43 Fordwich Road, Welwyn Garden City, Herts.

With ganged potentiometers the scales can be calibrated in terms of Q, and the readings will be valid for both the capacitance and inductance ranges.

Amplifier Input Impedance

Even with a silicon transistor emitter follower in the input stage, the bridge is heavily loaded by the amplifier when measuring high impedances such as low values of capacitance. By using an FET the input impedance of the amplifier is easily raised to several megohms; the circuit of Fig 1 gives full scale deflection of a 50 μA meter for 20 mV input, and makes the addition of an extra decade to the range switch S3 worthwhile. The resulting 1–10 pF range is very useful for the vhf type, and did not require correction for internal stray capacities—no doubt due to the use of the screened oscillator transformer and a lucky wiring layout!

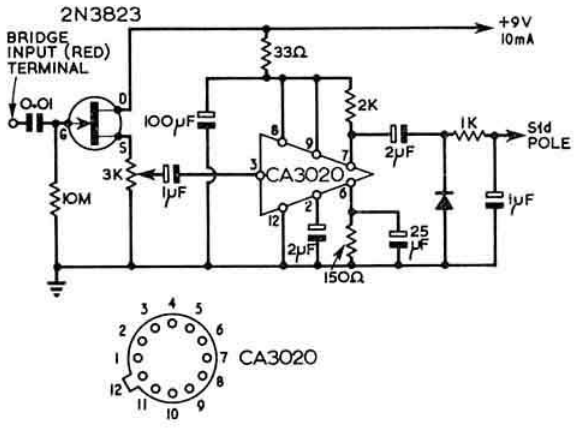

Fig 1. An IC amplifier with FET input stage. The remaining connections to the IC are left open circuit. For a negative earth system SIb pole is connected to earth and SIb contacts 2, 3 and 4 to the bottom end of the 3K ohm meter sensitivity potentiometer.

SIAME—Solid State Integrated Auto Morse Encoder

By J. KASSER, G8BTB*

Specification

SIAME is a CQ/TEST-CALL SIGN encoder with no moving parts. It is completely solid state using digital techniques. The signal to be encoded into Morse is stored in a diode matrix, so designed as to allow the signal to be changed by simply rearranging two rows of diodes in the matrix.

Uses

Besides being used in the home station for generating CQ's automatically in conjunction with an electronic keyer using micrologic (1), it can send "test" signals on cw or mcw with a new transmitter that is being debugged or can be used in a beacon station as the keyer unit. When used in a beacon station that is also being used as an operational station (example ZB2VHF on 4m) it can send TEST when the band is not being monitored and CQ when it is.

Construction

Since Siame is a complex exercise when considered as a whole, it is much easier to consider it in small sections. After an introduction to the theory behind Siame, and to digital techniques, the construction or rather evolution of Siame will be described.

Time-Coding

Good Morse is sent with regular timing. The dots, dashes and spaces bear a time relationship to each other. A dash is equal in time to three dots. A space can be equal to one or three dots, depending on its position. Let the period of a dot be one unit of time or "one bit," hence the letter B may be said to consist of twelve bits: the first three being a dash, the fourth a space, the fifth a dot, the sixth a space, the seventh a dot, the eighth a space, and the ninth a dot, the last three spaces giving dah-dit dit dit.

Any other letter can also be translated from aural Morse to digital, in the same way. Consider now the period of one dot as the period of the "ontime" of a signal being generated by a multivibrator. If this signal is considered in terms of Morse, it is equivalent to a string of dots.

Note that one bit is not the period of the tone signal, but the period of time in which the tone sounds; ie, if a 1 kHz tone is keyed in Morse at 12 wpm, the bit rate is defined as 12 wpm, and not 1 kHz.

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Method of Operation

A free running multivibrator generates a pulse train which is applied to a binary counter. A diode matrix converts this binary signal to a sequential count 1—32 with individual readouts of every number and governs which pattern is read out.

At the end of a pattern, an end of pattern pulse is generated and causes the matrix to change state. Thus after three CQ's the matrix will send the call sign G8BTB. Since the matrix is not long enough to store G8BTB on one line it stores it on two lines, G8, and BTB an end of pattern pulse does the switching from one line to the other.

After a complete cycle of three patterns and call sign (ie, CQ CQ CQ G8BTB or TEST TEST TEST G8BTB) the control section is sampled to determine which pattern will be generated in the next cycle. Thus when changing the pattern, even if the button is pushed in mid cycle, Siame will only change at the end of a cycle. The output pattern keys an audio oscillator and is also fed to the transmitter keyer.

Basic Logic

For those readers who do not know much about digital techniques, this section will attempt to explain a few of the basic circuit elements used in Siame. Once each unit has been explained, it will be referred to and a circuit will be drawn using block diagrams with a symbol for a gate circuit representing all the components in the gate circuit.

Fig 1 shows a number of gates. In (*a*) when either transistor input has a positive voltage on it, that transistor will be switched on and will conduct. Current will flow through R_L and point C will be at a low potential. In (*b*) when A or B (inputs) are at a low potential current will flow through R_L and the diode concerned, and point C will be at a low potential. In (*c*) if a high potential is applied to either input the output will also be high as the current will flow through the diode and R_L. Note that current will not flow into one diode and out of the other, since the other is reverse biased and blocks current flow through it. In (*d*) the first part is similar to (*b*) so when either input is low, current flowing through R_B flows out of the diode. If both inputs are high, however, the current flowing through R_B flows in the base circuit of the transistor and the transistor conducts. Current flows through R_L and point C is low. Hence any input going low makes the output high.

The bistable multivibrator is shown in Fig 2. Assume that on switch-on the circuit stabilizes with the TR3 switched on. This will occur due to the mis-match in the tolerances between the components. With TR3 on (fully conducting) $\bar{Q}$

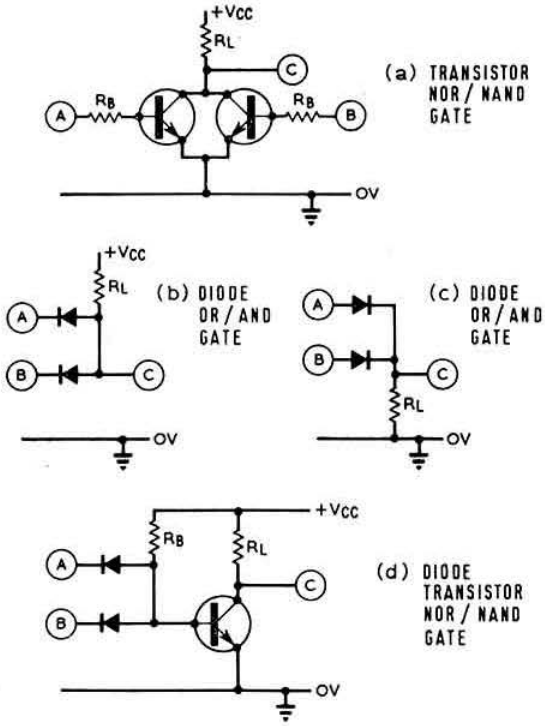


Fig 1. Gates.

will be at earth potential and no current will flow in R_{B2}, so that TR2 will be switched off (not conducting).

When a high signal is applied to S, TR1 conducts and switches on. Q goes low and no current flows in R_{B1}, so that TR3 switches off and $\bar{Q}$ goes high. Current flows through R_{B2} and TR3 turns on. When the input is removed from Q, since TR2 is now on, the circuit remains in a stable state (Q is low and $\bar{Q}$ is high). To change the state a high input has to be applied to the R input. The circuit then flips over and when the input is removed remains in a stable state (Q is high and $\bar{Q}$ is low having two different stable states the circuit is called a bi-stable.

Note that the bistable consists of two NOR/NAND gates (as shown in Fig 1 (*a*)) cross coupled input to output.

The JK flip flop shown in Fig 3 is a complex device made up of a number of gates connected together. It will be considered as a black box with certain properties. It can be used to store information and to count. When used as a store, perhaps as part of a shift register, input signals are presented to the R and S inputs. When a clock pulse negative transition occurs, what is present at the input is read into the JK and appears at Q and $\bar{Q}$. A fresh signal can then be applied to the input, and when the clock pulse transition occurs, this fresh signal becomes Q and $\bar{Q}$. The JK flip flop can also be used to divide by two. If both inputs are connected to a low state the output at Q and $\bar{Q}$ will be half the clock frequency.

Note that Q is opposite polarity to $\bar{Q}$ in all cases. If the inputs are connected to a high state nothing will happen.

The preset can set Q and $\bar{Q}$ to a previously determined state. This can either be a latching action (bistable type of connection) or a simple for the duration of the preset pulse (or gate connection) action. Different types of JK are made, and the manufacturer's data sheet usually states which type of JK the device is.

Consider now the diode gates shown in Fig 4 (*a*). There are three gates which have two inputs each out of a possible four (A, B, C, D). Gate 1 has A, B, inputs, gate 2 has A, B, and gate 3, C, D. The output from these gates is then fed into gate 4. This method of drawing a circuit takes up a lot of space. Redrawing the circuit as in Fig 4 (*b*), applying A, B, C, D, inputs and the supply voltage to common lines, the gates are then laid out above those lines as shown. The outputs are coupled via the diodes to gate 4 which has one line for the output. This arrangement is called a "matrix," and is simply a collection of diode gates, compressed together into a small space. This method of constructing multiple gates is a lot neater than wiring up lots of gates separately and is much easier to service. For a fuller explanation the reader is advised to consult a text book on the subject obtainable at most public libraries.

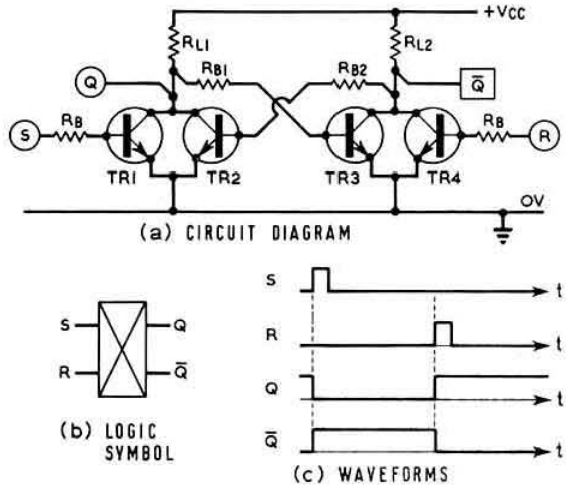


Fig 2. Bistable.

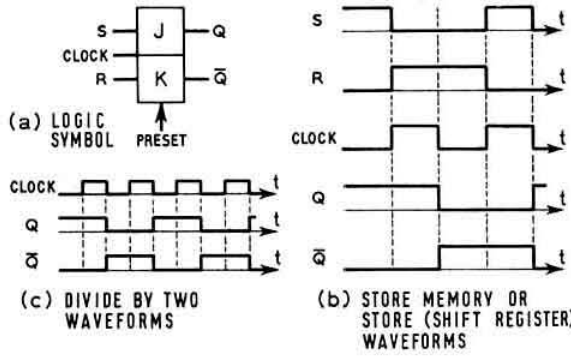


Fig 3. JK Flip Flop.

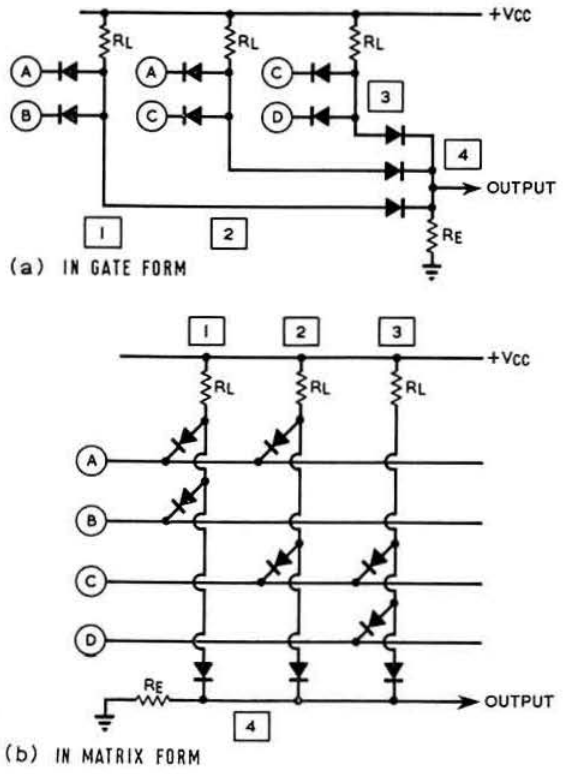


Fig 4. Diode matrix

Negative-Positive Logic

So far in discussing the gates they have been considered as having high or low states appearing on inputs and outputs. If a high state is defined as a logic 1 and a low state as a logic 0, a table of states at input and output can be drawn for each gate. Fig 5 shows the tables associated with the gates of Fig 1. These tables are known as "truth tables."

If Fig 5 (*a*) is the truth table for the gate shown in Fig 1 (*a*), A and B are 0 (low) and C is 1 (high). If A *or* B are 1 then C will be 0. Thus the gate is a NOR gate.

A NOR gate is a negative OR gate, ie, an OR gate with an inverted output, Similarly a NAND gate is an AND gate with an inverted output.

Fig 5 (*a*) shows a NOR gate, ie, a 1 at any input puts a 0 at the output.

In Fig 5 (*b*) the truth table is of an AND gate, ie, both inputs must be at 1 before a 1 appears at the output.

In Fig 5 (*c*) a 1 on any input puts a 1 on the output. This is an OR gate.

While Fig 5 (*d*) needs a 1 at both inputs to give a 0 at the output, ie, it is a NAND gate.

The two gates shown cross coupled in Fig 6 (*e*) form a bistable multivibrator as discussed, with reference to Fig 2.

The logic symbols for these gates are shown in Fig 6.

These gates have been defined for positive logic, ie, 1=high 0=low. Should the definitions be reversed however, ie, 0=high, 1=low, then the same truth tables will define different functions. Fig 5 (*a*) shows a gate needing two lows at the input for a high output, ie, it is now a NAND gate. The others will also similarly invert their functions.

A	B	C
0	0	1
0	1	0
1	0	0
1	1	0

(a)

A	B	C
0	0	0
0	1	0
1	0	0
1	1	1

(b)

A	B	C
0	0	0
0	1	1
1	0	1
1	1	1

(c)

A	B	C
0	0	1
0	1	1
1	0	1
1	1	0

(d)

Fig 5. Truth tables.

Binary Arithmetic

The truth tables shown in Fig 5 define the operating parameters of the gates shown in Fig 1. These truth tables are bulky things, and it is simpler to define the gates as follows.

$A+B=\overline{C}$ ..... (*a*)
$A\times B=C$ ..... (*b*)
$A+B=C$ ..... (*c*)
$A\times B=\overline{C}$ ..... (*d*)
Using positive logic (1 =high, 0 =low)

In the above equations the symbols that have been used are defined as follows:

+ means OR
× means AND
= means equals
$\overline{C}$ means inverse of C or "NOT" C ie, c=0

The rules that these equations follow are called Boolean Algebra, for just as ordinary algebra has its sets of rules and radio calculations have its sets of rules, so digital techniques have a similar set of rules.

This short introduction to digital techniques has of necessity been brief. For a fuller explanation the reader is again advised to obtain a text book from a local library or book shop.

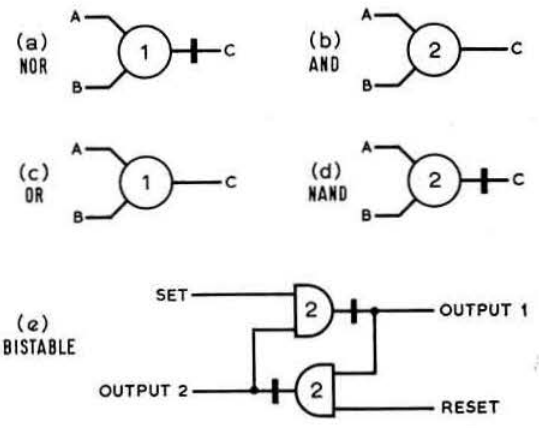


Fig 6. Gates.

Test Equipment

Although a multimeter can be used to detect high and low states, it is a lot easier to use the device shown in Fig 8. This consists of a bank of lamps each lamp (6 volts, 60 mA) being the collector load of a silicon n-p-n transistor (any type will do). Current flows in the base circuit, when the input is applied to a high point the transistor switches on and the lamp lights. If the input is applied to a low point the lamp will not light. If a bank of these lamp circuits is made up and the inputs connected to specific points of Siame they will monitor its operation, and one is able to check the operation literally at a glance.

If an oscilloscope is available, the clock or bit rate can be increased by using the monitor oscillator instead of the clock generator as the timing waveform and observing the resulting waveforms on the screen.

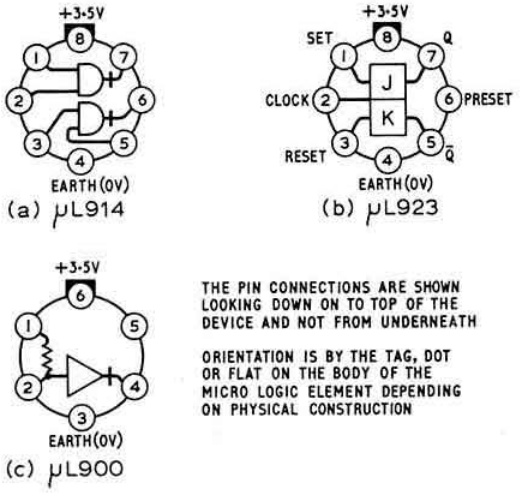


Fig 7. Connections to micro circuits (SICs).

Construction

1. Timing and Monitor Pulse Generators

These are astable multivibrators using micro circuits. However, ordinary silicon transistors can be used instead as there is nothing critical about these circuits shown in Fig 9. The unused inputs of any gates are connected to earth. The output of the tone generator is connected to a pair of high impedance head phones, used to monitor the operation of Siame. The isolator gate isolates the clock generator from the rest of Siame.

2. Counter

The counter consists of five flip flops each connected as a divide by two circuit. Each flip flop is coded by letter (A to E). The circuit is shown in Fig 10 (*a*) with the waveforms in Fig 10 (*b*).

3. Matrix

The matrix is divided into two parts. One part converts the binary pulses to an 0–31 count giving sequential readout on 32 lines. The second part converts the 0–31 readout to the Morse Encoding Pattern. Consider the first part, the truth table to convert binary to decimal (0–31) is shown in Fig 11. Each decimal number has its own unique binary number equivalent and a five input gate can be arranged to read it out, ie, change state when that number occurs. For example, consider number 17.

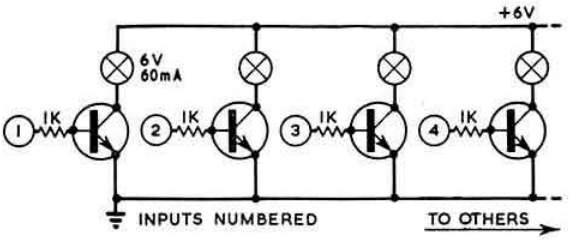


Fig 8. Lamp drivers.

Binary equation for high (1) output $= A \times \bar{B} \times \bar{C} \times \bar{D} \times E$. Thus the line in the matrix to read out number 17 will connect to lines A, $\bar{B}$, $\bar{C}$, $\bar{D}$, E,

Similarly all other decimal numbers are read out by their own five input gate in the matrix corresponding to the truth table in Fig 11. The inputs A, B, C, etc, come from the counter. It is advisable to build this in stages, building each number from 0 upwards at a time, testing with lamps that the matrix is converting binary to decimal. If all is correct the lamps will be seen to flash in turn, with time delay between cycles equal to the number of blanks (positions that do not have a lamp monitor) spaces. Looking at the matrix (Fig 12) a pattern can be seen—diode space diode diode space space—exactly as in the truth table. This pattern is a help during construction as diodes which are out of symmetry are in the wrong positions and will give wrong outputs.

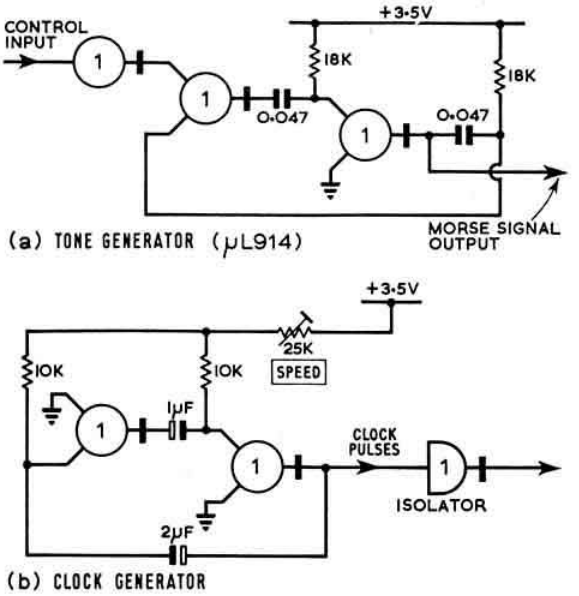


Fig 9. Timing generators.

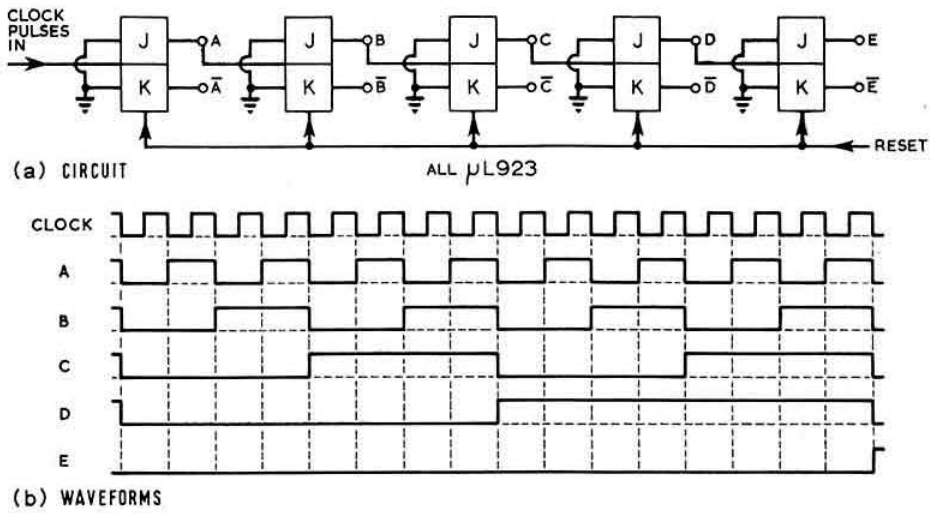


Fig 10. Counter.

Glossary

pattern—the encoding signals in one frame (CQ or TEST)
frame—the period between pulse 0 and pulse 31
cycle—three patterns and the calling sign.

* * *

Matrix (cont'd)

Having built a matrix that converts binary to a sequential 0-31 output, a choice must be made as to how to store in that 0-31 matrix the Morse encoding pattern, The truth table for the four patterns is shown in Fig 13. There are two ways of reading out the pattern. It can be read out as 1's or 0's. If the signal is read out as 0's, then each time a 0 must appear a diode is connected from the number line to the pattern line. For example, if the CQ pattern is to be read out in 0's, lines 1, 2, 3, which hold the first dash of dah-di-da-dit will have to be 0's (not 1's as Fig 13) and will be connected via diodes to the CQ line. The pattern will then be an inverted signal and must go through a NOR gate to be inverted.

The method used in Siame is to read out the pattern as 1's. This uses less diodes to store the pattern but introduces a problem, since there are some blank spaces left at the end of the pattern before the counter has reached 31. To read out the pattern in 1's all spaces (ie, all bits that are 0) are connected to the CQ line, however, it was decided to use an inhibiting circuit to block these unwanted outputs. This inhibiting pulse (E pulse) is read out by itself from all patterns, and flips a bistable multivibrator. The output of the bistable is gated with the pattern and inhibits the pattern until the 0 bit (1st bit) appears to flip the bistable back to its original position. The matrix for the pattern generator is shown in Fig 14. Each constructor of Siame will have to modify the G8BTB lines to his own call. Then where a 0 appears connect the diode. Remember that the call is too long to be stored on one line.

Fig 15 shows the pulse waveforms for the stored patterns. Referring back to Fig 4 it will be seen that the matrix really consists of lots of gates as shown in Fig 4 (*a*), and for a 1 output from the gates, all inputs must be at 1. Thus if any input is at zero there is a 0 output. To control which line is being read out, all that is required is for the wanted pattern's control line to go to 0.

4. Pattern Encoding Control

Siame should now be in an operating state, by applying a 0 to a control line it should be possible to generate an output pattern as sketched in Fig 15. This waveform controls the tone generator (Fig 9 (*a*)). Thus to determine which pattern is to be generated, some control circuitry must be employed.

To arrange for a complete G8BTB to be generated the matrix must be switched from one line (G8) to another (BTB). This is done using a JK flip flop. The 0 bit which occurs at the end of a pattern (G8--) is inverted and used to change the state of the flip flop that has its output connected to the G8BTB control lines. The pulse inversion takes place to ensure that JK flips over without losing a pulse since the change over occurs at the negative going transition. This circuit is shown in Fig 16. The capacitor connected at the input of the inverter is to suppress any transients ensuring that the JK flip flop does not change state if a transient spike occurs.

Siame should now be generating G8BTB with a continuous tone between the end of B and the end of the frame. (By connecting diodes to the control line this tone can be eliminated for the moment.)

A similar arrangement is used to choose the CQ or test patterns but here the change over is not automatic. The JK flip flop is used as a shift register element. The input to the bistable consists of two push buttons (instantaneous make) connected between the input and +3·5 volts supply line. When a button is pressed briefly the bistable sets itself up in one state. When an 0 bit pulse reaches the JK flip flop, the states existing at the output of the bistable are read in or transferred to the JK flip flop. Hence if CQ is pushed, when the 0 bit appears the control lines are set up for CQ. If while CQ is being generated in the matrix the TEST button is pushed, the bistable will change state, but this change of state will only be read into the JK flip flop when the next 0 bit occurs at

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
A	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
B	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
C	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
D	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
$\bar{A}$	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
$\bar{B}$	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0
$\bar{C}$	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0
$\bar{D}$	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
$\bar{E}$	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Fig 11. Binary—decimal (truth table).

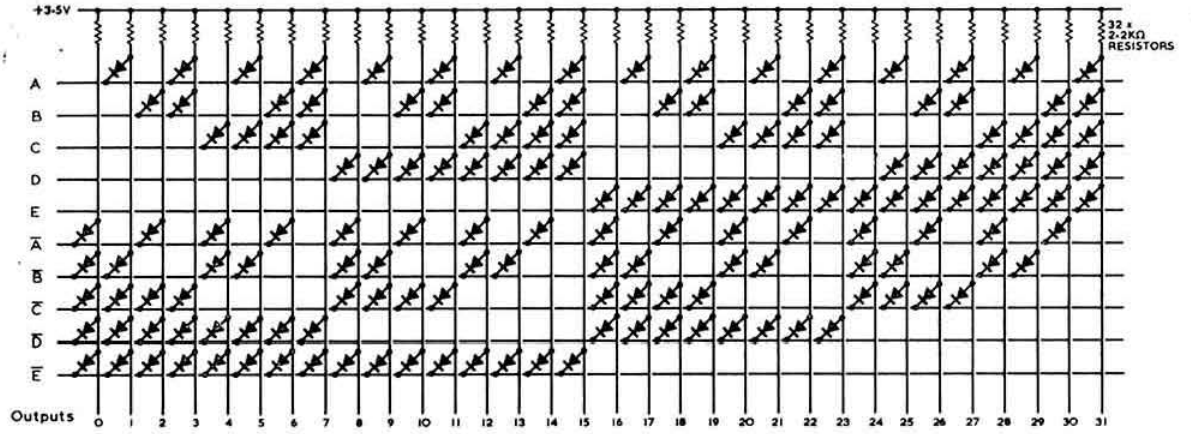


Fig 12. Matrix binary decimal.

X = 0 DUE TO BLANKING ACTION OF BISTABLE IN FIG 18 (INHIBITOR) HENCE DIODES ARE NOT REQUIRED

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
CQ	0	1	1	1	0	1	0	1	1	1	0	1	0	0	0	1	1	1	0	1	1	1	0	1	0	1	1	1	X	X	X	X
Test	0	1	1	1	0	0	0	1	0	0	0	1	0	1	0	1	0	0	0	1	1	1	X	X	X	X	X	X	X	X	X	X
G8	0	1	1	1	0	1	1	1	0	1	0	0	0	1	1	1	0	1	1	1	0	1	0	1	0	1	0	0	0	1	1	1
BTB	0	1	0	1	0	1	0	0	0	1	1	1	0	0	0	1	1	1	0	1	0	1	0	1	X	X	X	X	X	X	X	X

Fig 13. Pattern truth table.

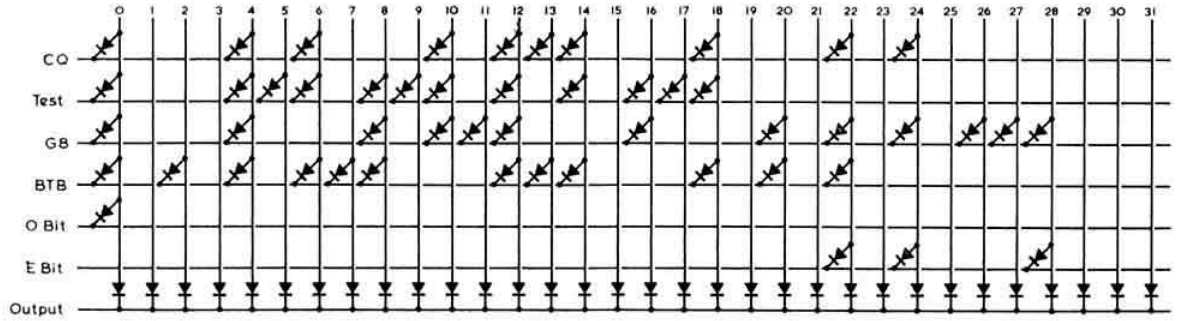


Fig 14. Pattern matrix.

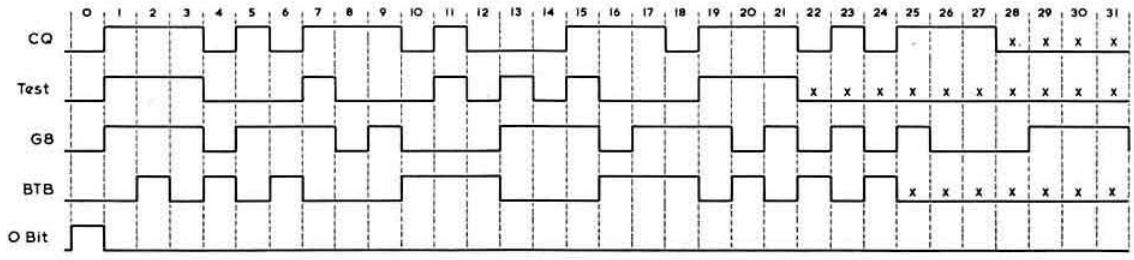


Fig 15. Waveforms,

the end of the frame, and the matrix will then proceed to generate a TEST pattern.

It is essential to disconnect the G8BTB control circuitry when experimenting with the CQ/TEST control lines, and vice versa, or the correct patterns will not be generated. The circuit for the CQ/TEST control lines is shown in Fig 17.

5. Inhibitor

It is necessary to inhibit the last few bits in each pattern. (Those that are generating the tone at the end of each pattern.) This is done by using the E bit to change the state of a multivibrator which will then apply an inhibiting 1 to a gate (to which the pattern is applied), between the matrix and the tone generator. The bistable is reset by the 0 bit pulse and then allows the pattern to go through. This is shown in Fig 18.

Siame will now generate the required encoding patterns for G8BTB, CQ and TEST. There are two spare gates on the output of the 2 gate (Fig 18). These just invert and isolate the waveform. They could be μL900's or halves of μL914. The output can be applied to a transistor and used to key the transmitter. Whichever phase of signal that is required for grid block or cathode keying may be obtained from the output.

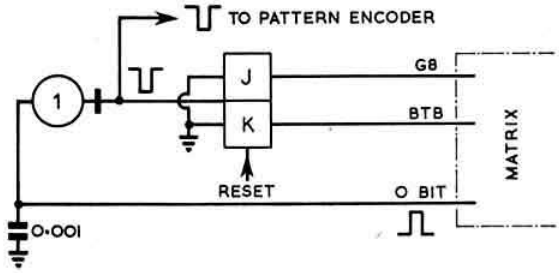


Fig 16. Call encoder.

6. Control Circuitry

It is now necessary to set up the conditions so that Siame will encode three CQ's or TEST and follow it with G8BTB. This is achieved by a count three circuit counting three patterns, and then switching to G8BTB. After the call sign is generated the system resets itself and the cycle starts again. The count three circuit is standard and is shown in Fig 19.

Upon starting Siame, it will encode three CQ's, then the count three circuit ejects a pulse which is used to change the state of the controlling JK flip flop, which then causes Siame to encode the call sign. The circuitry to do this is shown in Fig 20, and incorporates Figs 16 and 17.

In Fig 20, since a 0 input on any matrix control line will cause it to be read out, the control unit is arranged so that it holds all lines that are not to be read out at 1. To do this two gates in series must be used (in this logic system). Thus if one input gate 4 is 1, its output will be 0 and the input of gate 8 will be 1. Similarly with gates 5 and 9, 6 and 10, and 7 and 11.

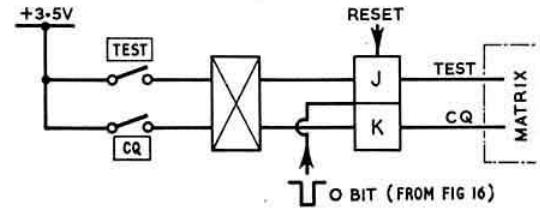


Fig. 17. Pattern encoder.

Consider the cycle. If the Q output of JK 1 is 0 (the $\bar{Q}$ output will be 1, inhibiting gates 4 and 5) and the Q output of JK 3 is 0. Gate 6 will then have two 0's at its input and the G8 line on the matrix will then be 0. Since the clock pulses are operating the matrix will read out G8. After a cycle an "0" bit is passed out of the matrix, inverted in gate 12 and applied to the count three circuit and to JK 3. JK 3 changes state and BTB is now read out. When three frames have been read out ie, G8 BTB G8 (this pattern has an unwanted G8 at the end which will be removed later), the count three circuit ejects a pulse which is inverted in gate 13 and JK 1 changes state, a pattern (CQ or TEST, depending on which has been set up) is now read out of the matrix. After three patterns once again JK 1 changes state and G8 BTB G8 is read out.

Note that the Q output of JK 1 is fed into both inputs of JK 3. If the Q output of JK1 is 0, then JK 3 sees an earth on both inputs, and will change state when the 0 bit pulse arrives. If the Q output of JK 1 is 1, then JK 3 sees 1 at its input, and the arrival of an 0 pulse has no effect.

Siame is now encoding CQ CQ CQ G8BTBG8 or TEST TEST TEST G8BTB. It is now necessary to block the G8 on the end of G8BTB so that CQ CQ CQ G8BTB only is encoded in each cycle. In order to do this Siame counts the number of times that the 0 bit appears when it is generating G8BTB, and resets itself completely after two counts. The circuit is shown in Fig 21. The 0 bit from the matrix is gated with Q output of JK 1 (Fig 20). This stops the 0 bit from going into the count 2 circuit when Siame is encoding CQ CQ CQ . It is then inverted (gate 14) and passed into the count 2 circuit, the output of which is again inverted (gate 15) and then passed into the μL900 power invert (gate 16). There is a double inversion here, because the output of the μL914 is not powerful enough to drive all the units connected to the reset line. The μL900 does have the power, but the input to it must be inverted once to keep the complete phase. The reset line is 0 for Siame to generated signals and 1 for complete silence—ie, no output. Thus after G8BTB the reset line goes to 1 and every JK flip flop in Siame resets at the same time, and Siame goes back to the beginning of the cycle, and once more generates CQ CQ CQ etc.

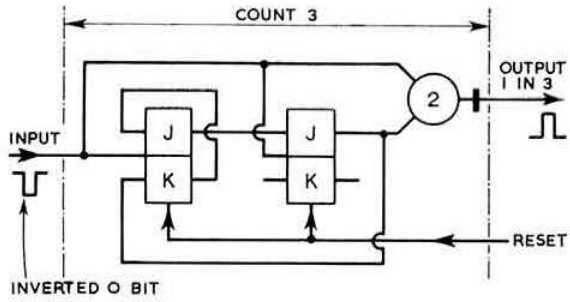


Fig 19. Synchronous Modulo 3 Counter.

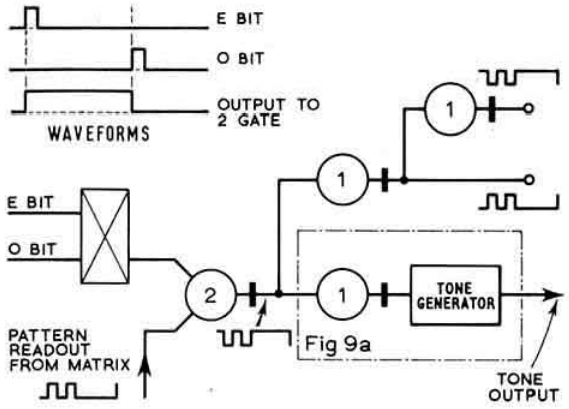


Fig 18. Inhibitor.

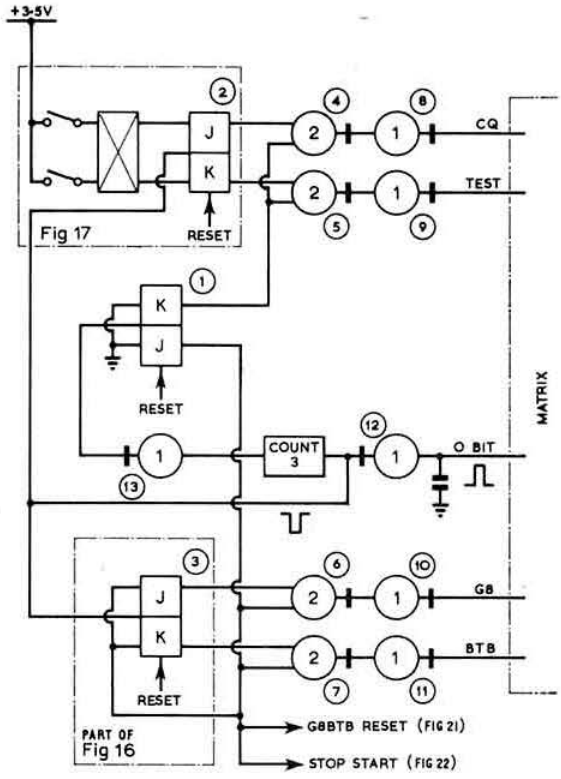


Fig 20. Control circuitry.

7. Stop—start

Upon switching Siame on, that is applying power, Siame can get itself up in any state, and the first cycle may start in any position. To avoid this some circuitry has been developed to start and stop the signals at definite points in time, that is—the start and end of the cycle.

Consider a bistable multivibrator (Fig 2), when the power is applied the bistable may set itself up in either state. To ensure that the bistable sets itself up in one state, an extra diode is connected in one lead (base to collector) as shown in Fig 22(*b*). This diode unbalances the network so that every time power is applied, the output at A is 0 and at B is 1.

Two such bistables are required, together with a JK flip flop and an inhibiting gate. The inhibiting input is derived from the controlling JK flip flop in Fig 20. This ensures that operation of the stop circuitry only takes place at the wanted point in time.

JK 18 is used as a shift register element. Initially on switch on its Q output is 0, the output of bistable 19 is 1, that of 20 is 1. When start button is momentarily depressed, the bistable changes state and the output of bistable 19 is now 0. This 0 is applied to gate 15 (it is used to inhibit this gate) in Fig 20, and the reset line goes to 0. The counter begins and G8BTB is read out. After G8BTB has been read out a pattern (CQ or TEST, depending on the control circuitry) is generated. Siame will continue generating the Morse encoding signals *ad infinitum*, since bistable 19 cannot change state as gate 17 is inhibited by the output of bistable 20 and no negative going edge can reach JK flip flop No 18. When the stop button is momentarily depressed bistable 20 changes state and its output goes low. As long as Q (from JK 1) is at 1 the output of gate 17 is at 0. When Q goes to 0 (it will change to 0 when G8BTB is being generated) the output of gate 17 goes to 1. At the end of G8BTB, Q will change state. This negative going transition, clocks into JK 18 what is at its input, in this case a 1. The output then becomes 1. This 1 is applied to bistable 19 and it changes state, inhibiting gate 15 (Fig 21), and when bistable 19 changes state, a 1 is present at the input of bistable 20, which also changes state. When the reset pulse occurs JK 18 changes state. Its output becomes 0. Siame is now back into its initial state, the reset line is at 1 and no-operation occurs. Fig 22 (*c*) sums up the operations of the stop-start circuitry in a truth table.

The output pattern always begins with the call sign. After the call sign is generated, CQ or TEST patterns will follow. If the start-stop buttons are depressed the cycle will always end after the call sign, hence a quick flick of start and stop buttons will cause just the call sign to be generated.

There are many additions and modifications that can be made to Siame, the field is vast. As an exercise in digital techniques it is certainly educational, and is a useful ornament to any shack.

When G8BTB becomes G3???, Siame will be modified to generate a suitable signal.

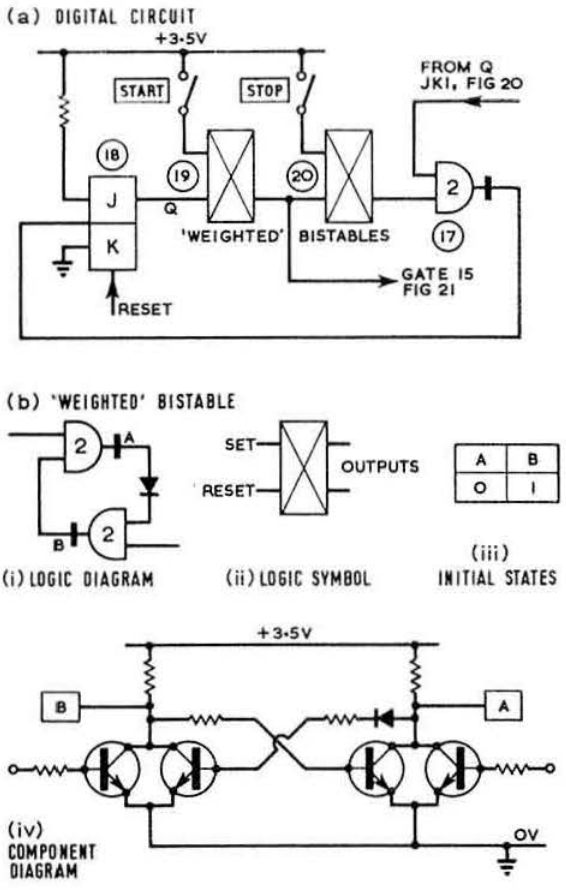
Notes on Construction

All diodes used are germanium. The micro circuits used are the Fairchild RTL series. Connections are shown in Fig 7. 1 and 2 gates are μL914 (with unused input earthed). The 1 gate generating the reset pulses is a μL900. All JK flip flop are μL923. All leads are colour coded and the positions of each element and its function noted, in order to facilitate finding it again.

Layout is not critical, but some sort of order should be observed for the sake of following the circuit. Supply decoupling is provided by applying condensers of 100 μF or 0·003 μF wherever necessary.

The lamps have been left in circuit permanently on various monitoring points such as: power on; CQ running; TEST running; G8; BTB; Inhibitor on; Running; Stopped; Call sign being generated; Pattern being generated, etc. They serve no useful purpose during normal operation, but they make Siame look interesting, for without these flashing lights it would just be a blank black box. Power supplies for the micro circuits are 3·5 volts at 400 mA. The lamps run off a 6 volt supply.

In fault finding it is easier to start at the beginning and follow through in the same sequence as construction took place.



OUTPUT	JK 18 Q	BISTABLE 19	BISTABLE 20
INITIAL STATE ON SWITCHING ON	0	1	1
AFTER START DEPRESSED	0	0	1
AFTER STOP DEPRESSED	0	0	0
AFTER TRANSITION OF Q	1	1	1
AFTER RESET PULSE	0	1	1

(c) TRUTH TABLE ..... START/STOP

Fig 22. Stop-start.

Since Siame is an exercise in digital techniques, there is some redundancy built in and some constructors will probably find different ways of doing certain functions. Incorporate any ideas of your own for your Siame will generate your call and be part of your station.

Bibliographical Reference

[1] Micro Ultimatic, *73 Magazine*, June 1966.

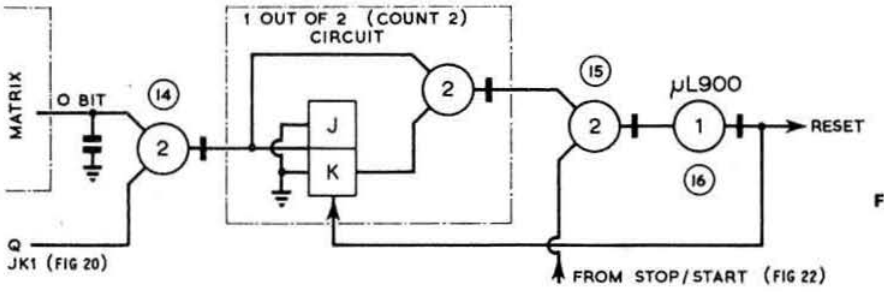


Fig 21. G8BTB reset.

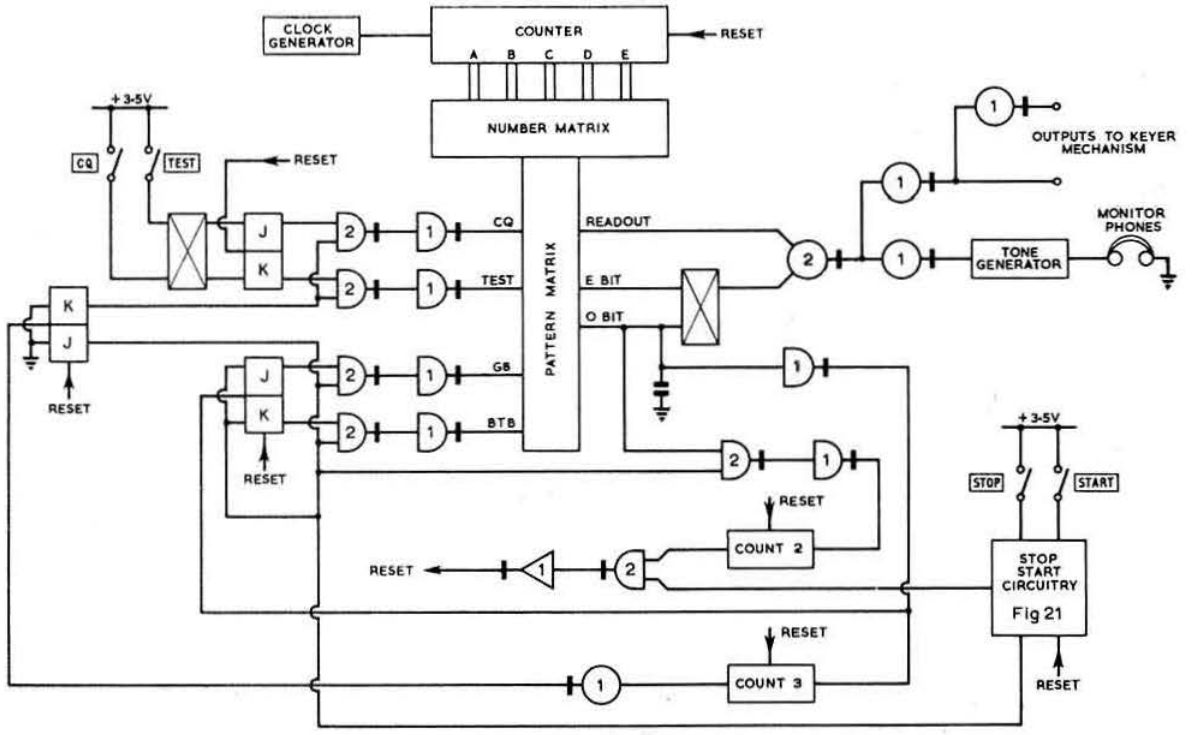


Fig 23. Digital circuit Siame.

Siame is generating G7BTB not G8BTB since the actual call is unimportant and will change with each unit constructed. However in order to avoid temptation Siame was programmed to G7 and not G8.—Editor.

Aerials—Planning and Rating Problems

By ROY STEVENS, G2BVN*

IN 1947 legislation was enacted in order to control and prevent the indiscriminate development of land. This was embodied in the Town and Country Planning Act of that year which was subsequently replaced by an Act of similar title which was placed in the statute book in 1962. The control of development is exercised by the planning authority which is usually the council of a county or county borough. They, in turn may delegate their powers to a local authority. Overriding control is in the hands of the Ministry of Housing and Local Government.

Considering the number of aerial installations which exist in the UK solely for the pursuit of amateur radio the number of cases where planning permission problems have arisen is relatively small. However, when an authority takes action under the Act the effect on an individual amateur could be that he is deprived of a vital part of his communication system. It is essential therefore that a member wishing to pursue his hobby should be aware of the legislation as it might affect him and that there should be available, if required, a source of specialist advice.

For a number of years the Society has dealt with enquiries on this subject and many copies of the guidance leaflet have been distributed. In addition, the Society has been fortunate enough to have a member, Mr A. H. Yallop, G3SVQ, who has dealt with countless planning queries which demanded knowledge not available at Headquarters. Where planning permission has been refused members have, in a number of cases, lodged appeals. There have been some disappointments but also some notable successes. One that comes readily to mind is the case where Mr J. A. Crux, G3JAG, in spite of considerable opposition, won his appeal against the decision of the Bedworth UDC not to allow the erection of a 60 ft aerial mast.

One of the aspects of planning permission which is felt to be most unsatisfactory is the total lack of consistency in the approach of the many authorities. A countrywide picture of the position is needed before one can appreciate the present position where previous decisions and similar circumstances are disregarded. A member living in Birmingham applied for planning permission for a *Heathkit* tower which was granted provided that the mast was placed a specified distance *from* the house. Another member living in the London area had his appeal allowed provided that the mast was placed *against* the house. From these and many other cases it is impossible to draw any firm guidelines and the initial advice to a member can only be in broad terms.

The Society was well aware of the unsatisfactory position and, after consultation with Mr Yallop, felt that the best approach would be to seek an amendment to existing legislation permitting amateur radio installations to be erected without planning permission being sought provided these installations fell within certain laid down limits. The first step was to take advice of Counsel and a joint opinion of Mr D. P. Kerrigan, QC, and Mr F. Maurice Drake, MA (Oxon), was obtained. In the writer's view it is unwise to try and summarise learned legal opinion and suffice to say that Counsel firmly stated that in their view planning permission was required for most amateur radio aerials and supported the proposed action of the Society in an approach to the Minister of Housing and local Government.

In the preceding paragraphs the events and thoughts leading up to submission of a letter to the Minister have been briefly described. One cannot attempt to set down the many hours of meetings and consultation (and expense) necessary to bring the matter to this stage. At the invitation of the Society Mr Yallop prepared a letter for submission to the Minister. After consideration by the Council of the Society this letter was sent on 15 April 1969. A copy was also sent to Mr G. D. Wallace, MP, who had offered to make a direct personal approach to the Minister.

The letter to the Minister was as follows:

The principal object of this Society is to further interest in Amateur Radio. The present membership of the Society totals 15,000 of whom 8,000 are licensed to transmit and receive messages by wireless telegraphy under the Wireless Telegraphy Act, 1949 within those frequency bands which are allocated for use by amateurs.

The majority of amateurs pursue the hobby of amateur radio from their homes. In order that they may do this it is necessary for them to have a proper aerial system. The aerial systems used vary in size and height above the ground according to the frequencies at which it is desired to transmit and receive radio signals. The higher the aerial then, generally speaking, the more efficient it becomes. In general it can be said that most aerials for amateur use are supported by masts between 20 to 40 feet in height above the ground. The aerials themselves vary between a single length of wire of from 60 to 150 feet in length stretched between two or more masts and a dipole aerial similar to but smaller than domestic television receiving aerials.

As a result of large numbers of cases being referred by members to the Society where Planning Permission for the erection of aerial masts in the gardens of members' homes have been refused, usually on the grounds that the erection of the masts would be prejudicial to the visual amenities, the opinion of Leading and Junior Counsel was taken as to whether or not Planning Permission was in fact required under the Town and Country Planning Acts. Counsel has advised that an aerial of similar size to a domestic television aerial would not require Planning Permission on the grounds that such an aerial does not materially affect the external appearance of a

* Chairman, GPO Liaison Committee.

building (Section 12 of the Town and Country Planning Act, 1962) a result which, Counsel suggest, can probably only be justified because domestic television aerials have become the rule rather than the exception for the vast majority of dwelling-houses, Counsel advise that a radio aerial other than such requires Planning Permission.

Whilst it is conceded that aerial masts above a certain height and aerial arrays beyond a certain size might well be injurious to the visual amenities of a residential area, in general aerials used by amateurs are limited in height and size by practical considerations regulated by cost and size of gardens. From cases which have come to the notice of the Society, it appears that the attitude of Planning Authorities towards the applications in question varies considerably which may be in consequence of the comparative novelty of the applications or an assumption that the development involved is of greater effect than is in fact the case. The result is that if the individual concerned wishes to take the matter further then he must appeal to you, the cost of which may far outweigh that of the aerial itself, quite apart from the time occupied by your Ministry, your Inspectors and Local Planning Officials in dealing with the appeals.

It is considered by the Society that it would be in the public interest if an amendment was made to the Town and Country Planning General Development Order 1963 so as to permit the erection of aerial masts within curtilage of a dwelling house within the following limitations:

1. *The height not to exceed 35 feet above ground. Any aerial mast not to have a base area of more than nine square feet tapering to not more than one square foot at the top.*
2. *Any aerial attached to a mast to consist of a wire not exceeding 0.08 ins in diameter, or, in the case of an aerial consisting of rigid elements shall comprise elements not exceeding 28 feet in length.*
3. *The distance between the outer parallel elements shall not exceed 15 feet.*

Diagrams are enclosed showing typical aerial arrays suitable for amateur use which will come within the limits suggested above.

We should be happy to attend a meeting with you to discuss this matter if you think it would be helpful.

The reply from the Rt. Hon. Anthony Greenwood, PC,MP was dated 5 May 1969 and is reproduced below:

Thank you for your letter of 15 April about planning permission for the erection of aerial masts for amateur radio transmission and reception.

I appreciate your Society's concern for the interests of members and should not wish to discourage their activities in any way.

The information you have given in your letter is most interesting and I would not disagree generally with Counsel's views as to the circumstances in which planning permission would not be required for an aerial. However, I do not think I can accept your proposal that a general permission should be granted, by an amendment of the General Development Order for the erection of masts, even within the limits you suggest. The kinds of development which the Order permits within the curtilages of dwelling houses are regarded as associated with normal residential occupation. Radio masts—and I have looked at the typical installation illustrated on the diagram you sent me—are comparatively rare and not the sort of thing one would normally expect to find or which could be accepted without question in a residential area. Furthermore the height of the installation may not be the only consideration; its situation could be equally important.

I, therefore, feel that the local planning authorities should continue to have the opportunity to consider each individual proposal on its own merits. I should recommend your members to give the fullest possible information about their proposals when applying for planning permission.

Members will note that the Minister has rejected the Society's proposals but the letter contains several pertinent comments which should be noted. In particular it is stressed that before purchasing aerials and aerial masts members should consider the question of whether it is necessary to obtain planning consent bearing in mind what has already been said. If it is likely that permission is required then full information should be given in the application form as to the height, the type of aerial to be used, the design of the mast and diagrams, and, if possible, photographs of the installation.

RATING

Whilst the work in connection with planning matters was in hand it was brought to the notice of the Society that two cases had occurred where the local authorities concerned had issued notices of increased rateable value due to the existence of aerial installations for amateur radio use. Due to energetic and prompt action on the part of the members concerned both the increased demands were denied. However, these cases might have been the forerunners of many others and the Society felt bound to take action to protect the interests of its members. (Here it may be noted that *all* radio amateurs would obtain the benefit of the Society's work).

The first step was to submit a brief and obtain the opinion of learned Counsel on the points involved. This was done and an Opinion was obtained from the Hon. D. M. Trustram Eve, an authority in this particular field. Whilst this was being done a further case where increased rates had been demanded was reported. Using the argument which had already proved successful this case too was denied.

In the light of the Opinion from Counsel a letter for submission to the Treasury (the ultimate authority in rating and valuation matters) was drafted by Mr A. H. Yallop. After consideration by Council this letter was sent to the Rt. Hon. Roy Jenkins, PC, MP on 15 April, 1969. The text reads as follows:

The principal object of this Society is to further interest in Amateur Radio. The present membership of the Society totals 15,000 who are all licensed under the Wireless Telegraphy Act to participate in the activities of the amateur service which is governed by the international regulation.

The majority of amateurs pursue the hobby of amateur radio from their homes. In order that they may do this it is necessary for them to have a proper aerial system. These systems vary in size and height above the ground according to the frequencies at which it is desired to transmit and receive radio signals. The higher the aerial then, generally speaking the more efficient it becomes. In general it can be said that most aerials for amateur use are supported by masts between 20 to 40 feet in height above the ground. The aerials themselves vary between a single length of wire of from 60 to 150 feet in length stretched between two or more masts and a dipole similar to but smaller than domestic television receiving aerials mounted on a single mast. The masts may consist of wooden or metal poles or may be of girder construction.

A number of cases have come to the notice of the Society, where local Valuation Officers have proposed an increase in the rateable value of a house because the owner or occupier has erected a small aerial mast. In one case the proposal was to increase the rateable value by £19, where the mast was only 32 feet high with a base 3 feet square tapering to one foot square at the top and was of metal lattice construction. Notice of the Appeal was given, as a result of which the District Valuer and Valuation Officer withdrew the proposal.

In another case the proposal was made to increase the rateable value of £75 by £5 and on appeal this was reduced to £3.

There are probably many cases of a similar kind which have not come to the notice of the Society and it is felt that the attempt to increase the rateable value of a dwelling house because of the pursuit of a hobby is unfair. It is conceded that the Commissioners of Inland Revenue might argue that since the rateable value of a property is ascertained by reference to the rent which could be charged if the property were let upon certain terms and that if an aerial mast is erected it is reasonable to suppose that a higher rent could be obtained. It is respectfully suggested that such an argument is fallacious, since there are many hobbies pursued in one's home which require an expenditure of money upon improvements and installations, for example, gardening, where it could be said that the letting value and hence the rateable value has been enhanced. The amenity value conferred by an aerial mast is of a purely temporary nature and would not be reflected in the rental value of a property.

Where proposals are made for the increase in the rateable value of a house, because an aerial mast as previously described has been erected, the expense of contesting a proposal has to be borne by the owner or occupier concerned which if the appeal is unsuccessful adds a further burden to the individual. The Society accordingly asks if you would consider the issuing of a direction to the Commissioners of Inland Revenue that where an aerial mast is erected solely for the pursuit of the hobby of amateur radio no proposal for an increase in rateable value should be made.

The reply from the Treasury was dated 14 May 1969 and read:

The Chancellor of the Exchequer has seen your letter of 15 April and has asked me to reply.

Whether the presence of a radio aerial system adds to the letting value of a property will depend on the circumstances of each case, but the Chancellor asks me to assure you that the Valuation Officers' approach will be exactly the same where they find improvements or installations used in pursuit of other hobbies or for recreational purposes. Where for example green-houses, aviaries, pigeon lofts, kennels or tennis courts enhance the rateable value of a property, it is also likely that they will be taken into account in the rating assessment.

There may be some difference of opinion about the amount of the increase in the rateable value attributed to the installation of an aerial but this may be contested before the Local Valuation Court and thence, if necessary, before the Lands Tribunal. There is no need for a ratepayer to be involved in expenses at the stage of an appeal to the Local Valuation Court because no fees are involved, nor are costs awarded: although of course, if he chooses to be professionally represented, he will have to meet the cost of that representation.

The Chancellor is sorry, therefore, but he is unable to agree that the members of your society should be given special treatment for rating purposes.

It is interesting to compare the text of the replies from the Ministry of Housing and Local Government and the Treasury. It might be inferred from these that one authority considers amateur radio to be an asset whilst the other considers it a liability.

In the meantime Mr G. D. Wallace, MP had tabled a question for answer in the House of Commons, and the text of the question and answer is as follows:

MR GEORGE WALLACE: *To ask Mr Chancellor of the Exchequer, if he will issue a direction to the Commissioners of Inland Revenue that where an aerial mast is erected solely for the pursuit of the hobby of amateur radio no proposal for an increase in rateable value should be made.*

MR TAVERNE: *No. The basis on which a dwelling house is assessed for rates is the rent at which the property might be expected to let in the open market. Where the installation of an aerial mast is likely to affect the rent which a hypothetical tenant would be prepared to offer for the property, it is only fair that this should be reflected in the rateable value.*

In view of the apparent discrepancy in the contents of the two letters already referred to Mr Wallace wrote to the Treasury on 23 May enclosing a copy of the letter of 5 May 1969 from the Rt. Hon. Anthony Greenwood. A reply dated 27 June 1969 read:

You wrote to me on the 23rd May enclosing this copy of Anthony Greenwood's letter to Mr Swinnerton of the Radio Society about aerial masts for amateur radio.

I don't think there is any difference of opinion between Departments here. It is understandable that the proposal to erect such a mast in a residential area might be viewed with some concern by the Planning Authorities because of its possible effect on the amenities of the neighbourhood. But if an occupier could overcome that concern, get planning permission and put up the mast, there clearly must be some likelihood that if the house were offered to let on the open market the aerial, by making the house particularly attractive to radio enthusiasts, would increase its rental value.

Whether it would in fact do so and, if it did, whether the increase would justify any increase in the rating assessment must in each case be a matter for determination in the light of particular facts of the case. But I am sure that Mr Swinnerton's members will find that Valuation Officers will not be unreasonable about this.

Again it is dangerous to attempt to summarise the salient points of the various letters but it appears that if a radio amateur erects a permanent aerial installation as an adjunct to his residence and is determined to sell the latter to no one other than another radio amateur then possibly a case exists for an increased rateable value. In any other circumstances it would seem that there is no case to answer. A portable aerial installation would be removed by the vendor of the property and any person than a radio amateur might well consider that an aerial installation occupied valuable garden space and was therefore a liability which would detract from the letting value of the house.

It is hoped that the foregoing sets down briefly and clearly the work that has been undertaken by the Society, with invaluable cooperation from Mr G. D. Wallace, MP, and Mr A. H. Yallop, LL.B., in two matters which could affect any member or radio amateur. In many cases work of this nature continues with the knowledge of its progress restricted to the Council and Committees of the Society and to such members who request advice. In the present instance the issues are of universal importance which justifies the space taken in the columns of *Radio Communication*.

1969 Eclipse Radio Reception Survey

ONCE again radio listeners, especially those in Europe and Africa, are encouraged to participate in a study of eclipse effects on shortwave transmissions. All listeners who satisfactorily complete the required monitoring and send their reports to me before 1 November, 1969 will be awarded a new and different special verification card for their efforts.

Each listener should select one of the four sets of frequencies listed below according to the first letter of their *last* name. Each frequency in the group should be surveyed during the 20.00–22.45 GMT time period between 7 September and 9 September, 1969. The station and frequency of those suggested which gives the best overall reception quality should then be selected for monitoring during the above time period (20.00–22.45 GMT) on three additional days—10, 11 and 12 September, 1969. If none of the frequencies in the initial group gives good reception, a different set may be selected from the table until a suitable one is found. To qualify for the special QSL, separate reports should be filled out for each day, numbered 1, 2, and 3 and mailed together to the address given below. (An International Reply Coupon should be enclosed for those who desire airmail delivery of their card.) In addition to listener's name and address, date, kind of time used, frequency and station, receiver and antenna used, each report should contain a list of times and signal strength estimates on SINFO scale (5 = strongest to 0 = weakest) or s-meter readings for each minute during the 20.00–22.45 time period. No programme details need to be entered on the report, but comments concerning sudden changes in reception quality would be helpful. Those who have the necessary equipment can submit calibrated chart records for each date instead of the list of times and signal strength estimates.

Suggested frequencies for 11 September, 1969 Annular Solar Eclipse. Standardization monitoring should be done on 10 and 12 September, 1969. Time period for all days should be 20.00–22.45 GMT.

First Letter of Last Name	Freq (kHz)	Station
A to F	15330	AFRTS
	15430	AFRTS
	15395	VOA
	15440	WNYW
G to M	15220	R. Nederland (Bonaire)
	15325	HCJB (shift to 15110 at 22.00 GMT)
	11835	4VEH (Haiti)
	9505	HISD (Dom. Rep.)
N to S	21525	WNYW
	17835	WNYW
	11920	AFRTS
	11720	CBC
T to Z	21690	Windward IBS (Shift to 15110 at 21.30 GMT)
	17880	HCJB (Shift to 17890 at 22.00 GMT)
	9770	4VEH (Haiti)
	6090	HISD (Dom. Rep.)

Reports should be sent to: David D. Meisel, Leander McCormick Observatory, PO Box 3818, Charlottesville, Virginia 22903, USA.

QSL Corner

By A. O. MILNE, G2MI*

WE noted in the July issue, the list of calls for which VE3DLC acts as QSL Manager. He is only one of many. Pity the poor National QSL Manager—trying to remember who is who's QSL Manager?

When handling thousands of cards daily, it is quite impossible to remember all this information. To check every card against an index would slow the job down to an unacceptable degree. In future, therefore, unless cards are clearly marked " via W2———," or similar, they will be sent to the national bureau of the amateur concerned. " QSL Managers " will have to collect from there. If you want cards quickly then send direct. G2MI/VP9 was asked by a number of contacts, " Who is your QSL Manager? " Answer given: G2MI!

We have quite a job trying to decipher handwriting. We have a great deal of trouble trying to tell U from V and U from W. Even D and O are a problem sometimes. Please write clearly.

A big headache is the outsize card. One received today is 10 in by 8 in on super-gloss paper which cracks when folded. A word, in particular to special events stations who are apt to use large cards, often provided by the organizations for whom the GB station is set up: *the maximum manageable size is 6 in by 4½ in.*

We are very grateful to the many members who sort their cards but please do not interleave them or separately envelope them. Above all, please do not reverse each prefix so that the cards are upside down with reference to those which precede them and those which follow. This is guaranteed to drive the sorter right up the wall.

Very few GB stations tell the Bureau who is handling their cards. Fortunately, the GPO very kindly advises us when these calls are issued and who is the licensee. Unless instructions to the contrary are given, cards are sent to this individual, through his Sub-Manager.

If you do not want your cards from the Bureau—this, of course, applies to anyone—will you please be kind enough to drop a post card to your Sub-Manager and tell him so. This saves the kind-hearted soul from hoarding unwanted cards. If you **do** want them, please do not wait for a reminder card before collecting them and please send more than one envelope.

G3RYV who has handled the section G3UAA to VZZ with considerable efficiency for nearly five years has had to give up due to pressure of business. The new Sub-Manager is David Dell, G3PQE, of 6 Rye Close, Cove, Farnborough, Hants.

Why not make up your mind who the card is for and then put the same call-sign on both sides? You'd be surprised how many people write, say, G2MI on one side and G3MI on the other. Please do not send QSL cards to your Sub-Manager. Envelopes may go to him but cards **must** go to G2MI.

* 29 Kechill Gardens, Bromley, Kent.

TECHNICAL TOPICS

By PAT HAWKER, G3VA

OVER the years, many thousands of words have been written throughout the world attempting to assess the differences between the various modes of modulation such as am, ssb, dsb and nbfm in terms of communications effectiveness. But, as anyone who looks at all closely into this subject soon discovers, it is extremely difficult to arrive at any simple definitive or quantitive answers. Remember how much furious debate used to concentrate on that "9 dB" advantage of ssb over am?—yet all amateur experience suggests that the advantage can in practice be appreciably greater than this disputed figure though this does not mean that ssb is always the correct choice.

Assessing Communication Modes

In fact, it is not much good trying to arrive at a "figure of merit" unless you also take fully into account two factors that are often disregarded: (1) the form of demodulation used in the receiver; and (2) performance under conditions of random interference as well as in clear channels. A comprehensive article which reviews the importance of these variables and manages to come up with at least some illuminating answers appears in the June 1969 issue of *EBU Review—Part A, Technical* by R. P. Haviland (*General Electric* of USA). This article—"A comparative study of communications using different modulation-demodulation techniques"—examines the effectiveness of am, nbfm, ssb (with carrier), ssb (suppressed carrier) and dsb (suppressed carrier) for each of six different demodulation techniques. These are: envelope detection; slope detection (this is actually normal fm discriminators and not the "slope" demodulation of fm with envelope detectors); product detection; select product (product detector with sideband selection); lock-loop (product form of demodulation using phase-lock loop); Fig 1(*a*); bi-aural demodulation (a lock-loop, synchronous demodulator with independent presentation and selection of usb, lsb and permitting bi-aural presentation of double sideband signals) Fig 1(*b*).

The performance is also examined in the presence of interference from stations using the same mode of modulation (the author admits that it would be valuable to extend this analysis to mixed modes of modulation). He covers cases where the interfering signal is on exactly the same frequency (channel) and also—as normally arises in amateur radio—where stations operate on frequencies spread randomly through the channels. In considering random interference the author points out: "Overall, ssb gives an improvement of more than 13dB over am . . . this has been recognized by the amateurs, who have virtually abandoned the use of am in the bands under consideration."

There are several valuable conclusions that arise from this article, some of which may be noted by examination of Table I. One, which has been hinted at several times before in *TT*, is that the most effective of these particular systems, *provided that a complex bi-aural demodulator is used* is not ssb but dsb, which can show a clear 6dB advantage over

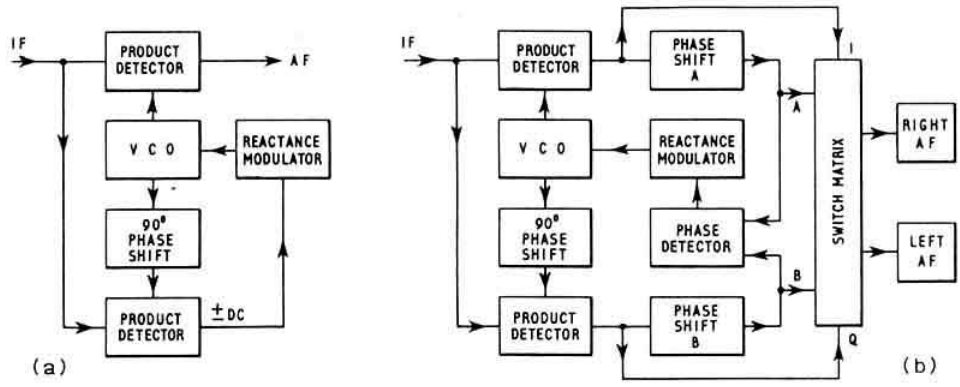


Fig 1. (a) block diagram of phase-lock loop synchronous demodulator; (b) bi-aural demodulator. Matrix switch positions; am/dsb right AF I, left AF I; USB both A + B; both sidebands right A + B, left A − B; LSB both A − B; FM both Q.

TABLE I
Relative Communication Effectiveness for Speech (decibels) with random interference (same mode)

Mode	Envelope	Slope	Product	Select Product	Lock-Loop	Bi-aural
AM	—3·2	—	—6·2	—3·2	—3·2	2·8
NBFM	—20·4	—7·4	—10·4	—7·4	—7·4	—1·4
SSB	—	—	10	10	7	10
DSB	—	—	7	10	10	16

(After Haviland)

any other system in such an analysis. Another is that (even under hf conditions of interference) nbfm can show up reasonably well *provided that one gets away from " slope " demodulation using an envelope detector.* The envelope detector for nbfm is some 13dB lower than with an fm discriminator or with a phase-lock loop (a form of fm detection which is already arousing interest among some amateurs). The value of bi-aural demodulation shows up well in this analysis for all modes. For uhf or microwaves, pulse-code-modulation (pcm) would show an edge on any of the modes covered here.

Weiss FM Discriminator

The preceding note indicates that nbfm with a discriminator or phase-lock loop demodulator in the receiver can give much improved results compared with the off-tuning on an envelope detector. One problem with most of the conventional fm discriminators is the need for centre-tapped if transformers or tertiary windings. A form of discriminator without posing these problems is the Weiss discriminator circuit. This has been used fairly widely in commercial two-way communications equipment but never seems to have attracted much attention from amateurs, though it has turned up occasionally in overseas journals.

The most recent example is an article in *Radio-REF* (July, 1969) by J. Rossaert, F9JR, who points out the value of this circuit and gives full details of a limiter/discriminator arrangement he has been using with an if of about 1 MHz to provide " a simple and efficient discriminator for nbfm ": see Fig 2.

Simple Zener Noise Calibrator

A wideband generator capable of providing a noise reference signal at a level that remains nearly constant, regardless of precise current flow is clearly a device which could provide operators with a most useful means of checking whether or not their receivers are maintaining sensitivity, or for comparing the sensitivity of different conveters or receivers. What appears to be an extremely simple noise generator technique, has been used by BBC Research in connection with a new vhf/uhf field strength measuring receiver. It is also used in the *Omega-T* noise bridge in a rather different application.

The receiver which displays field strength measurements directly on a digital read-out in decibels above one microvolt per metre has been described in detail in *BBC Research Report* 1969/15, but the basic principles of the noise calibrator were disclosed earlier by D. E. Susans in *Electronics Letters* (1967, 3, 8, pp 354–5), with a further note in the same journal a few months later (1968, 4, 4, pp 72–3).

To quote from the original note: " A simple noise generator based on a Zener diode, and suitable for use in the frequency range 30–900 MHz provides a very convenient noise signal for calibration or for checking the noise performance of sensitive vhf and uhf receivers. It has the merit of being simple and cheap to construct, and has good long-term stability and consistent noise output, as confirmed by its successful use in receivers for field measurements in the vhf and uhf broadcasting bands."

In the past, stable noise sources have had low output and limited life. It was found, however, that some semiconductor diodes, when working in the avalanche region of their characteristic, produce wideband noise of which the output per unit of bandwidth is constant over a very wide range of frequencies. While practical noise sources have concentrated on zener diodes of above 8-volt working voltage, it has been found that all types of silicon and gallium-arsenide diodes with a breakdown voltage exceeding about 6-volts generate high levels of noise in the reverse-breakdown region; however, germanium diodes do not appear to exhibit this property.

Although even higher noise levels can be produced below about 20 MHz, at these frequencies the noise is very dependent on the current passing through the diodes. Very stable noise outputs can be obtained from zener diodes, though if

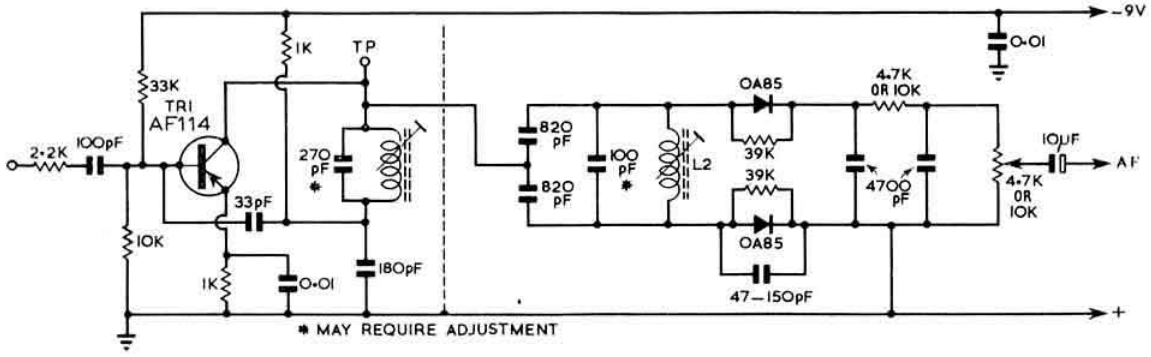


Fig 2. F9JR's Weiss discriminator. For i.f. of about 1 MHz L1 465 µH, L2 820 µH. TR1 can be AF114, OC44, AFZ112.

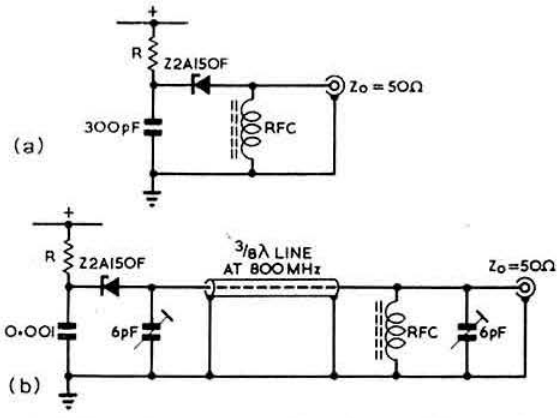


Fig 3. (a) Simple form of zener noise reference. R to give diode current of about 8 mA from ht line; (b) modified version giving extended uhf range.

noise in the uhf region is required, it is advisable to use a low-capacitance diode in order to simplify matching to the output feeder. Several experimental units, and the rather more complex arrangement including a wideband amplifier stage incorporated in the final receiver, have been described. For amateur applications, even the simplest form might well prove suitable.

As shown in Fig 3(*a*), this consisted of a 15-volt Z2A150F low-capacitance diode, and the entire unit was built into an rf coaxial connector. No matching to the output load is used, and noise output, due to capacitance effects, fall slightly with rising frequency; from about 32dB above thermal noise at frequencies below 100 MHz to 29dB at 400 MHz and 22dB at 900 MHz. Noise output, as a function of diode current, shows a broad maximum at about 6 mA current, dropping only about 0·5dB for a 20 per cent change in maximum current; there is also a slight fall off with increasing temperature. This would probably be quite suitable for many applications, but output stability can be further improved by providing impedance matching at the upper frequency limit. The arrangement of Fig 3(*b*) is claimed to provide output to within plus/minus 1dB between 30 and 500 MHz. In the final version, a 1N542A zener is operated in reverse breakdown with a current of about 8 mA, followed by BFY90 wideband amplifier.

If the unit were built in a screened enclosure, and a simple switched attenuator connected in the output lead, this could form the basis of a most useful receiver checker. Where only a low voltage supply is available, diodes such as the Z2A100F can be used on 13-volt supplies, requiring a current of about 20 mA. The interesting *Omega-T* bridge was reviewed by G2BVN in the October 1968 issue.

Diode T/R ("Duplexer") Switch

It seems quite a time since any new T/R switch circuits have been noted: that is until a useful-looking six-diode arrangement by R. Van Sickle was found in the " Ideas for Design " feature of *Electronic Design* (July 5, 1969): Fig 4. This is claimed to be suitable for use in the range 10 to 50 MHz (though we can see no reason why it should not be effective also at lower frequencies); an alternative arrangement, in which $\frac{1}{4}$ and $\frac{1}{2}$-wave line sections replace the lumped component resonant circuits is also reported to have proved satisfactory at about 300 MHz. No indication is given by the designer of the power limitation. An advantage of this form of T/R switch is that it requires only relatively inexpensive components and needs no external bias supplies or switching signals. The use of resonant circuits, however, does make band-changing a little more difficult than with some of the broadband systems. Insertion loss is claimed as less than 1dB in both transmit and receive modes. The transmitter-to-receiver isolation is given as better than 26dB for a 30-volt peak signal; where additional isolation is needed a second cascaded switch can be designed to take advantage of the lower signal level following the first switch. The device is based on the familiar limiting properties of back-to-back diode pairs.

In the transmit mode, all diodes conduct, while C1/L1 form a parallel resonant circuit blocking off the receiver from the transmitter. On receive, the low level aerial signals do not reach diode conduction potential so that CR1A/CR1B block the path to the transmitter; C1 is prevented by CR2A/CR2B from forming a parallel tuned trap with L1; whereas L1/C2 now form a series tuned resonant path to

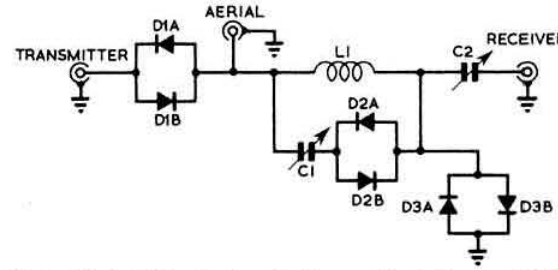


Fig 4. Diode T/R switch or duplexer. All diodes are 2N916. For 30 MHz L1 4 turns, No 18, $\frac{3}{4}$-in diameter, C1 and C2 200 pF.

allow the incoming signals to go to the receiver. The component values given are for use at about 30 MHz.

With so many diodes conducting during transmission, it seems likely that some care needs to be taken to ensure that any additional harmonic generation is prevented from reaching the aerial. In other words the switching unit should be within the transmitter enclosure or otherwise totally screened with a low pass filter in the connection from switch to aerial. With silicon diodes, the risk of additional cross modulation or spuriae on receive should be almost negligible.

More on the improved Super-regen

One of the qualities which one must admire in American and Japanese amateurs is the speed with which they react to any new ideas, and begin adapting them for use in practical equipments. One of the latest examples of this quickness off the mark of the Japanese can be found in the " improved " super-regen circuit to reduce radiation and hang-over which was announced by Bell Laboratories and which first appeared in *Ham Radio* (November, 1968). This circuit, which was given in *TT* last April (unfortunately without our spotting the omission of a capacitor needed to prevent short-circuiting the power supply) has already been reprinted from *Ham Radio* in around one dozen journals throughout the world.

Jim Fisk, W1DTY, editor of *Ham Radio*, has kindly drawn our attention to a full-length article by JA1BHG which appeared in *CQ-ham radio* as early as last May, complete

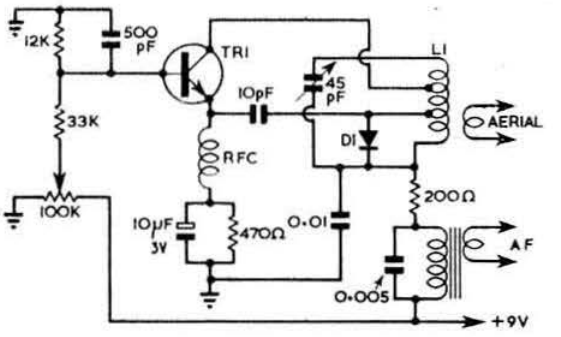


Fig 5. JA1BHG's version of the improved super-regen for 50 or 144 MHz. As an indication of tapping points, on 50 MHz L1 is given as 7 turns with collector tapping 2½ turns in, and diode tapped across ½ turn, RFC 10 μH and TR1 2SC372. For 144 MHz L1 has 4 turns with taps 1½ and ½ turns, RFC 20 turns, TR1 2SC387.

with full details of practical designs for 50 and 144 MHz operation, representing a pretty remarkable " reaction " time. I am not going to pretend that I can gather much detail from the four pages of Japanese text, but Fig 5 provides component values for these two bands, plus tapping points for the coils.

Nobody would expect a simple unit of this type to provide the performance of a low-noise receiver; nevertheless it should find a number of applications, particularly in view of the reduced " radiation " compared with the more conventional super-regen circuit. Another point that is often overlooked is that the super-regen functions as effectively on fm as on am signals.

Variable Voltage Power Unit

John Roscoe, GM4QK, has noticed the variable voltage power unit to a design by K0HVK which appears in *Amateur Radio Techniques* (page 115 from *TT*, February, 1961) and which uses (or abuses) two triode-connected 1619 valves as rectifiers in conjunction with a diode bias rectifier. He points out: (1) a " self-bias " arrangement is much simpler; although it has a long " tail " and results in higher minimum volts this may not matter in practice. (2) if you can get hold of them, a pair of 2A3 triodes will work nicely on a 5-volt winding of the transformer, leaving the 6·3-volt winding otherwise disengaged.

He stresses that there is nothing new about the variable voltage self-bias system (Fig 6). which has appeared elsewhere including *SWM* about 20 years ago. He has long used a pair of 2A3s to provide an HRO power supply since this

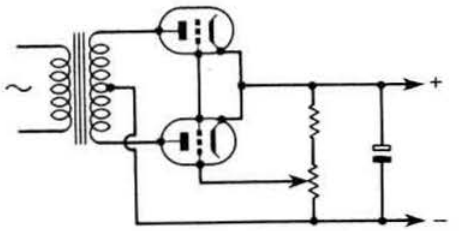


Fig 6. Self-biasing triode voltage-variable rectifier. Resistor values chosen to avoid valves running into grid current so causing volts to drop.

allows the volts to be " wound up or down " until the receiver exactly fits its calibration curve. GM4QK mentions one problem with this type of unit is that an ht line derived from it cannot readily be stabilized since this results in " oscillation." He adds that it is worth remembering that for a given current output, the *lower* the output voltage, the *higher* the dissipation in the triode rectifiers.

Transistor Clipper

The use of back-to-back diodes or diode strings for signal clipping is well known, but an unusual variation of this technique has been suggested in *RCA Technical Note* No 732. This is a transistor clipper in which a single string of diodes is used in conjunction with a complementary pair of n-p-n/p-n-p transistors: see Fig. 7. Presumably for lowest level clipping one could use the transistors, adding diodes to increase the clipping levels. The input signal is applied across terminal A, with terminal B connected to earth or to a suitable reference potential. Although only one diode string

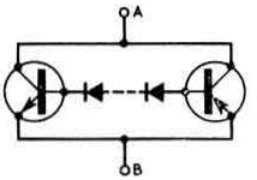


Fig 7. Symmetrical clipper based on complementary pair of transistors.

is used this system provides a good symmetry of clipping with a total difference which cannot exceed the possible tolerances in transistor junction voltages.

Unijunction Transistors

A form of semiconductor device which has so far received little mention in *TT* but which is now often advertised as available at reasonable cost is the unijunction transistor (UJT). Basically, the unijunction transistor—at one time this was often called a " double-base diode "—is a three-terminal switching device comprising an aluminium contact wire alloyed to a bar of n-type semiconductor with ohmic contacts to the bar at each end. In practice these devices are often used for triggering thryristors or to form simple relaxation oscillators (much as a neon bulb can be used at higher voltages).

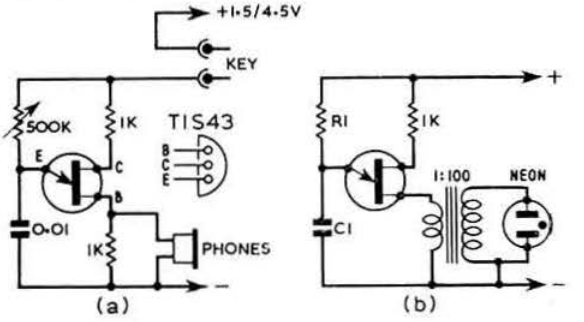


Fig 8. Relaxation oscillators using unijunction transistors: (a) Morse or side-tone oscillator; (b) Lamp " indicator " for battery equipment, R_1/C_1 determine duty cycle.

One useful application is as a simple oscillator for Morse practice or to form a side-tone oscillator to monitor sending. Fig. 8(*a*) shows a circuit of this type taken from *DL-QTC* (December, 1968). This specified a TIS43 unijunction transistor, but in practice is it is felt that almost any of the available UJRs would work in this type of circuit.

A rather more novel application has been suggested by Les Toth (*Electronics Design*, May 10, 1969); this is to form a " power-on " indication for battery-operated equipment. For such units, a conventional " pilot light " takes about a watt from the battery, often as much or more than the unit itself: yet a visual indicator is a useful reminder to switch the equipment off when not in use (Fig 8(*b*)). In this application, the UJT relaxation oscillator has an output stepped up by a low-cost 1 : 100 audio transformer to provide an ht source for a miniature neon bulb of the NE2 type, or any of the many similar neons. For lowest battery consumption, the oscillator frequency and duty cycle can be made low to provide a flashing light.

Extended Aperture Aerials

In *TT* (December, 1968), we included a note reminding readers of the neglected but potentially important " stretched " (capacitance-loaded) dipoles that were originally described by Dud Charman, G6CJ, in the *RSGB Bulletin* of July 1961. At least one reader wrote in to say he hoped to put up a stretched dipole for 7 MHz this year.

Recently we came across further information on a commercial application suggesting amateur uses of this type of element stretching; this was a description by TCI (Technology for Communications International of California) of what they term their " extended aperture principle " but which basically seems to depend upon capacitive loaded elements. The TCI array uses a series of these stretched elements to form vertical log-periodic arrangements which they claim " outperform rhombics." Certainly from the information given, the use of these broadband, low-Q elements in this type of array, although of course adding greatly to the height of the support(s), seems to offer substantial benefits. One of the problems of the log periodic type of frequency-independent array is that, at any given frequency, only a limited number of the total elements are active: by increasing the bandwidth of each element, more elements are active at a given frequency. It is also claimed that impedance matching is improved and the characteristics become less sensitive to the effects of wind or other distortion of the elements.

Linear Amplifiers using Colour TV Valves

To the recent notes (*TT*, July) on linear amplifiers using colour television line output valves, Bob Wilkinson, G3VVT adds that the PL505 used in the ON5JI design has been superseded by the PL509 which is readily available from local dealers in the UK at around 35 shillings plus purchase tax.

Ray Scaife, G3RSB has discovered that Thorn Radio Valves and Tubes—given in *TT* in 1965 as a source of Sylvania line output valves—now only accepts orders for minimum quantities of 100. These valves, however, can usually be obtained through Dale Electronics, 109 Jermyn Street, London SW1. This firm recently quoted £3 4s 6d and 8 weeks delivery for both 6JE6A and 6JE6C/6LQ6: the 6JE6B has been superseded by the 6JE6C which is claimed to have improved radiation cooling.

Square-Law Resistors for Front-ends

The problems of developing hf receivers having front-end dynamic ranges of better than 100dB have been underlined many times. One of the very few semiconductor techniques capable of this type of performance is the parametric up converter (*TT*, April 1968 or *Amateur Radio Techniques*, pages 66–68). But this technique, as Walter Schreuer pointed out, poses many problems for amateurs. Such a front-end requires large pump powers to reach acceptable linearity; furthermore they are not suitable for high-ratio down conversion.

Two recent articles by Dr J. G. Gardiner (*The Radio & Electronic Engineer*, May and June, 1969) have indicated that a new device, still under development, appears to offer considerable promise for high performance front-ends. This is the square law resistor or space-charge-limited diode of which some experimental prototypes have been developed by Dr G. T. Wright at the University of Birmingham. These diodes have an *I-V* characteristic following an extremely accurate square-law over a wide range of forward bias voltages. The importance of square-law characteristics for mixers are stressed in all articles concerning field effect devices. Dr Gardiner suggests that these SCL diodes could be used very effectively in balanced mixers to achieve very low cross-modulation and intermodulation; resulting in significantly better performance than can be achieved with ring switching diode mixers under identical operating conditions; furthermore only a few milliwatts of oscillator drive power would be necessary. High-performance receivers seem possible if these diodes can be fully developed.

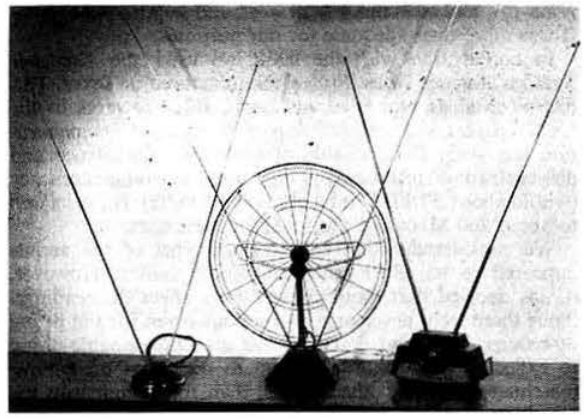
Here and There

In my notes on the vhf aspects of " chordal hop " (*TT*, June) a slip of the pen had me referring to layers and clouds of ionised particles in the troposphere. Martin Hall of RSRS, whose work in this field was noted at the time, chides me about this: the layers and clouds are boundaries between regions of differing dielectric constant!

We understand that Paul Sollum, G3BGL (also mentioned in the June item) has been continuing his valuable " aircraft flutter " work securing even more positive identification of individual aircraft out to ranges of 25 to 100 km. His recent work has included the use of very narrow bandwidths (few Hz) with the receiver swept over ±280 Hz to provide spectrum analysis. Individual aircraft reflections come up on a long persistence crt according to their doppler shifts. G3BGL has also developed a novel technique for *tape recording* signal strengths instead of using pen recording. He uses ssb equipment (filter, carrier crystal oscillator etc) to give an audio heterodyne whose amplitude fades in the same way as the original carrier. The audio note at about 3 kHz is taped and can be replayed slow speed or at original speed for oscilloscope examination of the spectrum or fading waveform: it can also be replayed via a crystal detector into a pen recorder. These techniques sound as though they might well have interest to other amateurs—and we suggest that anyone seriously attracted by such ideas would not be wasting their time by arranging with Paul Sollum a visit to the G3BGL shack at Douai Abbey (telephone 0735 21 3163).

An Investigation into Table-Top Television Aerials

By MAURICE MARGOLIS, G3NMR*



IN Great Britain, television interference has come to be an accepted inevitability for most radio amateurs. There are few who have not suffered the strained confrontations with angry neighbours, the embarrassing visitors from the GPO and those unpleasant treks into " enemy " homes.

With television moving up to the ultra high frequencies shortly, tvi may start to recede in importance to us. Nevertheless, it is an unfortunate fact that it rates high on most operators minds when they are active in the evenings. While this article will not suggest any miracle cures for interference, it will illuminate one aspect of the problem. Tvi is a very great problem, nationwide.

A total of fourteen years operation by two licensees, G3NMR and G3UML, at this location has produced its fair share of tvi complaints. Most of this operation has been using the legal limit on single sideband together with high gain rotary aerials in a crowded London suburb. Practically every aspect of tvi has been flushed into the open during investigations. The transmitting installation has always been kept technically beyond reproach. This is not difficult as long as the transmitter is run well within its limits and the aerial feed system is correctly matched, balanced and filtered to suit the aerial being used.

It is rarely that a case of tvi has proved insoluable when the aerial installation at the television receiver has been suitably adjusted. The cases that have posed constant difficulties are those where the aerial used has been an indoor type (not loft type), colloquially known as " rabbits-ears." These are bought by the public as BBC-1, ITA and sometimes BBC-2 aerials in good faith and most people are unimpressed when told that they are inefficient. The amateur knows that it is a waste of time trying to cure interference on these aerials, whilst the complainant sees the amateur as merely trying to wriggle out of responsibility.

When the Trades Descriptions Act came into being last November, it became an offence to advertise a product as something that it was not. Simply, untruthful advertising became illegal. Thus it appeared that if, in fact, an aerial sold as a BBC-1 aerial was resonant somewhere else then an offence might be committed under the new Act.

Look at this from our own point of view. If you purchase a ten metre beam, you obviously expect the aerial to be resonant and correctly matched at 28 MHz. If it resonates at 43 MHz with an impedance of 95 ohms, you have a right to complain and possibly take legal action. Thus, if a member of the public buys what is sold as a 45 MHz aerial, he should be justifiably annoyed if this aerial was resonant somewhere else. The fact that the beam purchaser would realize the error whereas the television owner would know no better is immaterial.

Common sense indicated that few of these table-top aerials could be resonant at Band 1 frequencies. The purpose of this investigation was to prove this and to determine where, electrically, these things made sense. While not reducing tvi or placating irate neighbours, this will provide a firm technical viewpoint for the amateur to battle from when faced with a " rabbit-ears " aerial.

Resonant Aerials

There would be no problem in filling the rest of this magazine with a lengthy and thoroughly boring discussion of the whys and wherefores of resonance. No one fully understands this phenomenon which occurs whenever a wave-motion happens. It is just one of the many laws of nature that happen to show up in basic radio theory. For our purposes, may we say that an aerial system is resonant at a certain frequency when it produces a low impedance at its feedpoint to energy applied at that frequency. Certainly, since all television receivers are supposedly designed for 75 ohm aerials, a television aerial is only worthy of the name if it can fulfil these conditions.

Frequencies

These tests were done in London, on aerials bought in London to receive London transmitters (Crystal Palace and Croydon). However, they are relevant anywhere as will be evident from the results. Our BBC-1 frequencies are 41·5 and 45 MHz, while ITA use 191·25 and 194·75 MHz. No tests were done for BBC-2 aerials since equipment was not available and tvi is far less common on these frequencies.

Equipment

A receiver covering the vhf spectrum with considerable accuracy was required for these tests. We are greatly indebted to Mr Richard Carroll, Managing Director of Eddystone Ltd, for the unsolicited loan of a superb *Eddystone* 990R receiver. This is a high quality professional unit covering from 27 to 240 MHz in four switched ranges. It is designed for exacting

* 95 Collinwood Garden, Clayhall, Ilford, Essex.

point-to-point and commercial work and sells for some £350. It was more than adequate for our purposes.

In conjunction with the 990R we used the *Omega-T Systems Antenna Noise Bridge*, manufactured in Texas. This has received an extensive and congratulatory press in the United States and a review appeared in *Radio Communication* last year. It is capable of measuring impedance and demonstrating resonance with quite startling accuracy (within about 50 kHz and 2 ohms at 50 MHz). It works well to about 200 MHz and was ideal for these tests.

We considered fitting baluns since most of the aerials appeared to be of the balanced dipole variety. However, it was decided that these might falsely affect the readings. Since there were never any instructions given for the fitting of baluns, it seemed that this was an unreasonable thing to expect a non-technical person to do. Thus no baluns, matching devices or filters, other than those built into the television receivers, were used.

Aerials Tested

It was our original intention to check every indoor aerial made in the country but the magnitude and expense of this task dictated otherwise. Eventually we limited ourselves to eight of the more popular models by reputable manufacturers and decided to ignore market-stall type junk. With these we have fair cross-section of the market. The aerials were obtained *Which* style, anonymously from ordinary sources.

Objects

Briefly paraphrased, these were to determine the resonant frequencies of indoor aerials sold as BBC-1 and ITA aerials and to see how they conformed with recent legislation. The details below are self-explanatory but generally each aerial acted properly on the ITA frequencies and not one came anywhere near sanity on BBC-1. Reception of the latter station, of course, provides most of the trouble experienced by amateurs.

Results

These are presented as physical descriptions of each aerial together with the findings in each case.

* * * * *

Panorama TT4

This comprises two elements as a centre-fed dipole fixed to an oblong weighted plastic base. Each leg is adjustable through 90 degrees and directly connected to a length of low quality coaxial cable. Each element can be varied in length from 15 to 27½ in by a telescopic section. These sections did not make good electrical contact with the inner parts and they appeared to be capacitively coupled when extended. The TT4 is sold to cover BBC-1 and ITA. When fully extended it resonated at 182·5 MHz and when retracted there was no change although the impedance rose from 10 to 50 ohms.

Vantenna Super

This also comprises two elements as a centre-fed dipole fixed to a plastic base with both elements variable through 90 degrees. Each leg is coupled to coax through a 470 pF capacitor, to isolate the aerial from the set in the event of a mains fault. Many of the aerials use these capacitors and it seems to us that any attempts to resonate the aerials are done before the capacitors are inserted. These, of course, alter the electrical length of the aerial. It is considered a sensible safety precaution to use the isolating capacitors but they obviously must be compensated for. The elements on this aerial can be altered between 22½ and 43½ in. The " Super " is sold to cover BBC-1, ITA and FM radio. It measured 215 MHz at 50 ohms extended and 226 MHz at 5 ohms when retracted.

Wolsey Topper

This is a half dome weighted plastic base, again with the elements in the dipole configuration but at a fixed angle. The outer braid of the coax feedline is connected directly to one element while the inner conductor is fed via a parallel tuned circuit comprising a 470 pF capacitor and ten turns of 14 swg wire on a ⅜ in diameter slug tuned former. The two elements are 16 in long and they are not adjustable. This aerial is sold to cover bands 1, 2 and 3, ie BBC-1, ITA and FM radio (just about). This specimen resonated at 202·5 MHz with 30 ohms impedance.

Vantenna

This is identical to the Vantenna Super except that the elements are shortened to a range of 12 to 22½ in. This measured 195 MHz at 5 ohms extended and 200 MHz at 80 ohms retracted. It is sold to cover BBC-1, ITA and FM radio.

Antiference STR/3

This again uses the dipole system with the 470 pF capacitors in series with each element. The elements are adjustable through 90 degrees on a lightweight plastic base. The dimensions are exactly as the *Vantenna*. The STR/3 is sold to cover BBC-1, ITA and FM radio. It measured 192 MHz at 5 ohms extended and 197 MHz at 90 ohms retracted. The STR/3 was very accurate for ITA but well off resonance at the other frequencies.

Telerection

This uses the familiar centre-fed dipole technique on a circular weighted plastic base, with the elements connected through 1000 pF capacitors to a good quality coax. Each element is 15 in retracted and 29 in extended and the elements are each adjustable through 90 degrees. No sales description is available. The *Telerection* measured 200 MHz at 100 ohms extended and 210 MHz at 100 ohms retracted.

Belling Lee Metropolitan

The *Belling Lee Metropolitan* is an unusual case. It is the only one of all the aerials we tested that makes a real attempt to put itself on to the right frequencies. In doing so, it invites disaster in an obscure way.

The *Metropolitan* has a plastic control box with two elements that vary between 7½ and 43 in. These can be adjusted through about 45 degrees. A big control on the front of the box turns a twelve-position switch whose rotor makes contact with a printed circuit board in the box. The outer braid is coupled through a 680 pF capacitor to one leg of the dipole. The inner conductor is soldered to one extreme contact of the printed circuit board. The twelve switched positions bring various combinations of series connected coils ending in another 680 pF capacitor into circuit.

The capacitor is connected to the remaining leg of the dipole. There are six air spaced coils of six turns each, ⅜ in outside diameter and wound with about 18 swg wire. Three more coils of similar wire and diameter have 2½ turns each and there are two horseshoe shaped coils actually integral with the circuit board.

As expected, several resonances were found due to the number of combinations of length and inductance that are available. The highest frequency stretched the 990R to its limit at 240 MHz and the impedance was above 100 ohms, the highest that the noise bridge can measure. It was possible to find a satisfactory resonance at the ITA channel with about 50 ohms impedance. Unhappily, we could not make the *Metropolitan* resonate below about 130 MHz.

The trouble with this aerial was that it has a beautiful resonance right in the middle of the 2m amateur band! This was on position D on the tested model with the elements fully extended. This means that anyone using the *Metropolitan* automatically has a two metre tuned circuit in the front end of his television. We hate to think what would happen if one of these was used near a two metre transmitter. On the other hand, the aerial loaded well on a two metre transmitter with a 1·5 : 1 swr, so it could produce a tolerable indoor 2m aerial for a flat-bound amateur!

This is far and away the best engineered of all the aerials. If it was properly brought down to the BBC-1 frequency and a little more care was taken to avoid odd resonances (this is probably susceptible to aircraft and taxis) it would be a useful aerial.

Telerection Double Top All Band

This device is worth including if only for the disbelief it inspired in the experimenters. Physically, it nearly defies description. The whole contraption is fixed on to a large plastic base. The rear section is, logically enough, a dipole of the usual type. It measures between 15⅜ and 29¼ in. It is directly connected to the coax feeder and adjustable over 90 degrees. Just ⅜ in in front of this is a circular wire frame that bears an uncanny resemblance to the wire grid used to divide the scoring sections on a dartboard. The frame is not electrically connected to anything. It just clips on to the plastic base. It is called a reflector.

On the other side of the reflector there is a 6 in long hinged coaxial rod with a big plastic ball on its top, supporting a folded dipole of BBC-2 dimensions. The dipole, for uhf, is made of a thick tube. The position of this contraption can be adjusted, like an aircraft joystick, to move it nearer to or further from the circular screen.

If, in fact, the dartboard is meant to form a reflector, then presumably the aerial has to be rotated when channels are changed since it reflects each of the aerials in different directions. (Unless one lives directly between Croydon and Crystal Palace, of course. Norwood residents take a bow). The *Double Top* (some pun on the dartboard here?) resonates at 208 MHz at 30 ohms extended and 219 MHz at 20 ohms when retracted. Removing the dartboard made no difference.

Of course, all this is screamingly funny except that non-technical people will pay money for such an aerial and then wonder why their reception also includes a local amateur. It is all very well smiling at the naivety of those who use such a device but please do not forget that we could be made to look quite as stupid on some unfamiliar esoteric topic.

* * * * *

Conclusions

Generally, ugh. Not one of the aerials tested came even remotely close to resonance on Band 1, although most of them were quite near the mark on Band 3. None of those claiming fm characteristics had such qualities either. They are promoted as being BBC-1 aerials when in fact they are no more effective than a piece of wire. Apart from testing the aerials at their extreme positions, we moved them around in all possible directions to get some sensible results but with no success in any case. It is quite obvious that sometimes any chrome plated brass is called an aerial at any frequency the manufacturer cares to name.

It mystifies the writer why the manufacturers cannot produce an indoor aerial that is genuinely resonant at the television station frequencies. Some form of trap loaded dipole, such as we use in tri-band beams, would seem to be a simple, high-Q and relatively inexpensive method. It could be make to look quite as attractive as present " designs," using the host of plastic, fibre-glass and other synthetic materials available for encapsulation. No doubt engineers could think up plenty of other systems that really work if they wanted to bother. Meanwhile, it seems that some positive action by the amateurs may be necessary to produce results.

Finale

As a postscript, it might be of interest to outline the case that actually triggered these investigations.

New occupiers of the house adjacent to ours had a rental set installed. There had never been a television in the house before and so the rental company left them with an indoor aerial that gave a moderate picture some nine miles from the transmitter. When we came on the air, we annihilated their reception.

They were extremely co-operative and they allowed me to install a television aerial system to my standards and requirements, the only request being that the cost be kept as low as possible. For BBC-1, a *J-Beams* Q Beam was installed and on ITA a regular four element yagi was fixed and aligned in the loft, well away from water-tanks and other debris. These were fed into a *Belling-Lee* Diplexer which was fed with a high quality semi-air-spaced coaxial cable made by *Aerialite*. On a separate feedline a six element yagi for BBC-2 was connected. The result was a complete elimination of all interference, even when we used the maximum legal output on 20m with an 8dB gain aerial pointed directly at the television aerials from about 80 ft away.

Did you know that photo-transistors can be made by grinding off the top of a silicon transistor and so allowing light to get to the base region? Clip off or leave the base lead unused; choose a silicon unit with high current gain and largest possible f_T, preferably planar passivated construction. Carefully open the top of the transistor container either by grinding or by cutting with a small pipe cutter, avoiding any metal fragments falling on the chip.

REGULAR FEATURE

THE MONTH ON THE AIR

By JOHN ALLAWAY, G3FKM*

THE strict attitude currently being adopted by the ARRL DXCC Committee towards each and every amateur who finds himself in a position to operate from any location outside his home country is already beginning to have unhappy repercussions. Present action by the Committee revolves around the basic assumption that all such individuals are suspect until they supply that body with " evidence " that they are not. Many amateur radio operators quite justifiably resent this attitude and the writer feels that there is urgent need for some alterations in the present procedure before the already battered image of the world's most popular DX award is damaged beyond repair. One instance of resentment at the ARRL attitude has been demonstrated by the case of André Saunders, 5Z4KL, a well-known officer of the Radio Society of East Africa. He recently found himself on official business in connection with the East African Safari Rally at a point inside Uganda. During his stay he managed to find time to make a few contacts as 5Z4KL/5X5. Having duly submitted a copy of his licence to operate in Uganda to ARRL, Mr Saunders was then asked to obtain written proof that he was, in fact, where he says he was. This he has quite reasonably and justifiably refused to do, although a large number of people (including the Chief Commissioner of Police) would be able to supply the information requested. The unfortunate outcome is that 5Z4KL/5X5 QSLs will not be accepted for DXCC credit, and a further visit to Uganda, which was to have taken place in late August purely with amateur radio in mind has been cancelled. It is fair to request proof of correct licences having been obtained by expeditioners, but surely they should only be required to undergo humiliating cross examination when there is reasonable suspicion that they are not being truthful. In a letter to your scribe Maurice Caplan, VS6AA, states that he has no intention whatever of attempting to prove that he was in Brunei during his recent VS5MC operation which took place during his holiday in that country. The writer feels that this is perhaps the correct attitude to adopt and commends it to other expeditioners.

The Final Plenary Meeting at the Triennial Conference of the Region 1 Division IARU which took place in Brussels in May accepted a recommendation that the portions of the 80m band between 3500 and 3510 kHz and between 3790 and 3800 kHz shall be used exclusively for inter-continental contacts. This should make long distance working on 80m much more interesting if stations in the region (Europe and Africa) will kindly co-operate.

Readers will be sorry to learn that Stew Perry, W1BB, is in hospital following the death of his wife, and would no doubt wish to add their messages of sympathy to that of the writer, at the same time wishing Stew a rapid recovery.

Top Band News

A very good idea has been put forward by GM2HCZ to help those who are searching for some of the resident stations in rarer counties. He suggests that a " wanted counties night " be held once a month and that on this occasion stations in rare locations be tempted to make as many short contacts as possible in the time available to help those who need their county. It is suggested that this special activity could take place on or around 1820 kHz between 18.00 and 23.00 GMT on the first Sunday of each month and readers are invited to comment on the suitability or otherwise of these arrangements.

Chas, G3XTL, reports that the recent operation by GM3SIG/A and GM3TXL/P from Angus and Kincardine was most successful both on this band and on 20m. The correct QTH for cards for GM3SIG/A and G3SIG is not in the 1969 *Call Book* and they should be sent via G3XTL who is the club's QSL manager (see *QTH Corner*). A repeat visit is planned for next winter. This expedition also gave a number of 20m county hunters new ones, and your scribe has received a request from G3VNR on behalf of overseas county chasers that such expeditions spend some of their time on the hf bands. Anyone intending to visit Fermanagh, Banff, Berwick, Bute, Clackmannan, E. Lothian, Kinross, Kircudbright, Nairn, Peebles, Roxburgh, Selkirk, W. Lothian, Wigtown, Cardigan, Merioneth, Montgomery, or Radnor is requested to get in touch with G3VNR (Steve Delahunt, 25 Dartmouth Av., Newcastle, Staffs.) as he is anxious to arrange skeds for US stations with these counties.

News from Overseas

In a letter to your scribe, Bernard Randell, XE1RV (ex-G3ALE), says that he would be pleased to arrange skeds with anyone wishing to work him on five bands for the new DXCC award. He says that he is not primarily a DX chaser, but has a 3 element 10m beam, a Mosley tri-band dipole for 10, 15, and 20, and a doublet for 40m which he can load against ground for use on 80m. His best times for getting on the air are around 06.00 daily and between 14.30 and 16.00 on Sundays and his SB100 transceiver is used both on cw and ssb. Bernard points out the line voltmeter in the picture of himself and says that it is an essential part of the station equipment due to the frequent falling off in the mains voltage in Mexico.

* 10 Knightlow Road, Birmingham 17. Closing date for the October issue is 2 September, for the November issue—15 October, and for the December issue—12 November.

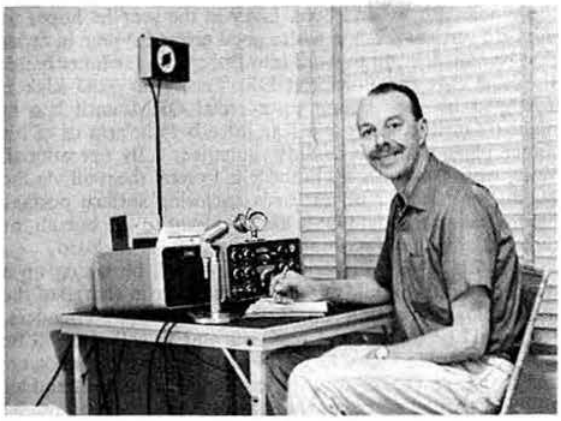
During his visit to Brunei VS6AA made 1500 contacts in 94 different countries which was a very fine effort since the VS5MC operation was only secondary to a holiday. The equipment used consisted of a KWM2A and 51S-1, the property of VS5MH. Maurice hopes to be active on 40m and 80m this winter, mainly on cw but he will use ssb on request. Another item of news is that the Royal Signals ARS intends to organize a DXpedition during 1970 to celebrate the 50th anniversary of the formation of the Royal Corps of Signals. No details are yet available, but it is expected that some of the rarer Commonwealth countries may be visited.

Alan Hemming, ZD9BE, has now returned from Tristan da Cunha, and says that ZD9BE will no longer be a valid call. He says that there are now only two ZD9 calls—ZD9BM and ZD9BN who are on Tristan and Gough Is respectively.

Desmond Yong, who will be remembered by many of the older generation as VP3YG and more recently as 8R1Y, is now in the USA, and signing 8R1Y/W4. He is using a Drake TR3 transceiver and a 14AVQ vertical antenna on the roof of his house, with an inverted vee for the lf bands. Cards for 8R1Y, 8R1Y/W4, and VP3YG should be sent to the address in *QTH Corner*.

The entire VS5 amateur population in conference during VS6AAs holiday visit to Brunei. Left to right: Erich, 5PH, Slim, 5TJ; Mike, 5MH and Maurice 5MC (VS6AA).

Latest news from YJ8JM is that he has been managing to work a few Europeans but is still having great difficulty in his attempts to get into the UK. He has a sked with LA7RF every Sunday on 14,040 kHz at 08.00 and this has only failed twice during a three month period—on both occasions resulting from mains failures! John uses a home built transmitter which is crystal controlled and has a QQV06-40 in the final, and his antenna is a G5RV. The receiving set up consists of an Eddystone 840C with an Electroniques front end feeding into it. It is suggested that UK stations may pay special attention to 14,040 kHz between 06.30 and 10.00. John asks those sending him QSLs (especially the US stations) not to send an sae as the high humidity in that part of the world nearly always results in the flaps becoming stuck down before he receives them, however an addressed slip which can be gummed to an envelope which he is happy to supply would be much appreciated. Two or three IRCs are a must as postage is extremely expensive.



XE1RV, Mexico City, Bernard (G3ALE) is active on 3.5-28 MHz cw and ssb.

Peter Dalton, K2RBT/6, is a keen 80m DX enthusiast whose signals were worked from the UK by a number of stations last winter. He says that several G stations were heard on 80m in Alaska early this year and that there are a number of stations in both Alaska and Hawaii who have the necessary interest, power, and antenna to make contacts with Europe next winter. There has been a substantial increase in activity all over the Pacific and Pete believes that all these areas can work Europe from 06.00 onwards between November and February. A very kind offer is made to make schedules for British stations wishing to attempt Europe/Pacific 80m contacts and those interested are invited to write to Peter Dalton, PO Box 432, Sunnyvale, Calif 94088, USA.

9V1PD will be leaving Singapore in the very near future and returning to his GM3MFE call. Requests for QSL cards after September should be sent (with sae please) to the address in *QTH Corner*.

VQ8CR reports a move to the northern end of the island of Mauritius which should enable him to erect his quad and

G2FUU (left) with VP2AL and (right) VP2AW whose station he operated during his recent visit to Antigua.

the dipoles for 40 and 80m. Later in the year he hopes to put up a vertical antenna with a good ground system in order that he may attempt to work into Europe on the latter band. It seems that the European DX " net " on 3795 kHz is swamped by very strong commercial QRM until late at night (Mauritius time) and Ray intends to inform us of his future plans when he has his equipment fully operational. With regard to QSLs his practice is to send them all via the bureau unless he receives cards enclosing surface postage before the appropriate QSL has been sent to the bureau, or direct at any time if more than surface rate is enclosed.

Roy, ZL2ANX (formerly G3KXA), will be taking up a new post in the middle of October as officer in charge of the meteorological station on Raoul Is in the Kermadecs. He should be there about one year and his call-sign will be ZL1AAT/K. He hopes to be active on all five hf bands cw and ssb with a Viceroy transmitter, Drake 2B receiver and an all-band ground plane antenna. If his kit arrives in time he will also have an SB101 transceiver. It is intended to put up some long wire directional aerials towards the UK as Roy wishes to work as many G stations as possible and intends to be very active. There is only one mail delivery a year, so ZL2AFZ will act as QSL manager. Frequencies to be used will probably be 3505, 7005, 14,050, 21,050, and 28,050 kHz cw, sideband frequencies to be announced later. Good signals from Europe are heard on 80m in New Zealand especially during October and February, and 40m is a very good DX band in ZL but rather frustrating as Europeans are heard calling CQ DX and then working each other! Roy wishes to send his regards to G3BA, G3EDD, G3FAN, G3NEO, and all his other old friends and may be reached at 50 Le Mata Rd, Havelock North, New Zealand, until 6 October.

Contests

The **VK-ZL Oceania DX Contest** 1969
10.00 4 October to 10.00 5 October (phone)
10.00 11 October to 10.00 12 October (cw)
All bands 3·5 to 28 MHz

Stations exchange RS(T) plus three figure QSO number, starting from 001. Contacts with VK/ZL stations count 2 points, with other Oceania stations 1 point. (Oceania stations working VK/ZL count 2 points, the rest of the world 1 point.) The final score is derived by multiplying total QSO points by the sum of VK/ZL call areas worked on all bands—the same call area worked on different bands counts as a separate multiplier. Logs must show: date, time, call-sign of station worked, band, number sent, number received, points claimed. Underline each new VK/ZL call area contacted and use a separate log for each band. A summary sheet should be enclosed showing call-sign, name and address in block letters, details of equipment used, and for each band the number of QSO points and multipliers claimed. Entries may be single or all band. A declaration that all rules and regulations were observed should also accompany the entry which should be posted to reach the Contest Manager, NZART, Box 489, Wellington, New Zealand, no later than 23 January, 1970. This year's contest is part of New Zealand's Bi-Centenary Celebrations and attractive multi-colour certificates will be awarded to the top scorers in each country, and to all entrants showing a minimum operating time. A silver shield and NZART badge mounted on a polished wooden base will be awarded to: (1) top scorer in each continent, (2) top world score on each band (both phone and cw in each case), (3) top club entry from N. America and from Europe (in this case an entry must be made in *both* phone *and* cw sections and logs must give the club's name). Listeners may participate and should log VK/ZL stations. Their logs should show date, time, station heard, station being worked, RS(T) of station heard, serial number sent by that station, band, points claimed. In this case the phone and cw sections are together and the final score is the total of the two sections, otherwise scoring is the same as for transmitting entrants.

The **9th World-Wide RTTY DX Medallion Sweepstakes**
02.00 4 October to 02.00 6 October
3·5 to 28 MHz RTTY only

Exchanges consist of message number, time, zone, country, continent. QSOs with stations in one's own zone count 2 points, with others counting according to sponsors exchange points table. It is necessary to use standard CARTG log sheets and it is suggested that intending participants request a copy of the rules and fuller details when writing for them to: CARTG, 85 Fifeshire Rd, Willowdale, Ont, Canada.

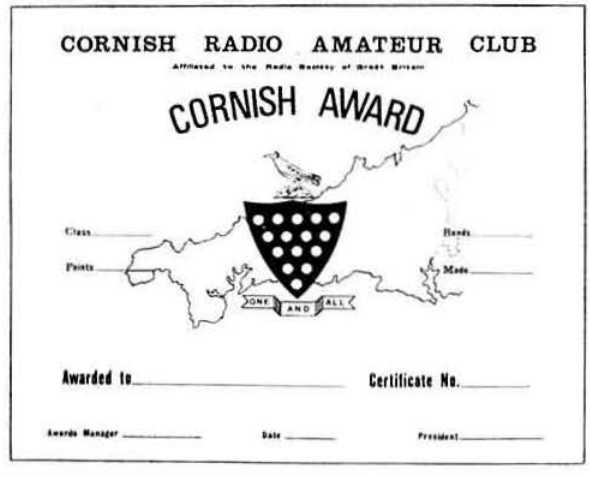
The **VU/4S7 DX Contest**
06.00 6 September to 06.00 7 September (phone)
06.00 20 September to 06.00 21 September (cw)
All bands, no cross band operation permitted

Exchange RS(T) plus serial QSO number starting from 001. QSOs with VU/4S7 count 2 points, with other stations 1 point. This is the first time that stations other than VUs or 4S7s have counted for credit in this event. ARRL countries and W, JA, SM, UA, VK and ZL call areas will count as multipliers. Certificates will be issued to top scorers on single and all bands in each country. Send summary sheet with log and signed declaration that rules have been observed with name and QTH in block letters to: Radio Society of Ceylon, Contest Committee, PO Box 907, Colombo, Ceylon. (Deadline 15 October.)

A reminder that the **CQ WW DX Contests** will be taking place during the weekends of 25/26 October (phone) and 29/30 November (cw). Full rules will appear in October *MOTA*. It is expected that summary forms and log sheets will be available from G3FKM in the near future.

Awards

The **Cornish Award**
Issued by the Cornish Radio Amateur Club



PROPAGATION PREDICTIONS

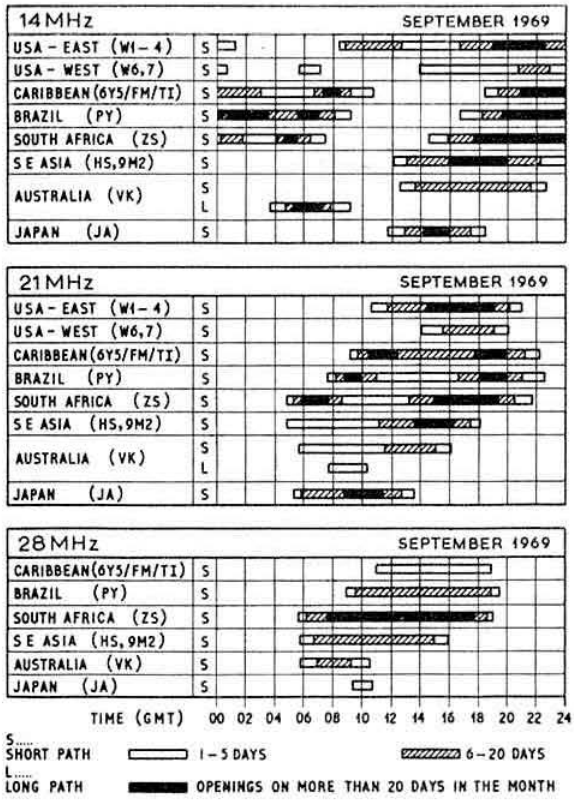
During September the F2 muf's gradually increase again after their relative low period from June to August. For this reason DX conditions on the hf bands (28 and 21 MHz) will improve steadily during the month to reach a maximum at the end of October or beginning of November.

On **28 MHz** an improvement in traffic with South-East Asia and Australia can be expected, compared to the previous month. North America will, however, be heard only under exceptional conditions, for which the chances will be greater the further South one moves in Europe.

Traffic with the Eastern USA in the late afternoon and with Japan in the early evening should be certain on **21 MHz**. In September the season for short skip conditions (for distances up to 2000 km) usually comes to an end.

Because of the longer nights, traffic with North America will experience a slightly worsening condition on **14 MHz**, especially in the second half of the month and during the latter part of the night. South America should be reached easily during this time, as long as North American QRM allows this. DX conditions will improve on **7** and **3·5 MHz** with the approach of winter. As a rule DX traffic is only possible on these bands when the greater part of the path lies in darkness. The daytime transmission distances will increase slowly on these bands. **7 MHz** will be ideal for local and European traffic without the dead zone, as far as commercial stations on this band leave room for the Amateur Service. Interruption of local traffic on 3·5 **MHz** will only occur in the latter half of the night in disturbed conditions.

The provisional mean sunspot number for July 1969 from the Swiss Federal Observatory was 87·9. During the first eleven days of the month there was considerable sunspot activity. The predicted smoothed sunspot numbers for November, December and January 1970 are 90, 88 and 87 respectively.



Europe: Class I 30 points; Class II 20 points; Class III 10 points. Others: Class I 15; Class II 10; Class III 5 points. VHF/UHF 9, 6, and 3 points respectively. Each different Cornish station worked counts 1 point and same station may be worked on each band for further credit. QSLs need not be sent, but must be seen and certified by two licensed amateurs or an official of a national radio society. All K6BX/CHC rules apply and the award is available to listeners. Applications should be sent (with 5s, $1, or 8 IRCs) to Ted Bowden, G2AYQ, Albany House, Goonown, St Agnes, Cornwall. There is no charge to blind/disabled applicants.

The **Diploma Ligura**

Sponsored by the Ligurian Section of ARI and requiring confirmed contacts since 1 July, 1969 as follows: Basic certificate 8 with the province of Genoa, 3 with Imperia, 2 with La Spezia, and 2 with Savona. The second class award requires an additional 4, 2, 1 and 1 QSO respectively, and the third class another 3, 2, 1 and 1 (a total in this case of 30). Contacts may be on any mode. The basic award costs 10 IRCs and the endorsements 5 IRCs each. Anyone working 4 Ligurian RTTY stations in addition to the third class award requirements is awarded the Columbus Medal. Send list of contacts certified by two licensed amateurs to ARI, PO Box 347, Genoa, Italy.

More information has been released concerning the "**WAB**" **Award** (see page 405, June *MOTA*). An equivalent award for listeners has now been introduced—the "**Heard All Britain**" **Award**. The same rules apply as for the transmitting award and the official record book must be used. In order to help listeners, stations logged during WAB contests may be used for credit provided that the station has submitted a check log or entry, otherwise QSLs will be needed. The cost of both the basic WAB and the HAB has been reduced to 7s 6d, $1 or 12 IRCs.

CQ Magazine announce that their **SSB Award** will be discontinued from 1 October. The **SSB Honor Roll** listing will be discontinued on 31 December. Will readers please note that claims for the **WPX Award** are not dealt with by G3FKM—application forms are however available and these should be completed and sent direct to the US. QSL cards must be in the possession of the applicant but do not need to be submitted or checked.

DXpeditions

KA9RC and others hope to operate from the Ogasawara Is (formerly Bonin and Volcano Is) between 21 and 26 September. There will be no 80m activity, but ssb signals

may be expected on 10, 15, and 20m, and a 40m cw frequency of 7015 kHz has been mentioned. Details of a Japanese expedition to the same location, designed to coincide with the All Asian DX Contest, were received too late for inclusion in August *MOTA*. Simultaneous operation on all bands 2 to 160m was promised and the call-sign was expected to be JD1YAB. The possible call-sign of the KA9RC expedition is given as KA1C but in view of the recent return of the area to Japanese sovereignty it is possible that a JD1 call will be used. Marcus Is, which was also KG6 previously, is now known by the Japanese name of Minami Torishima.

It seems that the projected trip to CR8 by VK2BFI announced in last month's *MOTA* will not materialize. According to *DX News Sheet* VK2BFI, who is ex-WA6NFI, had his fare to VK paid last year because he intended to visit Chatham Is. Possible trips to Willis Is and Lord Howe Is have also been mentioned in connection with the same operator. It is understood that the fund for the CR8 trip had reached $200.

A group of NJDXA members will be making a special effort to give contacts to all those who need Warren County, NJ, during an expedition to that rare county during the weekend of 18/19 October. The call-sign to be used will be W2JT/2, and frequencies to be used are given as 3555, 7055, 14,055, 14,255, 21,055, 21,355, 28,055 and 28,555 kHz. QSLs should be sent via W2JT or the W2 QSL bureau.

After considerable confusion lasting for some weeks Gus, W4BPD, returned to Mombasa on 26 July on his way home to the US. The final straw came when the boat which he had hired became shipwrecked, fortunately at a time when Gus was not aboard, but unfortunately with the loss of the captain's life. Plans for visits to Wizard Reef and other Indian Ocean islands have had to be abandoned, but it was Gus's hope to operate from some African countries including Tchad, the Central African Republic, and Upper Volta. It is to be hoped that correct call-signs will be used at any further stops on Gus's itinerary as those used from the VQ9 area are not of the correct form as laid down by ITU.

Bill Conklin, K6KA, together with K6JGS/HK3 and HK3VA are showing interest in a possible trip to Cocos Is (TI9) which they may be able to make next January. A few contacts with this rare place were handed out by TI8NAM/TI9 on 6 and 7 July.

PY7AOA reports planning an expedition to a group of islands or rocks said to be some 350m from Recife and 100m from Fernando de Noronha. This may take place in November and the call-sign may be PY0AOA or PY0AB.

US sources mention the possibility of a visit to Spratly Is by some of the Hong Kong gang this autumn. The nature of the reception expected to be extended to such a party by the inhabitants (if any) is given as the chief difficulty.

DX News

It appears that a new operator has arrived on Midway Is and that KM6BI is on the air again. On arrival he found 1000 unanswered QSL cards and has promised to deal with all these during his 18 month stay on the island. Enquirers should send sae and postage to RMC Robert McCormick, Amateur Radio Station KM6BI, FPO San Francicso, Calif 96614, USA.

Readers will be sorry to hear that all the equipment belonging to Guy, TR8AG, was destroyed by fire resulting from a lightning strike. He hopes to be back on the air early in September with new equipment.

Anyone needing a QSL from VK9TB for a contact since June, 1966 is advised to contact WA8DXA at the address in *QTH Corner*.

An ARRL announcement dated 24 July stated that Ifni has been deleted from the DXCC countries list. In future only contacts made before 13 May, 1969 will count for this country, those since will count as Morocco. There is also a possibility that Zanzibar may be removed from the list in the near future.

Another station cleared for DXCC purposes in Thailand is WB2WYX/HS. He has been reported on 14 MHz ssb between 13.00 and 15.00, He is limited to a dipole at the present time but hopes to have a beam up soon.

Qth Corner

A2CAU	now PO Box 120, Lobatsi, Botswana.
C31BL	via F3KT, Michel Desvilles, 4 Rue de la Terrasse, 87 Limoges, France.
C31BS	via ON5FD, Guy Gillain, 112 Adantstraat, Kraanem, BT, Belgium.
C31CE	via HB9UP, Konrad Hinz, Farnsburgerstr, 47, 4052 Basel, BS, Switzerland.
C31CH	via F9YY, Jean Nold, 33 Blvd. Marechal Joffre, Toulon, Var, France.
C31CI	via HB9SJ, Bruno Ebneter, Wasserhaus 27, 4142 Munchenstn, BS, Switzerland.
C31CM	via F9ET, J. Francois Gaubert, 4 Rue Ch. Lecocq, Gueret, Creuse, France.
CR3KD	via WA4PXP, 612 Ellison Avenue, New Smyrna Beach, Fla, USA.
CT3AO	via CT2AK, Rua Ernesto do Canto 74, Ponta Delgada, S. Miguel, Azores Is.
EA9ER	Tercio de la Legion, El Aiun, Spanish Sahara.
G3XTL	C. H. Barlow, 31 Princess Av. Warsop, Nr Mansfield, Notts.
WB2WYX/HS	Capt. Robert Heron, Central Mail Room, Box 3752, APO San Francisco, Calif 96310, USA.
HS2JR	via DK1RR, Gerhard Berg, Schulstr 8, 5901 Rudersdorf, Germany.
HS3ML	via WB2DST, 94 Sunnyside Av, Pleasantville, NY USA.
JD1YAB	JARL, QSL Bureau, PO Box 377, Central Tokyo, Japan (plus sae and IRCs)
JW8MI	via LA8FI, Gunnar Kvarsnes, Bodo Radio, Bodo, Norway.
KA1C	via WA8NZH, 706 Johnson Avenue, Bedford, Ohio, USA.
KG4AL	US Naval Stn, Box 25, FPO, New York, NY, 09593, USA.
MP4TDA	via G3HSE, D. C. French, 78 Brocklehurst St, London, SE14.
DL7NS/OH0	via DL7MQ, Dieter Surmann, Olberstr 6, 1 Berlin 10, Germany.
TI8NAM/T19	Box 2412, San Jose, Costa Rica.
TJ1AT	PO Box 173, Garoua, Cameroon.
VK9TB	via WA8DXA, 7184 W. 130th St, Cleveland 30, Ohio, USA.
VQ8CU	Box 13562, Tampa, Fla 33611, USA.
VS6BC	via GM3JDR, D. Roberts, 5 Lindsay St, Golspie, Sutherland.
VU2DK	PO Box 104, Poona 1, India.
XT2AA	BP 75, Ougadougou, Upper Volta.
ex-ZD9BE	A. Hemming, Glyn Borthyn, Crugbyar, Llanwrda, Carms.
ZL1AAT/K	via ZL2AFZ, G. C. Studd, 48 Nuffield Av, Napier, New Zealand.
8R1Y/W4	Desmond E. Yong, 4509 Le Moyne Lane, Pensacola, Fla 32505, USA.
9Q5FF	via WA9PCI, 17203 Green Bay Av, Lansing, Ill, USA.
9U5CR	via ON5TO, Omer Timmerman, 8 Oostendse Steenweg, Brugge, Wv., Belgium.
ex-9V1PD	Duncan Aird, c/o 6 Lomond Drive, Bannockburn, Stirlingshire.
9Y4AA	via W6CUF, J. A. Maxwell, Box 473, Redwood Estates, Calif, 95044, USA.

RSGB QSL Bureau, G2MI, Bromley, Kent.

All hope of retrieving the logs of VP8IYs operations from the South Shetland Is which were left behind during the emergency evacuation has now been abandoned. There is still volcanic activity and the base has been permanently abandoned.

A massive expedition to the island of Sint Maarten to put PJ8MM on the air during the CQ WW DX Contest (phone) in October is being organized by the operators of the PJ5MM and PJ0MM contest stations of April and October, 1968 respectively. Both the latter won the world multi-operator multi-transmitter category. Further organization and score analysis leads the team to hope for a score of 10,000 QSOs in the 48 hour period this time! A 40m beam and a loaded 180 ft tower (at sea level) should help to improve the 40 and 80m signals. Competition will be provided by the W3MSK group who will be flexing their muscles from nearby Curacao with their PJ0CC call-sign.

JW1CI, who is located on Bear Island, has been worked on 14 MHz cw and ssb. He expects to be joined by JW3XX in September. Bear Is counts as Svalbard for DXCC, but is separate from that country for the purposes of the WAE Award.

Activity has been reported from Upper Volta in the form of XT2AA. He is said to be ex-TU2CL and to be using a SB101 and a dipole, and likely to be there for about 5 months.

Jim, formerly ZD8Z, is now in Trinidad and has been given the call-sign 9Y4AA. He prefers 3505, 3535, 7005, 14,035, 21,035, and 28,035 kHz cw and 21,280 kHz ssb and is said to be willing to QSY for 5BDXCC chasers. QSLs should be sent via W6CUF as for the previous ZD8Z contacts.

VS6AA reports that Slim, VS5TJ, will be leaving Brunei in October and will be sailing with his wife in a 36 ft yacht from Hong Kong to Darwin. Eric, VS5PH (who is also DJ6PH) will be returning to Germany next year, and Mike, VS5MH, leaves for New Zealand in October. This will leave VS5 with no amateur population.

Those needing a contact with S. Shetland Is may be interested to know that CE9AT keeps a schedule with his QSL manager CE3ZN on 14,185 kHz at 21.15 on Fridays.

JA8KB is reported to be a meteorologist on Minami Toroshima (ex-Marcus Is) and hoping to be on the air soon with the call-sign JD1YAA.

1969 Countries Table

	1·8 MHz	3·5 MHz	7 MHz	14 MHz	21 MHz	28 MHz	Total
G3LNS	—	102	122	174	161	131	690
G3HCT	—	85	73	47	61	111	377
G3JVJ	12	70	24	81	18	2	207
G3UML	—	63	22	101	23	18	227
G3XBY	2	36	37	51	51	43	221
G3TZU	5	31	46	91	118	150	441
G8VG	2	25	26	29	48	44	174
G3WPO	17	10	37	31	1	23	109
G4RS	4	21	10	61	65	21	182
G3IAR	2	23	21	25	23	26	120
G3PQF	6	13	12	30	8	5	74
G3KS	1	17	14	70	61	62	225
G3VPS	3	15	15	61	27	20	141
G3VLM	1	16	18	56	18	32	141
G3VUM	4	4	8	70	51	57	194
G3PEJ	4	3	20	41	45	34	147
G3VJG	—	2	19	9	6	54	90
G3XYP	—	—	37	134	72	63	306
A5390	9	87	69	170	163	104	602
A6148	8	60	55	109	93	79	404
BRS24529	4	55	80	153	94	75	380
BRS31164	4	52	47	127	107	81	418
A5662	18	31	31	127	114	86	407
A6431	9	34	31	92	83	46	295
BRS25429	4	39	39	79	48	30	239
A6337	4	38	25	89	70	35	261
BRS26870	5	36	32	98	75	59	306
BRS27806	6	35	20	67	64	4	236
A5154	2	35	16	103	73	62	291
A6023	4	32	15	67	54	28	200
A6201	—	35	20	48	—	—	103
BRS30694	8	26	30	81	100	52	297
A6923	4	29	14	54	40	27	168
A5466	8	24	27	41	30	37	167
A6254	6	24	15	125	148	80	398
A6003	5	25	24	46	93	61	254
BRS28198	2	27	32	1	—	20	82
A6248	2	20	12	88	46	1	169
A6278	1	16	27	118	67	16	217
A6220	1	16	24	70	15	18	144
A5489	—	18	8	57	55	25	143
A6498	4	14	2	17	8	11	56
A6553	1	13	8	34	73	59	188
A4253	1	13	8	28	25	11	86
A6098	5	9	16	30	—	—	60
A6242	1	8	7	80	58	35	189
BRS31172	1	8	17	54	50	9	139
A6179	1	8	14	45	24	4	96
A6144	—	4	15	62	—	—	81

(This month's table is in order of 1·8 plus 3·5 MHz scores).

Band Reports

The exceptionally fine weather during the past month appears to have been a strong disincentive to spending time on the air but the following stations have been reported by the following enthusiasts who receive your scribe's grateful thanks: G2BW, G2BOZ, GW3AX, G3TZU, G3WNT, G3YOB, BRS2098, BRS26870, A5182 and A6179. Stations listed in italics were on cw, the rest on ssb.

3·5 MHz. 21.00 HV3SJ, VS9MB, 5Z4KL. **22.00** F9RY/FC, JW3ZI, LU2ECU, PY0RE, VP8KO, ZD9BM, ZS6AK, *4U1ITU*, 9H1BQ, 9J2XZ. **23.00** TU2BC, 3V8NC, 9Q5EP.

7 MHz. 03.00 *HB0XVR*. **04.00** *LU3ECO*, *ZL3GQ*. **06.00** CE2SB, HK3BNK, ZL2BCG. **18.00** 9M2DQ. **21.00** *VK2EO*. **23.00** *EL2Y*, MP4TCN. **24.00** *LU6DJX*, VP2KF, 3V8NC.

14 MHz. 03.00 HH9DL. **04.00** *VP1DW*, 5R8AN. **05.00** FO8BV, KG4AA, KH6SV. **06.00** CE1FA, CP5ED, KF7-BSA. **07.00** F0HI/FC/M (G3KFE). *FO8AA*, VP5GC. **09.00** *YJ8JM*. **13.00** JX3DH, 3V8NC. **15.00** HL9UU. **16.00** W3AWU/YB6 (Sumatra. QSL via W3 QSL bureau), 9N1MM. **18.00** HS3AM. **19.00** KG6AAY, *KL7AZJ*, TU2BB, 5H3MA. **21.00** *FM7WF*, *JW2QK*, MP4TCN, TA2SC, 3W8AR (? more information). **22.00** DU1AA, EA9ER, VE8RCS, VP2GLE. **24.00** FY7YQ, 9N1MM.

21 MHz. 10.00 VS9MB. **11.00** XW8CS, 7X0AP. **12.00** KX6s DC, GS, VK9BN. **13.00** VU2DK, 4W1BG, 7Z3AB. **15.00** AP2MR, *FR7ZD*, *KC6CT*, *MP4BFO*, TJ1AJ, 9K2BV, 9V1s PA, PB. **16.00** VK9XI, ZS3LU. **17.00** FM7WD, *HH9DL*, *PJ2VD*, VU2OLK (QSL Box 53, Bangalore), YB0AAE. **18.00** ZS3JJ. **19.00** MP4TCN. **20.00** *CO2BB*. **21.00** *TG4SR*. **22.00** *VK2EO*, VP9s DL, MI.

28 MHz. Mostly short skip but VK6AI heard at 09.00.

Many thanks to all correspondents and especially to the following for permission to reproduce items from their publications: The **DX'ers Magazine** (*W4BPD*), the **Florida DX Report** (*K4GRD*), **CQ DX** (*ARL*), **NARS Newsletter** (*5N2AAF*), **Long Skip** (*VE3HJ*), **QUAX** (*SM4DXL*), **On the Air** (*ON4AD*), the **West Coast DX Bulletin** (*WA6AUD*), **DX'press** (*PA0TO*), **DX News Sheet** (*Geoff Watts*), the **Ex-G Radio Club Bulletin** (*W3HQO*), and the **DX'er** (*K6YGS*).

Please send all correspondence **to reach G3FKM** no later than **15 October** for **November issue**, and **12 November** for **December** issue.

FOUR METRES AND DOWN

By JACK HUM, G5UM*

The A1 Mode

Making a go of cw telegraphy is like driving in London; it's important to keep in practice. And where cw is concerned " keeping in practice " need mean no more than the ability to send and receive good clean Morse at the minimum statutory speed of 12 wpm. Conversely, it can mean clipping along at a speed faster than the other man can write the stuff down, so that he reads it almost as though it were 'phone, making brief notes as the contact proceeds.

It must be admitted that a proportion of amateurs today look on the morse requirement as an irksome necessity. " I mugged up enough to pass the test and then with a sigh forgot it all," as a noted Midlands amateur was once heard to say, in a memorable phrase. In these circumstances, " keeping in practice " is meaningless because there isn't any practice.

Of course this situation comes about through the free exercise of choice by the individual amateur based on his personal inclinations and communication needs. At vhf most of these requirements and needs lean towards the use of telephony simply because the metre wavelengths offer a superb medium for its exercise at great strength, good quality and freedom from unwanted noise.

There exists nevertheless a persistent and growing body of opinion that more cw would enhance the communication capability of the 4m and down wavelengths. There are even those who advocate more telegraphy for medium distance contacts when telephony would be the more usual mode to use, simply for the enjoyment to be had from exercising the skill of sending good Morse.

It is over those greater distances where phone gives out that cw really comes into its own. Every operator who has attempted to resolve weak signals with the bfo in knows that it is am that gives out first, with ssb holding up rather longer, and A1 remaining Readability 5 after even the single sideband has failed.

This situation may be turned to practical account in several ways. One is to have a telegraphy activity night, as a member recently suggested. Very attractive; but it might tend to canalize cw into set periods when what is needed is continuous operation every night of the week.

Sustained nightly operation will do three things. It will encourage others to give a look to the cw segments in the confident anticipation that some one will be there, which can't be said at the moment. Secondly, during the normal propagation conditions that exist for most of the time it will initiate contacts over considerable distances. And thirdly it will offer a better chance of catching fleeting auroral and sporadic-*E* opportunities like those which 1969 has already startlingly provided.

Yes, *but who will be there*? Who will commit himself to be on 4m, 2m or 70cm at guaranteed scheduled times? This is what users of the A1 mode want to know more than anything else. To help things along, " Four Metres and Down " invites cw men to file details of their intended operating times for publication here so that others will know when to look. As for the " where to look," this should always be the cw section at the bottom of the three main communication bands, if only to narrow down the area in which to search for what may be quite weak signals.

If you want to cover a couple of hundred miles on " Two " when the barometer is low and the rain tippling down outside, try the key.

From "B" to "A"

It might be suggested that the foregoing item remains of no more than academic interest to quite 50 per cent of those on vhf today—the Class B men who don't use Morse. But to say this is to deny the current feeling among many Class B licence holders—though by no means all—that their present status is a temporary one, to be accepted in order to gain operating experience while the Morse code speed is being worked up.

Getting into the Class A section of *The Callbook* offers the prospect of enormously extending operating ranges by working those weak signal DX stations to which we refer above. (And of course it confers the privilege of using the 4m band as well.) It seems a pity not to operate one's station to maximum capability just for the want of a few words a minute of Morse speed.

Now, this last sentence, we well know, is going to infuriate those readers who have made a conscientious attempt to reach the statutory 12 words a minute but somehow don't seem quite to be able to get there (in fact, you need 14 wpm under the belt to allow a bit for examination nerves). To those who have tried and so far failed the thought must eventually intrude that perhaps the job is not being tackled in the right way.

Assuming that some or all of the RSGB aids to learning Morse have been enlisted (see " RSGB Publications " page in this journal) there still remains the need for constant and reiterative practice. We in amateur radio can't quite do what the RAF were doing twenty-five years ago—packing a Blackpool ballroom with two or three thousand rookies and pumping Morse into them until they were inoculated with it; but we *can* do at a local level a great deal to inculcate the code.

What is required in each district is a small pool of Class A men to concentrate upon giving Morse practice to any local Class B man who has stated a need for it. This is already

* Houghton-on-the-Hill, Leicester, LE7 9JJ. Send reports for the October issue by 6 September and for the November issue by 13 October.

done by many Clubs and Groups up and down the country, though less frequently at the man's home, where a nightly ninety minute session will work wonders in achieving the magic " twelve per " (and beyond). Given this order of concentration in tuition a month should be enough. As soon as the trainee feels that the code comes to him as second nature then he is as good as through the test.

Long Range on " Four "

At the South Downs listening post of Ron Ham, BRS15744, the monthly programme of scientific study embraces checks on solar activity, the sunspot count, tropo manifestations on that remote and difficult beacon GB3GW (of his 90 observations during July, 67 produced signals), and whether any sporadic-*E* has been in evidence (during July it occurred on thirteen days over a range of frequencies between 30 MHz minimum and 73 MHz maximum).

What has particularly intrigued BRS15744 over the past several weeks is the way the 4m band has been behaving, both in respect of the new Sheffield University beacon and the meteor pings from those Eastern European broadcasting stations to which G3MNQ referred last month in his classic opus. Incidentally, we hear from G3JHM that some of these same broadcasters are using considerably more power than was indicated in our note last month: the one at Bialystok runs 74 KW of fm, for instance. We have it that the presence of fm broadcast transmitters in our 4m band can now be detected from Bulgaria and the USSR as well as from Poland and Czechoslovakia.

Back to Ron Ham: he has just embarked on a 14-day three hour period check on the Polish fm station at Gdansk (70·31 MHz) to observe the characteristics of its signal as influenced by random meteor trails—and as G3MNQ has pointed out, there is a great deal of sporadic meteor activity going on constantly in addition to the more regular showers that get plenty of advance publicity because their habits are known in advance.

Also on 4m, Ron Ham has had GB3SU at RST 579 over a late July period that produced an average of 549 from this new and useful marker.

Many other 4m listeners have lavished praise on GB3SU for the fat signal it is now laying down over much of the UK on 70·695 MHz. This has been most marked since the installation was transferred to the Metallurgy Block of Sheffield University, still a city centre site that bears no comparison with what is intended later. Right now, the aerial is nothing more than a V-dipole at 120 feet above street level.

Something distinctive about the GB3SU keying cycle is the half-second break in the carrier every five seconds. Then every 60 seconds the call letters are transmitted.

Reports, especially from long range, of reception of this beacon will be welcomed by Tony Whitaker, G3RKL, at the University's Department of Electronic and Electrical Engineering, Moppin Street, Sheffield, S1 3JD, or direct to RSGB Headquarters, for the attention of the VHF Manager.

* * *

Following upon last month's big news of the Iceland-to-UK breakthrough on " Four " comes a hint that an opening over an even greater distance but in the other direction may not be beyond the bounds of possibility. From Malta a report has been received at Harrogate by Michael Powell, G3NNO, on the logging of his telegraphy on 26 July during the Pennine VHF Contest by 9H1BL of Paola. The distance is around the 1,500 mile mark.

BEACON STATIONS

Call-sign	Location	Nominal Frequency	Emission	Aerial Direction
GB3ANG	Craigowl Hill, Dundee	145.950 MHz	A1	S
GB3CTC	Redruth, Cornwall	144.13 MHz	A1	NE
GB3GW	Swansea	144.250 MHz	A1	ENE
GB3GM	Thurso	70.305 MHz	A1	N
GB3GEC	W. London	434.000 MHz	F1	N/W
GB3SU	Sheffield (temporary location)	70·695 MHz	A1	Omni
GB3SX	Crowborough, Sussex*	28.185 MHz	A1	E/Omni
GB3SX	Crowborough	70.026 MHz	A1	Omni
GB3VHF	Wrotham, Kent	144.500 MHz	F1	North-West

* Not operational

ZB2VHF is now operational on 50·0092, 70·311 and 145·1298 MHz. Reports to G3JHM.

At the Malta end 9H1BL had a JXK 4m converter into an Eddystone 888A with a 5-element Yagi up at 60 ft. His report to G3NNO was a substantial RST 579. He also heard G3NJN/P near Barrow-in-Furness, G3SLJ/P and a station quoted as " possibly G3MEV " which more probably was that well known 4m worker G3MEH in Surrey.

This is exciting news that deserves to be capped as soon as possible by tidings of an actual two-way over this formidable mountain-barriered path.

About the Varactor

Varactor diodes aren't cheap: but relate the simplicity of the uhf transmitter using one of them to the complexity of the valve approach, and the economics begin to tell. So, under portable conditions, do the lighter weight and greater reliability which are inbuilt characteristics of the varactor approach.

Judging by some of the horrible signals which varactors have been heard to put out, especially during contests, it is clear that there's much to learn about the device in some quarters. And conceding that most of us would like to learn more about them anyway, an offer by G3LWM, Jeff Harris, product manager of Component Services at Thorn Bendix, will be widely welcomed. He can supply free of charge a copy of the Sylvania *Varactor Handbook*, which is a beautifully produced 48-page tech-manual likely to be of great interest to the more advanced worker on the ultra-highs. He will mail one if a 10 × 12 in stamped envelope is sent to him at his place of work, Thorn Bendix Ltd, Great Cambridge Road, Enfield, Middlesex.

Clyde Valley Video

Co-operation between GM6ADR/T of Motherwell and GM6AEG/T of Larkhall has brought about the first " one way contact " between them. Running less than 10 watts input 'ADR has been giving 'AEG S8 vision signals over a distance of about five miles. Signals back from Larkhall to Motherwell are expected when 'AEG completes his vision transmitter, which shouldn't be long.

At GM6ADR/T the 625 line signal is at present positively modulated. When the power increase is effected to 50 watts a change will be made to negative modulation.

So far as they know, these two are the only video stations in Lanarkshire. They believe that in their populous area

there must be many amateur television enthusiasts with whom they have not yet come into contact. Others interested are invited to drop a line to GM6ADR, G. A. Hunter, " The Bungalow," Broomside Braes, Camp Road, Motherwell, Lanarkshire.

And Down Essex Way

Someone else who would like to be put in touch with fellow video enthusiasts is Martin Allard, G3WFC, who has just acquired the additional call-sign of G6AEM/T.

He has a 4CX250B final with 150 watts available, with positive or negative control grid modulation by a fully transistorized modulator.

Video sources are a home-built transistorized 1 in separate mesh vidicon camera, and a separate flying spot scanner for slides and captions. It is also possible to run 8mm telecine. The transmission is normally 405 lines, fully interlaced to broadcast standards, but 625 lines random interlace is available.

A further comment from G3WFC/G6AEM:

" I didn't know what amateur TV was until I worked G8AYC in January of this year, just before my 18th birthday, but then I became so bitten by the TV bug that it only took a few months to build the complete station up. I now have a fair amount of experience in converting transistorized BBC2 tuners to 70cm, and I would be quite willing to assist anyone in range of here, who is interested in receiving my transmissions, to perform this conversion."

Martin Allard's QTH is 57 Priests Lane, Brentwood, Essex.

Old timer Gerald Jeapes, G2XV, tries out his all transistor transmitter-receiver at the Cambridge Club's HF/NFD site. The unit is self contained with batteries and speaker, and the 19 in aerial has given coverage up to 12 miles. The amplitude modulated transmitter runs half a watt and the receiver is a super-regen. Says newer timer local man Alan Papworth, G3WUW: " What is of most interest is that after holding a licence for so long and being bred on valves, G2XV sets an example to us all with transistors."

Twenty One ATV Years

Still on the televisionary theme, we have a news flash from Ian Waters, G6KKD/T, that plans are well in hand to celebrate next year the twenty-first anniversary of the inauguration of the British Amateur Television Club. There is to be a two day Amateur Television Convention in Cambridge, at Churchill College, no less, to take place over the last weekend of July, 1970.

Climaxing proceedings that will include technical symposia in profusion will be a grand banquet on the Saturday night.

More details in the fullness of time; this advance notice will alert all Stroke T men to book the date now.

Expeditionaries

There's news of more out-and-abouters this month, offering to those remaining at home opportunities for collecting some of the rarer counties that may be required for the " Four Metres and Down " certificates.

In action now from the Isle of Man is the famous " GB2GC " group, subject to a seachange into GB2GD for the purpose of the IOM operations; these continue for some days after VHF NFD.

Eight Class A licensees are on the island, with support from three BRS men. Says Richard Porter, G3VXK: " The set-up is very much as it was in Alderney in 1967. We are operating on 4, 2, 70, and 23, with the accent placed on the latter two. Aerials in use on 4m, the 4-over-4-over-4-over-4 stack. On 2m, a 10-over-10-over10-over-10 stack. On 70cm, a 14-over-14-over-14-over-14 stack. On 23cm, a 5 ft dish with dipole and reflector feed."

Over much the same period, in fact during the week 6 to 13 September, GW3NAQ/P operated by G3NAQ and G8ADD will tour Merioneth, Montgomery, Cardigan and possibly Carnarvon, to give 70cm and 2m contacts to all who want them, late afternoons and evenings. Schedules for subsequent stops will be accepted over the air. All contacts will be verified direct if an sae is sent, via the Bureau if not.

Later in the month, from 14 to 27 September, Christopher Tredwell, G8CHW, 14 Brighton Grove, Rusholme, Manchester 14—full address in case sked-fixing is desired—will operate from fourteen Scottish sites in several different counties to put GM8CHW/P on 145·925 and 433·9 MHz. There will be a 14 W transmitter on " Two " and a " Three Twenty " tripler on 70cm, with 10-element and 18-element aerials respectively, which should ensure a fair amount of rf urge into distant receiving points.

Expeditions Past

Neville and Marie Tomlinson, G8BOA, of Leicester, make Northern Ireland their holiday target most years: Marie comes from Newcastle in County Down. This year GI8BOA/A was on 2m from Neville's father-in-law's QTH looking right across the Irish Sea with nothing but the Isle of Man in the way, hull down on the horizon, between there and the English Coast. So it was a bit disappointing that GI8BOA/A should earn only eight contacts from his home-built (not brewed) transmitter with 18 W putting a thumping signal as far east as G3NEO of Sheffield.

" It was quite obvious that very few people make a habit of turning their beams towards Northern Ireland," remarked G8BOA on his return home, a sentiment which EI6AS, too, has voiced on more than one occasion. There *is* activity

on 2m from both GI and EI, and there would be more if members there felt that those on the mainland fired westabout more often than they do.

* * *

One station that *did* do justice to the GI and EI fraternity was GW8APZ/P on its recent appearance on the summit of Snowdon with a 2m transmitter running 204 milliwatts input. The team of six each took a 40 lb pack and in turn helped lug a stretcher made up of the sections of the 30 ft mast. This also came in useful to carry aerials, three tents and folding chairs to the summit, plus a couple of EC10 receivers and their companion converters.

Results: six countries worked, 62 contacts, and the best of them G3GZJ way down in Redruth, at 330 kM. Says G8AZU in a subsequent report: " We all feel that the expedition was a great experience and very worth while. Our main objective of proving our portability and of putting up a reasonable performance with a low power rig was achieved."

Dutch Memorial Contest this Weekend

If lots of stations using the prefix PD3 are heard during VHF National Field Day this coming weekend, their very numbers should make obvious the fact that they are legit. They will be participants in the Idzerda Memorial VHF/UHF Contest laid on by VERON for 7 pm to 7 pm Saturday/Sunday 6–7 September.

Rules are as IARU contest except that Dutch participants will add " IDZ " to the code to be exchanged. A copy of the rules may be had from G5UM by sending an sae.

Skeds wanted—on " Thirteen "

Brian Rose, G3ULR, is constructing pulse equipment for use on the 2300 MHz band and would be particularly pleased to hear from anybody within 200 miles of his QTH at 23, Lansdown Road, Hartlepool, Co Durham, who has plans to operate on 13cm. No, he is not in search of contacts over a 200 mile path! What he *is* interested in is getting to know other 13cm experimenters within reasonable reach so that views may be exchanged and where practicable attempts made to establish radio contact on this band.

Xtal Xchange

Can anyone oblige Bill Burton, G8ANQ, with a crystal or crystals anywhere between 12166 kHz and 12150 kHz (any type of holder will do)?

He offers crystals at 12125 (for 145·5 MHz), 12045·833 (which comes out at 144·55 MHz), 12037·5 (144·45), 6065·6 (145·5744 MHz), 6067·66, which gives 145·83984 MHz and a 6002 kHz number which sounds like just the job for the cw end of " Two ": it gives 144·048 MHz. Letters to G8ANQ at 18, Newlands Avenue, Bishop Auckland, Co Durham (*not* QTHR).

Tech Corner

From G3PMJ (Stewart Revell of Manchester):

In many cases of TVI the cause is not necessarily the large amount of signal being put out on the amateur vhf bands, but that of sub-harmonics of the crystal chain. This can mean: Eliminate the sub-harmonics and so remove the TVI. And the most effective way of doing this is not to produce them.

By the use of fifth overtone crystals at 70 MHz no signals are generated below the transmit frequency. For 2m the starting crystal frequency should be in the 72 MHz region, followed by one " times-two " multiplier. The price of suitable crystals for quantities of two or more is (or was) 32s 6d each from STC. The units I use are miniature 4202-AT5 type, ref. " HS " plus or minus 0·005 per cent. These are wired-ended units, USA type HC18U.

Using fifth overtone crystals one may as well employ a transistor circuit to go with it. There is less likelihood of overdriving the crystal, and the stability is excellent. A four-transistor driver unit intended to feed into the push pull grids of a QQVO3/10 is shown in the accompanying diagram. This is self explanatory, and acknowledgments go to G3JVL, from whose transistor transmitter parts of this one have been adapted.

Points for constructors to note are: Do not try to get the maximum output from any stage. With good matching between stages it is possible to make TR3 the driver if the emitter resistor were to be reduced in value to two 10 ohm. The values of the capacitors in the vicinity of the crystal oscillator are not critical: anything from 20–30 pF will do for the feedback, and 35–50 pF for the emitter decoupling. The 2N708 may be substituted by a BC108 if desired. In fact, any transistor with an Ft over 250 MHz and an HFe over 100 seems satisfactory.

The coupling from TR4 is through a 100 pF capacitor to a one-turn link. Two turns will be found to be far too much (diameter $\frac{1}{2}$ in). To minimize mutual inductance keep all tuned circuits well separated from one another and preferably at right angles.

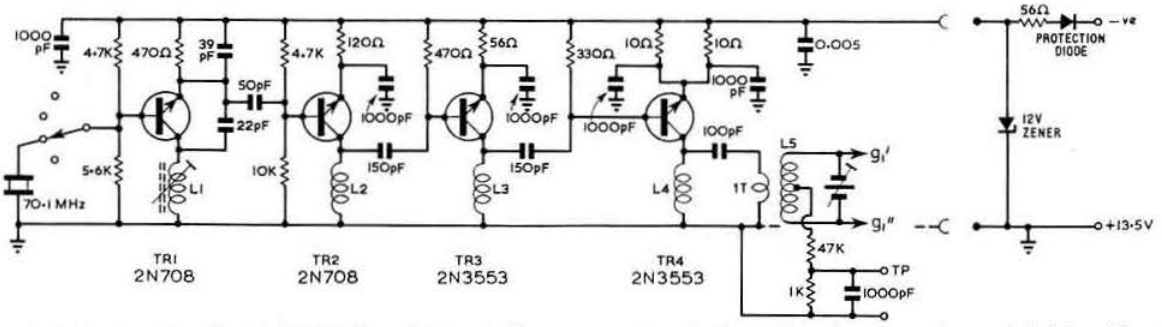


Fig 1. Inductor values for the G3PMJ transistorized driver unit for the 4m band are: L1, 4 turns of approx 20 SWG with vhf core; L2, 3 turns 22 SWG spaced one wire diameter (may need core); L3, as L2, and core may be needed; L4, as L2 and L3, though no core was found necessary; L5, 4 by 4 turns on solid $\frac{1}{4}$-in former, for coupling into push pull 3/10 grids.

The unit is built up on Veroboard and is " floating," i.e., is not connected to chassis except by way of the supply, thus allowing either positive or negative supply voltages to be used. Similarly, the heaters of the 3/10 remain ungrounded.

The driver transistor (2N3553), which will deliver something like 700 mW output, requires a heat sink to assist dissipation.

To enable the unit to be peaked up a voltmeter should be connected across each succeeding emitter stage and the preceding collector tuned for maximum reading. Make sure that the drive is on 70 MHz and not on some other frequency.

From G3EEZ (Alan Wakeman of Wolverhampton):

Further to the note in " Tech Corner," August, it is worth pointing out that the setting of the 13cm waveguide mouth at the focal point of a dish is an *initial* setting and must be adjusted to a received signal for maximum gain. The optimum position will usually be found to be some short distance further away from the dish than the actual focal point.

This arrangement can also be modified to provide a 9cm feed (3400 MHz) by using two food cans (could be Heinz soup or similar) measuring $2\frac{7}{8}$ in in dia by $4\frac{1}{2}$ in long. For 9cm the probe length and the position from the closed end then become 1·232 in.

From GM3TLA (David Pearson, of Aberdeen):

While operating portable I have sometimes used a low power (130mW) 2m transistor transmitter, based on the Mullard-G8ARV exciter design. This has worked quite well, giving contacts up to 80 miles under normal conditions (I have not tried it during an opening). The circuit of the modulator is unusual for it does not employ any transformers and so it might be of general interest.

A high impedance dynamic microphone is used, the circuit having a response peaking at about 1 kHz with a sensitivity of 1mV. The collector of the BCY71 is connected to the choke feeding the collector of the output transistor TR4 of the exciter unit, which feeds the aerial. The 56 ohm resistor and 10μF electrolytic connected to this choke in the original design should be omitted. In the accompanying diagram all resistors are 5 per cent tolerance $\frac{1}{4}$ watt, and all electrolytics 16 volts working or greater.

The exciter unit should be aligned for maximum output

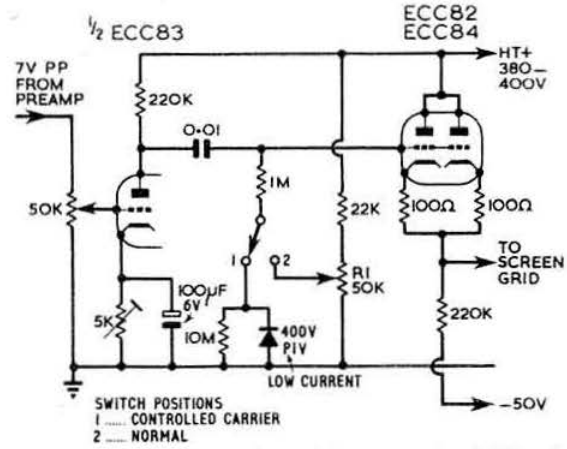


Fig 3. The G8ARV circuit for applying screen modulation to the 100 watt transmitter described in the accompanying " Tech corner "note.

with 10 volts on the output transistor, and then the modulator should be connected. The voltage on TR4 should be 5. The average power can be increased with 5v on TR4 by realigning the output stage, but the modulation quality will be impaired and this realignment is not recommended.

Although full modulation cannot be obtained (there is feed through from the driver transistor TR3 of the exciter), reports on modulation depth and quality have been good.

From G8ARV (David Taylor, of Dudley, Worcs):

Those 70cm operators who may have built the simple tripler design shown here in July may care to consider progressing on to the more ambitious 100 watt circuit shown on the opposite page.

This line-up was developed by G8AEO and G8AEV and has been built by several members in the Midlands. All have reported that it tunes up first time.

A drive of 5 watts of rf on 2m is needed. If the pa in this circuit is blown, an output of 50 watts of rf can be realized for about 90 watts input to the final 6/40A. The output circuit tunes 50 to 75 ohms by means of the sliding short on the balun.

Alignment is straightforward. If initially the rig is tuned

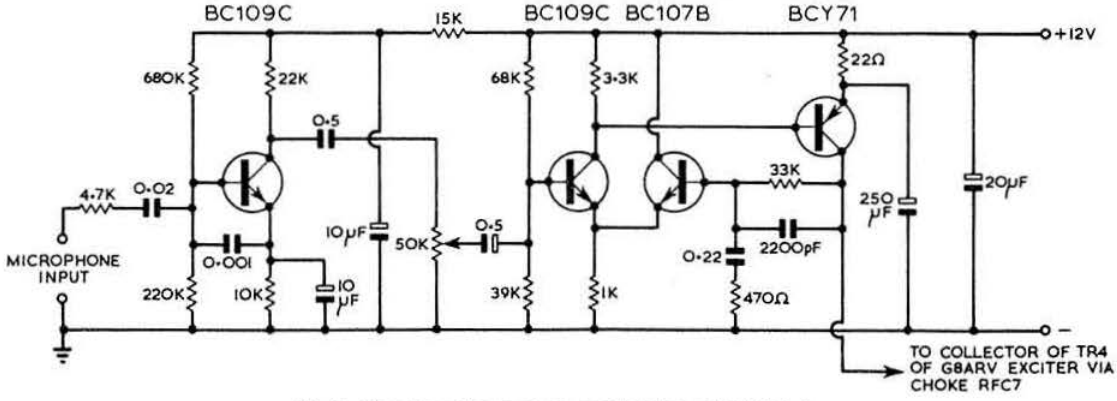
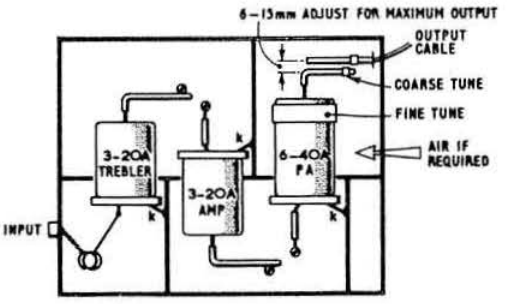
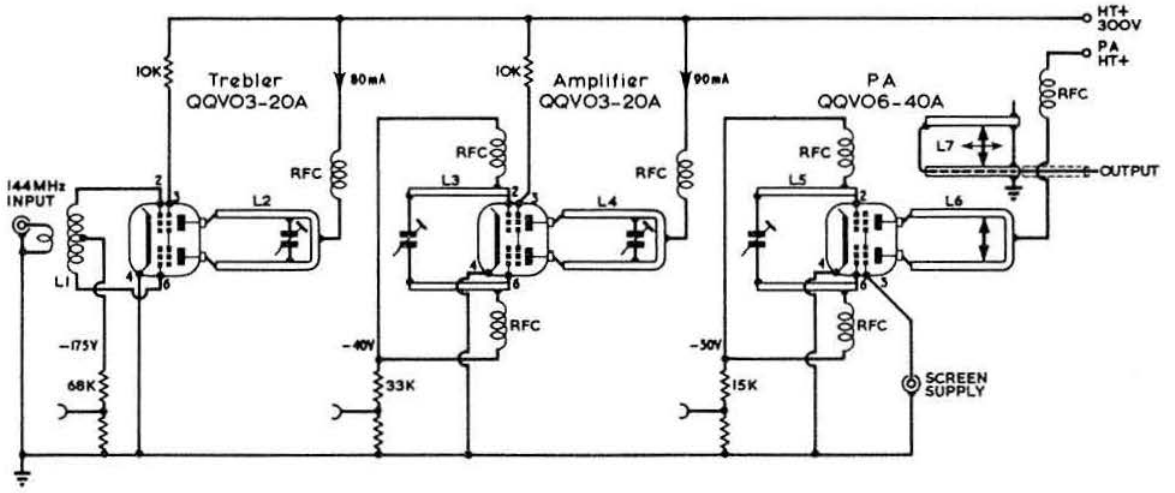


Fig 2. The transformerless modulator of GM3TLA.

THE G8AEV — G8AEO TRANSMITTER FOR 70CM DESCRIBED BY G8ARV IN THE ACCOMPANYING NOTE



The Mechanical Layout



The Circuit Diagram

Fig 4. Inductance details for the 100 watt 70cm transmitter described by G8ARV: L1, 4 turns of 16 gauge wire 12mm dia, 12mm long, with one turn link coupled into the centre. L2, as shown in diagram, 51mm long, with 0·8 to 6pF trimmer (C004EA/6E). L3, two lengths of ¼ in brass tube 22m long tuned with similar trimmer to L2. L4 is as L2. L5 is as L3 but 19mm long. L6 as in diagram but 38mm long with shorting link and less trimmer. Tuned by 12mm wide copper strip sliding on the QQV06/40A valve bulb. L7 as below ¼ in dia brass tube balun, 75mm or more long. RFC 20cm of pvc covered wire 6mm dia, about 25mm long.

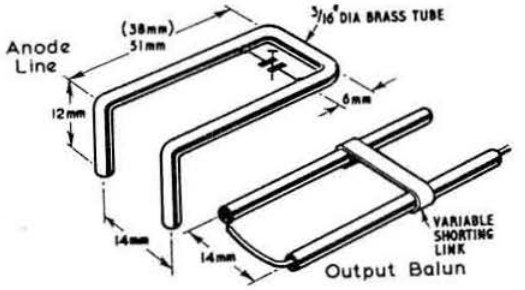
Valve operating conditions for the 70cm transmitter described by G8ARV:

QQV03/20A tripler: Vg1 175 volts, Ig1, 2·4mA.
Vg2 250 volts, Ig2, 5·6mA.
Va 300 volts, Ia, 80/90mA.

QQV03/20A amplifier: Vg1 —40 volts, Ig1, 1·2mA.
Vg2 250 volts, Ig2, 5·0mA.
Va 300 volts, Ia 90/100mA.

QQV06/40A p.a. (anode and screen modulated):
Vg1 —70 volts, Ig1 3·0mA.
Vg2 250 volts, Lg2·5mA.
Va 400 volts, Ia 150mA.
P load 30 watts.

QQV06/40A (screen modulated):
Vg1 —50 volts, Ig1 3·3mA.
Vg2 110 volts, unmodulated.
Va 450 volts, Ia 80mA unmodulated.
P load 10 watts.



The PA and Output Inductors

up into a lamp load final alignment should be done into the station transmission line system, which will probably present quite a different impedance from that of a bulb, and therefore the tuning positions will not be the same.

Modulation can be by any of the conventional systems (am, fm or cw). I use screen grid modulation as I wish to run video (G6SDB/T) as well as audio. A suitable circuit to provide it is also shown. With screen modulation carrier output is set to 10 watts (therefore 40 watts pep) when running 450 volts at 80mA input. Controlled carrier can also be provided by the circuit shown. The carrier-set potentiometer is the 50 K ohm R1, while the 5 K ohm potentiometer in the cathode of the ECC83 should be set to give a symmetrical voltage swing at its anode.

Here and There

" Many thanks for the television news in ' Four Metres and Down.' All I can say is: the more of it the better!"—G3WFC/G6AEM/T.

* * *

" Hope you can find a small space in ' Four Metres and Down ' to mention that my call with a Stroke P after it is being used on 2m by some unauthorized person "—G3NRE of Birmingham. Let's hope this is a case of mistaken phonetics.

* * *

" I understand following a QSO on 40m that HA7KLM who operates extensively on vhf/uhf is keen to obtain schedules with British stations on 2m telegraphy. He operates on 144·052 MHz "—G3ULR.

* * *

" A landline early warning system organized by GI3HCG was very useful last winter between GI and the south of England to tell people about aurora. We would like to see this extended to cover a large area of G-land, in order to bring more people on. When aurora occurred it was disheartening to hear the same stations on every time. There should have been more"—GI3TLT.

* * *

" When my father and I being on holiday in S. W. Scotland looked up a local amateur and mentioned the vhf aspect of amateur radio, we were greeted with loud chuckles and the comment: ' We don't do such professional things up here.' "—BRS28005 (T. M. Cooper, of Sussex).

* * *

An urgent QSP from G3ENY, who writes: "At the London VHF Convention some books called 'Artificial Earth Satellites: Memoirs of the British Astronomical Association' were given away as raffle prizes. Yesterday I worked G3RHI, a Manchester schoolmaster who is doing a space project with some of his pupils, including tracking by Doppler shift. A copy or two of the book would be most useful to them. Would anybody who has finished with the raffle prize care to send it to G3RHI?" To which we need add only that G3RHI is B. J. Arnold, Summerfield Bungalow, Heathlands Drive, Prestwich, Manchester.

" G8APX of Watford has been QRT since December acquiring an XYL . . . soon (September) he will be moving to Rannoch School, Perthshire, a poor site, but he hopes to be taking part quite often in Stroke P and Stroke M expeditions into the mountains "—G8APX.

* * *

" I enjoy working 2m very much but feel it is lacking in cw, so would like to have a sked with any keen cw types. The more cw on 2m the better. There are plenty on for the telegraphy contests so why go QRT until the next one? "—G3KAN (write him at 75 Delapre Street, Far Cotton, Northampton, if you like to take up the offer).

* * *

" . . . 4m with its vast potential of high Aurora incidents, sporadic-E, MS, back-scatter and so forth . . . never let it become a top-band type natter band."—G3FDW.

* * *

" For serious DX TV valve gear is rubbish dump material. Transistors are the thing . . . far better in tuners and amplifiers, rf and if"—BRS27148 of Ripon.

* * *

" I had a word one night with EI5BH of Athlone, who was on n.b.f.m. He said he would have to get going on s.s.b. Lo and behold, a few evenings later there he was with 200 watts from a complete phasing type unit . . . he is in the TV servicing line and certainly knows his stuff "—EI6AS.

* * *

" Beacons on 4m are definitely needed from four or five sites besides GB3GM and ZB2VHF "—G3TTG.

* * *

" Wholeheartedly in favour of more 70cm beacons . . . can something be done in this direction soon? "—G3VZV.

* * *

" Have made a complete rebuild of the 70cm station and now use a phase locked vfo rig with a 4X150G in the final . . . single sideband a distinct prospect for the future "—GW8AHI.

* * *

" Single sideband can provide a far more reliable signal over long distances on v.h.f. than a.m. and can provide information at a far more rapid rate than c.w., without the tedium of writing down every letter. Without it, many links between isolated groups of v.h.f workers who are striving to make more and better use of the spectrum would not be possible"—G3MNQ.

* * *

" On the Monday after the Aurora I posted at 11 am a report to a GI in Lisburn, a 5d. stamp on the envelope and a 5d. s.a.e. enclosed. By Wednesday lunchtime my 5d sae with QSL card were back in my home. It took just 50 hours from the time I posted it to the time I received it back. I think this is a record worth a word of praise"—BRS15744 of Sussex.

* * *

Congratulations to John Warrington of Melton Mowbray, G8AKE. He has just been awarded the second ever 432 MHz Senior Award Certificate [the first was secured by G3MCS two years ago]. The G8AKE claim, 40 counties, nine countries, was ratified at the last meeting of the Society's VHF Committee. So were six 70cm ordinary claims, plus others for 2m and 4m. Details next month.

Making the Grade

By E. JOHNSON, G2HR*

WITH the approach of autumn, a fresh set of faces will appear at RAE classes throughout the country. Much advice has been given to students, but some points are worth repeating in conjunction with the writer's impressions over some years, coupled with 40 years' experience as an amateur.

The instructor

The standard and methods of instructors vary greatly. This cannot go unnoticed by students who have previously failed the examination, and enrol again in a different class. Some instructors may appear to adopt unorthodox methods. If they pay dividends, there is no reason for change. Ignore Mr X's approach to *his* class. It suits him and gives results, but it may be anathema to the other chap. Many school-teachers run these classes, and a temptation exists, which should be resisted, to make a too school-masterly approach. The students come because they want to, and whatever their age cannot be treated as schoolboys. Naturally one meets with youthful exuberance at times, and at the other end of the scale there are oldtimer listeners who cannot refrain from reminiscing on "sparker" days. An instructor worth his salt has to be somewhat of a psychologist and can guide them back on the rails tactfully. One occasionally meets an "awkward" student who will not conform. He can always leave. Need more be said?

The author does not adhere rigidly to the order of the Syllabus. He makes no claim to be right, but considers there are certain illogicalities.

Certain parts of the Syllabus can be boring, and points can fail to click. A little diversion coupled with an anecdote can work wonders, and the students see the light. A little psychology again! If possible, a coffee break should be made which makes a more intimate and social contact with the instructor invaluable.

Do remember that no instructor is perfect, and can be caught out. He should not attempt to bluff, and a frank admission will gain respect when he is unable quickly to find the answer. Any other approach is grossly unfair.

The writer was uneasy some few years back when he received applications from youngsters whose age debarred them from their local classes by virtue of the lower limit placed on the age of further education. The author's own Education Authority accepted them not without reluctance. The great age disparity has never posed problems, and both the under 14's and over 50's have mixed very happily. The experiment proved such a success in view of the high pass-rate achieved by the younger element, that virtually no age queries now exist. Rightly or wrongly, a licence can be obtained at age 14, and facilities should exist for those in sight of this age.

One final word from the instructor angle. Always assume the class knows nothing, and there is nothing so simple that requires no explanation. Students with some knowledge must exercise patience, but even they can pick up a wrinkle or two in the elementary stage.

The student

Whilst it may be that many know little, a would-be candidate should, and is expected to cope with elementary arithmetic. It is surely not the job of an instructor to hold up a class and explain how to convert a decimal to a vulgar fraction, or vice-versa. This is junior school stuff.

The Syllabus can, at first sight look frightening, but you are not expected to have more than basic knowledge. Whole volumes are written on aerials and semi-conductors, but you are only required to know the fundamentals. However, do study recommended books out of class, remembering that the course is roughly equal to a fortnight's schooling. Taking notes is a must. Nature has not endowed you with a built-in computer. Homework cannot be compulsory, but one or two problems to worry out each week can be invaluable.

Nobody can teach you licence conditions. This is *your* job, and the instructor can ask random questions each week. As long as you know the facts, you do not have to quote verbatim. If you have a photographic memory so much the better. You must express yourself clearly in the answer paper. We all know that the candidates are not judged on their spelling and grammar (many of the author's class would have crashed here), but, although the examiner is perfectly fair, it is only human subconsciously to fail a border-line case which does no credit to the mother tongue, and needs a mind-reader to translate.

It is of immense value to set a mock examination, simulating actual conditions. The instructor can spot your weaknesses, and often—the writer has had good luck here—similar questions have occurred in the examination proper.

The latter is not difficult, so make up your mind never to miss a class, be on time, and even if you are only of a mediocre standard you can pass.

There is an ancient Simian Proverb—"What one fool can do, another can."

So go to it!

* 35A Woodland Road, Chingford, E4.

RAE Courses

Barnet, Herts. Evening Institute, Stanhope Road, Finchley, N12. Commences 25 September, 7.00 to 9.00 pm. Instructor, B. D. Emson. Enrolment on 9, 10 and 11 September.

Barry, Glam. Barry College of Further Education, Colcot Road, Barry, Glam. Tuesdays (Theory) and Thursdays (Morse and practical) from 7.30 to 9.30 pm. Commences 23 September. Enrolment: 8-12 September. Fee: 30/- (under revision).

Bath, Somerset. City of Bath Technical College, Bath, Somerset. Commences September. Also 10 week Morse Course between September and Christmas 1969.

Bedford, Beds. Westfield Further Education Centre, Chester Road, Queens Park, Bedford. Enrolment: 8 September. Two term course.

Boreham Wood, Herts. Boreham Wood College of Further Education, Elstree Way, Boreham Wood. Commences 24 September, 7 to 9.15 pm. Lecturer: G. L. Benbow (G3HB). Enrolment on 8/9 September. 6.00 to 8.00 pm.

Brentford, Middx. Brentford Centre for Adult Education, Brentford Secondary Girls' School, Clifden Road, Brentford. Commences 22 September—6.30 to 8.30 pm. Enrolment: 11, 12, 15 and 16 September. Also High Fidelity and Tape Recording Course commences 24 September.

Brighton, Sussex. Brighton Technical College, Richmond Terrace, Brighton BN1 2SZ.

Carshalton, Surrey (London Borough of Sutton). Carshalton College of Further Education, Nightingale Road, Carshalton. Thursdays 7.00 to 9.30 pm. Commences 15 September. Enrolment: 8, 9, 10 September.

Chelmsford, Essex. Mid-Essex Technical College, Victoria Road, South Chelmsford. Commences 26 September. Lecturer, A. D. Macdonald (G3NPM). Enrolment: 15 to 17 September, 5.00-8.00 pm. Fees, under 18 years £1, 18–20 years £2, 21 or over £4.

Chingford, E4. Chingford Community Centre, Friday Hill House, Simmons Lane, Chingford, E4. Mondays 7.30 pm to 9.30 pm. Enrolment and classes commence in September. Fees and dates to be finalized. Contact G2HR (Tel. 529 2932).

Colchester, Essex. North-East Essex Technical College, Sheepen Road, Colchester. Tuesday evenings from 6.30 pm to 9.00 pm. Commences 30 September. Enrolment: 15 to 17 September, or at first meeting. Morse Practice on Wednesday evenings as part of Radio Society programme. Further details from F. R. Howe, G3FIJ, c/o Electrical Engineering Department, North-East Essex Technical College, Sheepen Road, Colchester, Essex.

Crawley, Sussex. Ifield Evening Institute, Lady Margaret Road, Ifield, Crawley, Sussex. Wednesday evenings, 7.00 pm to 9.00 pm. Fee: Over 19 years on 1 September—90/-, under 19 years on 1 September—45/-. Enrolment: 10 and 11 September 7.00 to 9.00 pm at the College, or by post to A. J. Gibbs, G3PHG, 6 Dairyfields, Gossops Green, Crawley, Sussex.

Glasgow, C5. Glasgow College of Nautical Studies, 21 Thistle Street, Glasgow, C5. Tuesday and Thursday evenings from 7.00 pm to 9.30 pm. Commences 9 September. Enrolment: 7.00 pm at the College on the opening evening. Fee: £1 for the course payable on enrolment.

Grimsby, Lincolnshire. The Adult Education Institute, Hereford Centre, Ely Road, Grimsby. Mondays from 7 to 9 pm. Enrolment: 16, 17, 18 September between 7 and 9 pm. Fee: 22/6 per term or 10/- per term for under 18s not in full employment.

Ilford, Essex. Ilford Literary Institute (County School for Girls), Cranbrook Road, Wednesday evenings from 7.15 to 9.15 pm. Commencing 24 September. Enrolment: 8 to 11 September at 8.30 pm. Fees: Under 21, 25s. Over 21, 50s. Instructor G8JM. Further details may be obtained from: W. G. Hall, G8JM, 48 Hawkdene, North Chingford, London E4. (sae please).

Loughborough Technical College, Radmoor, Loughborough, Leicestershire. Department of Electrical Engineering. Tuesday: 6 to 7 pm Morse Practice, 7 to 9 pm Theory. Commencing 16 September, 1969. Fee £3 14s 6d. Lecturer D. R. Doughty (G3FLS).

Lowestoft College of Further Education, St Peters Street, Lowestoft, Suffolk. Wednesdays 6.30 pm to 9 pm. Course Lecturer: A. F. Ward (G3HSP). For further details apply at the College. Course commences 17 September 1969.

Mexborough, Yorkshire. Mexborough Schofield Technical College, Park Road, Mexborough. Wednesday evenings throughout year, 6.30 pm. Commences 17 September. Morse as required.

Northwood, Middlesex. Northwood School, Potter Street, Northwood. Enrolment 8, 9 and 10 September. Instructor A. Hardy, (G4GB).

Princes Risborough, Bucks. Evening Institute, County Secondary School, Merton Road, Princes Risborough. Commences 15 September. Theory, Mondays 7.00 to 9.00 pm. Practical, Wednesdays 7.00 to 9.00 pm. Lecturer: L. Emmet (G3VKD). Enrolment: 10 and 11 September, 7.00 to 9.00 pm.

Sheffield. Western Road Evening School, Sheffield 10. Wednesdays 7.00 to 9.00 pm. Details from J. Bell, G3JON, 30 Alms Hill Road, Sheffield S11 9RS. Tel 367774.

Slough, Bucks. Slough College of Technology, William St., Slough, Bucks. Thursdays and Fridays—Theory by G3WQC and Morse by G3FVC. Enrolment: Thursday 11 and Tuesday 16 September.

Wembley, Middlesex. Wembley Evening Institute, Copland School, High Road, Wembley, Middlesex. Commences 22 September. Morse 7.00 to 8.00 pm, theory 8.00 to 10.00 pm. Lecturer: A. Bayliss, BSc, FIEE, (G8PD). Enrolment: 15 to 18 September at the School between 7.00 and 9.00 pm.

Weybridge, Surrey. Brooklands County Technical College, Heath Road, Weybridge. Commences 30 September, 6.30 to 9.00 pm. Lecturer: J. E. Lacey. Enrolment: 15 and 16 September, 2.00 to 4.00 pm. 6.00 to 8.00 pm.

Wombourne, Staffs. Wombourne Evening Institute, Ounsdale School, Wombourne, Nr. Wolverhampton. Commences September. Enrolment: Applications should be made as soon as possible to the Head Teacher of the Institute, Mr D. E. Battison.

SOCIETY AFFAIRS AND NEWS SUPPLEMENT

A Brief Report of the Council Meeting held at Society Headquarters on 7 July, 1969

Present: *J. W. Swinnerton, President (in the Chair), Messrs B. Armstrong, N. Caws, J. Etherington, J. C. Graham, R. J. Hughes, A. F. Hunter, E. G. Ingram, G. R. Jessop, L. E. Newnham, J. Petty, G. M. C. Stone, G. Twist, E. W. Yeomanson (Members of Council) and A. E. Dowdeswell (General Manager).*

Apologies for absence were received from Messrs H. E. McNally, R. F. Stevens, D. M. Thomas, F. C. Ward, and J. Adey (Editorial Staff).

Membership and Affiliation

It was resolved:

(i) to elect 108 Corporate Members and 33 Associate Members.
(ii) to grant corporate membership to 17 Associates.

Council agreed to waive the subscriptions of five members due to blindness or other disability.

Council agreed to grant life membership to F. C. Beadle, VK7HS, in accordance with the Articles of Association.

Applications for Affiliation from the following were approved by council:

(i) Maldon Youth Centre Radio Group, Maldon, Essex.
(ii) Leicester Royal Signals Amateur Radio Club, Leicester.
(iii) University College of South Wales and Monmouthshire Amateur Radio and Electronics Society, Cardiff. Secretary: P. Jones, GW3YLV.
(iv) Flint and District Radio Society, Mold, Flints. Secretary: H. Jones, GW3TMP.

Society Trophies

Mr Hunter reminded that the Scottish NFD Trophy needed replacing. A Council Member then offered to cover the cost of a new trophy.

Area Representation:

Council approved the nominations of the following Area Representatives:

Messrs R. H. Newland, G3VW, Edgware and District
R. J. Redding, G3VWR, Maidenhead
L. H. Webber, G3GDW, Torbay.

Council also approved the nomination of Mr V. W. Stewart, GM3OWU, as Regional Representative for Region 13, following the resignation of Mr I. W. Sheffield, GM3VEI.

Committee Minutes

Minutes of the following Committee Meetings were approved by Council:

VHF Committee (4.6.69)
RAEN Committee (3.5.69)
Exhibition Committee (23.5.69)
Scientific Studies Committee (9.6.69)
Membership and Representation Committee (13.6.69)
Finance and Staff Committee (17.6.69)
Exhibition Committee (20.6.69)

Tax Allowance

Mr Caws reported that the Board of Trade had confirmed that subscriptions to the Society may be an allowable expense against Income Tax.

Club Stations

A letter was tabled from the Belfast YMCA Amateur Radio Club which referred to a circular they had distributed advocating the use of Club Stations for the training of potential licensees. After some discussion Council indicated favour for such a scheme.

Council was in session for 4½ hours.

Obituary

J. B. WALKER, G5SX

Johnnie Walker died suddenly on 18 July 1969 at the age of 51 following a heart attack. His many friends in the BBC were shocked and distressed to hear the news. During the last twenty years as a specialist engineer in the Planning and Installation Department of the Corporation he was a fund of knowledge and an untiring example but, above all, a good friend to all his colleagues.

For the last four years, G5SX was President of the BBC Club Ariel Radio Group and a keen supporter of National Field Day and other Club events. He was a first class cw operator whose services will be greatly missed by the Club.

Among those present at his funeral on 24 July were G3IRB, G3BRL, G3GIQ, G3KKQ, and G2BCI whilst the many floral tributes included a wreath from G3BA.

Johnnie will be sadly missed by all his friends and colleagues and our deepest sympathy goes to his widow and his son and daughter.

H.M.T.

Mobile Rallies

28 September—Harlow Mobile Rally, Magdalen Laver Village Hall, near Harlow, east of the A11. Open from 10 am. Talk-in station on 160m and 2m. Further details from the Hon Secretary, B. G. King, G8CHC, 36 Upper Park, Little Parndon, Harlow, Essex. Tel Harlow 20812.

5 October—RSGB Scottish Mobile Rally, Beach Ballroom, Aberdeen. Details GM3AEL.

12 October—Peterborough Mobile Rally, at the Walton County School, Mountsteven Avenue (off the A15, Lincoln Road), Peterborough. Commence at 2 pm. Talk-in stations on 1980 kHz (G3QS), two and four metres, plus hf ssb DX. Free admission, parking and entertainment—refreshments available on the site at moderate prices, plenty of space, and indoor accommodation. Trade stalls and junk sale all under cover—bring your surplus. Further information from Douglas Byrne, G3KPO, Jersey House, Eye, Peterborough (Tel Eye 351).

26 October—the Anglian Mobile Rally, (Colchester Radio Society and Ipswich Radio Club), Suffolk Show Ground, Ipswich, Suffolk. Talk-in stations on 160m and 2m. Trade stands covering Amateur Radio, hi-fi, colour tv, electrical spares, junk, and a bring-and-buy. Refreshments will be available on site. Trade enquiries to G3SJO, Colchester 78842. Further information from D. W. N. Thomas, G8BVE, 9 Burlington Road, Ipswich. Tel Suffolk 55200.

Special Event Stations

Basingstoke

The Basingstoke Amateur Radio Club will operate a station from the Basingstoke Arts and Crafts Exhibition at the Town Hall on 26 and 27 September using the Club call G3CTR. Operation will be on 2m and the hf bands between 10.00 and 21.00 hours. There will also be a display of amateur equipment and test gear and visitors will be welcome.

Gravesend

The Gravesend and District Scouts will be operating GB3HH during the Jamboree-on-the-Air on 18–19 October. The site will be the Hopehill Camping and Training Ground at Meopham on the A227 road. There will be ssb operation on the hf bands and possibly a 4m station.

Stratford-Upon-Avon

In 1769 the first Shakespearian Festival at Stratford-upon-Avon was organized by the famous actor David Garrick. To mark the 200th anniversary of the Festival the Shakespeare Birthplace Trust have invited the Stratford-upon-Avon Radio Club to operate a special station and the call-sign GB2GF has been allocated. The station will be located in the Shakespeare centre and visitors will be welcome. Operation will take place on 5, 6 and 7 September on all bands from 1·8 to 28 MHz. A special QSL will be sent for each contact.

High Wycombe

GB3WRA will be operated by a group of local amateurs from the 23rd annual Wycombe Show on Saturday 6 September. Operation will take place from The Rye, High Wycombe on all bands from 1·8 to 70 MHz using am, cw and ssb. Visiting amateurs will be welcome and further information can be obtained from G3FSN.

RADIO AMATEUR EMERGENCY NETWORK

By S. W. LAW, G3PAZ*

We attended Woburn on the hottest weekend we can remember for some time. Even the deer were apathetic. Not so the proceedings, which went with a swing. RAEN mobiles were among those present and we were most attracted by the possibilities inherent in the caravan occupied by G3LVP and company of the Essex Group. The ladies of the party seemed a little thoughtful about the idea, but who knows! Another thing to impress was the typical RAEN-type coaxial dipole used on 4m for the talk-in. We watched with approval the slick way it was lowered and dismantled at the end of the Rally, noting that RAEN was also represented in the procedure. Not a bad subject for a friendly inter-group exercise perhaps—always supposing that the Groups have catered for /P set-ups in their areas. The ability to instal a portable station at short notice could be a valuable asset to a Group, especially if demonstrated in exercise to a few representatives of the User Services. Mobiles do a great job but an extra twenty or thirty feet of mast can make an enormous difference to VHF.

Apathy or Atrophy?

Apathy from summer heat is one thing, but there are other aspects to be considered. Complacency is possibly one of the most insidious forms. The classic is, of course, " It can't happen here, Old Man." Another, less obvious, form is " We'll he there, —when it happens!" Or even " They will call us if we're needed!" Yes—but do *they* know that you exist? Just approach a few high-ranking User Service types in your area and see what answers you get. You may receive quite a shock! And whose fault will that be? Don't blame " them at HQ " or the GPO or, in fact, anyone except yourself. Make it your business to ensure that all the potential users of RAEN in your area not only know of you but what you have to offer and the channels through which you can be contacted should the occasion arise. Obvious? You should hear the things we hear! Don't be nervous of heights, either. The top people are often the most approachable.

* 130 Alexandra Road, Croydon, Surrey, CRO 6EW.

Honorary Registrations Secretary:
Mrs. Jane Balestrini, "Merrivale", Willow Walk, Culverstone, Gravesend, Kent.
Honorary Secretary, RAEN Committee:
Mr. E. R. L. Bassett, 57 Upper St. Helens Road, Hedge End, Southampton, SO3 4LG.

Heard Down South

Those who waffle about 4m being dead must have cloth ears! We can't speak for the whole country but we are not dull south of the Thames these days. What with Essex (doing very well these days with their committee-controlled system), Mid-Thames (very strict on frequency checks), NW Kent (always about) and the Surrey group (by no means idle) there is usually something doing on 70·375 ± 25 kHz. All these on one August evening plus a most intriguing exercise (entitled " Sussex Hotel ") from the N Sussex group. We copied some of this, but when one message included the word " Laevodihydroxyphenylalanine " (thank you, Mr Typesetter !) we decided to just sit back and cheer. Never a dull moment!

The Frequency Problem

Whilst it is true that RAEN operation is no longer confined to the frequency band mentioned above, most Groups using 4m have laid out a fair sum for crystals and would not welcome a change. However, it has been pointed out that there are two sides to the problem. On the one hand we have the difficulty of mutual interference when adjacent Groups use wide-band receivers and on the other hand there is a distinct advantage in being able to inter-communicate on the band edge with one's next-door neighbours as it were. An interesting angle was raised at a recent Controllers Meeting when it was pointed out that cartographers have long ago solved the problem of how many colours are needed to separate areas on a map. Possibly a diplomatic swop-round of crystals between Groups who have QRM troubles might work wonders?

Truth is Stranger—?

We hear of a certain Official who, when RAEN was mentioned, then pontificated " Naturally, if a Radio Amateur were to hear a ship in distress and informed us, we would give the matter our earnest attention."

Contests

September	
6–7	VHF National Field Day* (page 276 April)
6–7	VU/4S7 DX-Phone
14	3·5 MHz Field Day (page 572 August)
20–21	VU/4S7 DX-cw
21	Rugby D/F National Final
21	144 MHz Fixed Station (page 496 July)
October	
4–6	RTTY DX Medallion Sweepstakes
4–5	VK/ZL/Oceania-phone
4–12	Lebanese DX-cw and phone
5	432 MHz Open (this issue)
5	1296 MHz Open Contest (this issue)
11–12	28 MHz Telephony (page 350 May)
11–12	VK/ZL/Oceania-cw
18–19	WADM DX-cw
25–26	7 MHz cw (page 421 June)
25–26	CQ WW DX -phone
November	
3	144 MHz SSB
8–9	7 MHz Telephony
15–16	1·8 MHz
29–30	CQ WW DX-cw
December	
6–7	Tops CW Club 80m
6–7	CHC International DX-cw
7	70 MHz-cw
13–14	CHC International DX-ssb

* To coincide with an IARU Region I Contest

Looking Ahead

13–14 September—IARC Convention, Geveva.
1–4 October—RSGB International Radio Engineering and Communications Exhibition, Royal Horticultural Society's New Hall, Greycoat Street, Westminster, SW1, 10 am to 9 pm.
10 October—RSGB Dinner Club, Kingsley Hotel, WC1.
18 October—Regional Representatives Conference, London.
24 October—RAOTA Dinner, London.
5 December—RSGB AGM, Royal Society of Arts, London.

Contests

80m Field Day, 14 September 1969

Omission from the rules published on p. 572 of the August issue.

Rule 8. **Scoring.** 15 points for each contact with a portable or mobile station, and 3 points for each contact with a fixed station.

Oxford RSGB DF Qualifying Event

The Oxford Qualifying Round was once again the recipient of excellent weather. This was a little unfortunate in that the organizer wanted it nice and wet beforehand to prevent competitors driving up to the " B " Station G3UJO/P which was a mere 1¼ miles away. Station " A " G3NCM/P was 9½ miles away over half a mile from the nearest road.

The start was marred as Station " A " was too weak in strength and only two or three competitors heard it. Consequently, an approximate bearing of 100 degrees was given, this was 3½ degrees from the actual bearing, to enable competitors to start. Most competitors then attempted to find Station " B " while the organizer sorted out the " A " station. The poor signal was due to the operator hiding in a tree, the car battery slipping, a frantic grab, and both were on the ground! However, little damage was suffered and the situation was soon restored to normal.

The " B " Station being close to the start, and a well-known and potent transmitter, hoaxed many into travelling too far which, together with a " funny " aerial, kept teams out for a reasonable time in the dry weather conditions.

Transmitter " A " was finally ensconced in a deep ditch in the middle of a copse and had a very long wire aerial going each way from the transmitter. One end was terminated on a well-known contemporary vertical steel edifice which radiated well and confusingly.

After the excellent home prepared teas by the lady helpers the results of the 17 teams taking part was announced.

Name	Time at " A "	Time at " B "
B. Mahony	15·27	14·27
E. Mollart	15·38	14·29
J. Vickers	15·50	14·32½
D. Newman	15·52	14·50
A. Simmonds	15·53	14·42½
E. Bristow	15·53½	14·42
W. North	15·54	14·26
R. North	15·55	14·41½
R. Parsons	15·57	14·27½
L. Harding	15·59	14·40
P. Rich	16·11	14·39½
M. Hawkins	16·24	14·32
B. Bristow	16·26	14·39
P. Tyler	—	14·30
I. Butson	—	14·41
R. Smith	—	14·45
G. Peck	15·58	—

G3LE.J

G3JLE Summer Top Band Contest

The 1969 Summer Top Band Contest held on 5 and 6 July produced 45 entries. This was a greater number than 1968 but fewer than 1967. A rather disappointing entry considering that there were well over 150 stations on the air.

The idea of including an overseas section seems to have failed due to lack of publicity as EI, DL, PA and OK stations were worked but only a few were active.

The UK section was won by I. T. Cashmore, G3BMY, of Halesowen who also won the 1967 event. The equipment used was a home made transceiver and a half wave end fed aerial. G3BMY is to be congratulated on his fine win which was made even more notable by the fact that his log contained no errors at all. Virtually all other entrants, except G3LCH and G6OO had points deducted for errors made.

Position	Call-sign	Score	County Code
1	G3BMY	603	SE
2	GW3WRE/A	552	GN
3	G6BQ	510	KT
4	G3TNO*	495	SX
5	G3CGD/P	491	GR
6	G3FM	483	SY
7	G3OKA	482	CH
8	G4AR	476	SY
9	G3BFP	467	SY
10	G3TIR	459	SX
11	G3TAA	420	LD
12	GW3XJC	408	GN
13	G3ORY/A	404	SF
14	G3SQX/A	388	LD
15	G3GRK*	384	KT
16	G3XDY	378	LN
17	G3XUD	375	YS
18	G3PWY	362	MX
19	GM2HCZ	357	DF
20	G3UFY	344	SY
21	GW3SCX	343	GN
22	GI3XRQ*	340	DW
23	G3EUE	323	SY
24	G3SKC	322	MX
25	G3WJS	319	EX
26	G3YEL	317	MX
27	G3TKX	313	YS
28	G3WRR/P*	311	SY
29	G3RQI	308	BE
30	GC3XTJ	306	GY
31	G8RZ	302	CD
32	G3UFW	301	WE
33	G3VXM	273	HE
34	G3UHO	264	WE
35	G3GMK	251	HE
36	G3VLX	250	KT
37	G3VGZ	241	DH
38	G3LCH	224	LD
39	G3JSK	217	WE
40	G3TLF	203	EX
41	G5DZ	202	HE
42	G3GDW	191	DN
43	G3XUT	94	SE
44	G6OO	24	LN
	OVERSEAS SECTION		
1	PA0JR	190	—

* multi-operator

Now for the odd complaint from your judge. Please read the rules —several logs were sent to RSGB Headquarters and not to the address given in the rules, these could have been disqualified. Do send in a cover sheet with signed declaration—one entrant failed to do this but a letter from the judge avoided disqualification. Five or six logs had to be re-scored because entrants lost the rules or could not be bothered—this is not good enough and is unfair to the judge. Watch this in future or your entry may not be accepted.

Only one entry was received from an overseas station, and that was from PA0JR, although there were two EIs, one DJ and three or four OK stations, as well as PA0GMU, active during the contest.

The runner-up was Brian Jones, GW3WRE/A operating from Nash Point Lighthouse. This was Brian's first contest—well done indeed. The gear used was a modified DX100, Hammarlund HQ170 and an inverted vee dipole.

In third place comes the stalwart of Top Band Contests, Jack Box, G6BQ, who still uses the transmitter he built in 1939!

Conditions seem to have been quite good with a high level of activity and not too much static. The standard of operating is reported as high but as already mentioned the judges have had to penalize nearly everyone for errors in log keeping. All the entrants who sent in comments appeared to have enjoyed themselves and for once there have been no complaints about the scoring system.

G3SQX suggested a 160 metre phone contest and the cw contests restricted to the bottom 25 kHz of the band. This has been raised before and in principle some restriction is perhaps desirable in big contests. Most entrants used the correct log sheets and this does make life easier for the checkers.

July 1969 144 MHz Open Contest

87 entries for this contest were received by the VHF Contests Committee. One was received by the HF Contests Committee! All G prefixes were represented, with nine GW, four GC, two GM, two GI and one GD stations sending in logs.

Conditions were good in the early stages of the contest but deteriorated on the Sunday. G2WS and G2BHN found few stations to work in the South East, while G3GJY and G8AUN found QSB troublesome on many contacts. The best three contacts were G3EFX/P to F8LJ/M at 866 km, G3IGV/P to F2ZN at 815 km and G3WSC to DK3GK/P at 705 km.

In the single operator fixed station class, Henry Neale, G3REH, narrowly beat G8BBB for first place, reversing the positions in the March event. Crawley ARC, G3WSC provided the winner in the multi-operator and /A Class. Runner-up was G3SLJ/A for Caesaromagus VHF/UHF Contest Group. Pity the GB2RS newsreader! Operators at G3WSC were G3TIR, G8BQE, G3YBJ, G3XNS, G3GRO and G2DP. G3SLJ/A was operated by G8AWM, G8BIM and 'SLJ himself. Top scorer and leader of the portable section was GW3NUE/P, operated by Terry Russell (G3JFH), Roger Allen (G3TQZ), Martyn Vincent (G3UKV) and Geoff Tibbets (G3NUE). Runner-up, and no doubt a very welcome contact for many, was GD3XAC/P, with G3VRW and G3XAC at the controls.

Most entrants seemed satisfied with the rules and scoring system but a few suggestions were received. Several thought that a penalty should be introduced for operation outside the geographical band plan. It is felt that this would be quite impossible to enforce. The band plan is unlikely to be observed in contests until operators calling CQ stop to think before deciding where to start tuning. As G8BXT says, " Why beam North and tune 145 down ? " Two stations in Dorset mentioned a portable filling about 350 kHz with converter whine and suggested that Rule 11 should be invoked. However, as neither of them gave the call-sign of the offender there is little that can be done.

Section A FIXED STATION SINGLE OPERATOR

Call	Posn	Points	QSOs	County Code	Best QSO KM	Power	Aerial
G3REH	1	868	142	LN	415	50	10 ele
G8BBB	2	856	160	CE	435	120	10 ele
G6GN	3	694	111	ST	—	90	10 ele
G3USB	4	547	97	CE	502	150	10 ele
GC2FZC	5	538	66	GY	570	60	8/8 slot
G3GJY	6	519	74	YS	545	18	8 ele
G3EHM	7	483	100	SD	350	80	10 ele
G8AUN	8	465	70	NK	312	40	6/6 slot
G3NEO	9	455	73	YS	430	150	10 ele
G2WS	10	401	74	ST	352	74	6 ele
G8BXT	11	312	87	SD	355	12	8 ele
G3PWJ	12	301	74	SD	295	150	6/6
G3AFA	13	279	64	ST	312	140	8/8 slot
G8APJ	14	209	91	LD	307	18	8 ele
G3WQG	15	201	67	BS	325	20	8/8
G5UM	16	198	44	LR	480	40	10 ele
G2BHN	17=	182	51	ST	285	35	4/4 slot
G3LTN	17=	182	37	NR	300	90	6/6 slot
GC3YIZ	19	173	27	GY	320	12	8/8 slot
G3PKV	20	167	50	HF	365	25	6/6 slot
G3VPR	21	163	40	LN	332	15	4 ele
GW3BOQ	22	146	34	MH	350	50	6/6 slot
G8CHC	23	145	50	EX	357	43	8/8 slot
G8CCV	24	135	36	BE	225	36	8 ele (fixed)
G8CAI	25	124	62	LD	205	15	8 ele
G3UCS	26	119	50	WR	230	20	6/6 slot
G8AEL	27	94	25	BD	256	20	6 ele
GC8BMO	28	85	14	GY	270	15	10 ele
G8BVV	29	83	32	ST	190	40	6 ele
G8BKR	30	72	37	GR	120	18	8 ele
G8BIJ	31	68	50	MX	214	10	8/8
GW8CGN	32	56	20	GN	215	70	8 ele
G3UIK	33	47	35	LD	88	15	6/6 slot
GI5ALP	34	38	7	LY	425	90	20 ele
G8CEM	35	31	25	EX	93	12	8 ele
G8CJV	36	26	16	WR	80	21	Dipole (Indoor)
G8BYK	37=	15	14	LD	55	15	6 ele
G8AAC	37=	15	11	YS	—	4½	5 ele (Indoor)

G8CCE Disqualified Rule 17 QTHs not logged

Section B MULTI-OPERATOR and /A

Call	Posn	Points	QSOs	County Code	Best QSO KM	Power	Aerial
G3WSC	1	945	171	SX	705	80	10/10
G3SLJ/A	2	765	151	EX	432	30	8/8/8/8
G3UCU	3	536	132	LD	425	25	8 ele
G3UHF	4	332	85	LE	320	120	8 ele and 28 ele stack
G3YKV	5	164	49	GR	250	15	8 ele
G3YGP	6	144	62	LD	305	12	8/8 slot
G3WTP/A	7	131	46	BE	—	10	10 ele
G8CAP	8	99	57	MX	206	10	8 ele
G8CKD/A	9	22	12	WR	72	21	Dipole

G8CKY/A and G3IXH disqualified, logs sent to wrong address, Rule 2. G8CSA late entry, Rule 18 (i)

Section C PORTABLE

Call	Posn	Points	QSOs	County Code	Best QSO KM	Power	Aerial
GW3NUE	1	1405	232	BR	500+	50	10 ele
GD3XAC	2	1358	151	IM	512	30	10 ele
G8BQX	3	1201	173	SX	613	25	8 ele
G8AKQ	4	1184	149	YS	530	50	10 ele
GW3TXR	5	1027	172	MG	550	50	10/10
GW3ITZ	6	939	165	FT	480	25	8/8 slot
G8APV	7	926	154	HE	510	25	8/8
GW8BVP	8	915	138	RN	322	12	10 ele
G8AJC	9	820	116	KT	410	28	6/6 slot
GW8ACG	10	787	142	FT	412	20	5 ele
G3EFX	11	767	116	DT	866	25	8/8 slot
G3UES	12	756	168	HE	436	25	8/8 slot
G3NKL	13	699	137	LE	425	22	8 ele
G8AWN	14	684	113	YS	405	20	10 ele
GC8AAZ	15	583	71	JY	570	15	8 ele
G3WUW	16	581	139	WR	325	17	6/6 slot
GW3VXC	17	481	102	MH	380	4½	6/6 slot
G3IGV	18	470	55	CL	815	30	6/6 slot
G2DJ	19	449	116	DY	370	20	5 ele
G8APO	20	370	83	ST	355	11	8 ele
G3SDS	21	352	67	DT	365	35	6/6 slot
GW8AZU	22	340	62	CV	330	0·2	6 ele
G8BCL	23	338	69	YS	420	30	8 ele
G8BQA	24	302	82	SX	270	1	8 ele
G8AVG	25	283	77	WE	310	15	Halo
GM8AGU	26	261	41	KE	440	40	8 ele
G8CBZ	27	222	39	DN	445	18	6 ele
G3ONP	28	206	69	SD	245	6	8/8 slot
G8CSB	29	195	82	SY	301	20	6 ele
G3WSN	30	186	79	EX	416	15	4/4 slot
G8BBA	31	161	49	SD	256	12	10 ele
G8AHE	32	158	41	WR	305	12	5 ele
G8BLM	33	140	45	SD	—	7½	4 ele and 6/6 slot
G3CGQ	34	133	45	BD	330	18	10 ele
GM3OWU	35	95	18	LK	—	10	8 ele
GI3RXV	36	69	30	LY	—	30	6 ele
G3OTK	37	60	26	ST	215	4	Dipole

G8AAY Late entry Rule 18 (i)

On the subject of timing of the contest, G8APV and G8BQX, both near the South Coast, felt that the timing should have been the same as the other countries in Europe, while GW3NUE thought the timing " comical " G8AFA on the other hand liked the timing, while G3UCS pointed out that not everyone is free on Saturdays. G8BQX also queried the necessity of exchanging QTH and QRA Locator. This has been specified so that users of either system will have available the information they need without having to ask for repeats. The Adjudicators are sympathetic in cases where an operator has been unable to wring a QTH out of a Continental station.

The exchange of QTH does tend to show up a shaky contact or poor operating, and some of the errors, such as Guildford becoming Ilford, would be a RAYNET nightmare. Many suspect QRA Locators were noted and the " owners " of the following are asked to check, or better still, get a friend to check them: XO85C, YL47H, YO74C, ZK14E, ZL28H, ZL40C, ZL42H, ZL46J, ZM50H, ZN11B, ZN30C, ZN30J, ZN40A, ZN75F, AL11E, AL24G, AL30C and AM49B.

Check logs from G3KRG/P, GW5NF and G8BLC are acknowledged.

A.J.G.

Results of First 432 MHz (Open) Contest, 24-25 May, 1969

Section A

Call-sign	Psn	Score	QSOs	Cnty	Best QSO	Dist km	Pwr
G8AKE	1	187	49	LR	G2JF	200+	150
G8BBB	2	183	48	CB	G8AEV/P	190	150
G3REH	3	168	40	LN	G8AEV/P	186	150
G8BAK	4	128	51	BD	G3WXI/A	200	150
G8ATK	5	115	42	SY	G8BBB	140	10
G8BGQ	6	109	50	HF	G3REH	120	30
G8AUE	7	107	40	DY	G3TTV/P	140	50
G8AKT	8	94	32	BD	G2JF	135	24
G3XEB	9	85	44	HF	G8AEV/P	175	26
G8BAV	10	60	25	DY	G3WGC/P	137	30
G8AVC }	11	56	22	DY	G8BCA	160	20
G8AYN }		56	31	SY	G8BBB	112	25
G3UBX	13	51	19	SD	G3UQK	103	20
G8ART	14	45	27	HF	G3REH	154	45
G3EHM	15	32	13	SD	G8AYB/P	70	15
G8APJ	16	18	14	LD	G3DAH	82	8
G8AMU	17	16	10	SY	G2JF	86	150
G8BKR	18	12	8	GR	G8AWR/P	73	25

Section B

G3SLJ/A	1	162	54	EX	G8AWS/P	234	120
G3WXI/A	2	127	35	YS	G3KEQ	251	80

Section C

G8AWS/P }	1	213	63	SD	G3KEQ	233	25
G3NNG/P }		213	53	BE	G3UQK	214	10
G8AYB/P	3	190	61	BD	G3UQK	145	20
G3WGC/P	4	187	63	HF	G8AWS/P	—	35
G3TTV/P	5	165	56	SF	G3WXI/A	190	10
G8AJC/P	6	81	26	KT	G3REH	263	25
G8BGW/P	7	63	24	DY	G3NNG/P	168	10
G3GHN/P	8	40	25	KT	G8AKT	180	25
G8ADP/P	9	37	8	DN	G6GN	120	25

Although over 186 stations were recorded as being active during the contest, propagation conditions were so poor that very few of the logs sent in claimed contacts of over 200 km, The event was dominated by the G8 calls; many of the regular participants being conspicuous by their absence. Undoubtedly, the appalling weather damped more than just the enthusiasm of many stations, and in fact there were only nine entries received in the portable section.Whilst the tally of fixed stations was only one fewer than in this event last year, the total number of logs submitted in all sections was down by thirty per cent.

This decline in the number of entries, however, cannot be attributed entirely to the bad weather conditions, which, after all, were very little worse than what most regular VHF/UHF enthusiasts now accept as the norm. The choice of a holiday weekend for this event was unpopular, and whilst a few new competitors were tempted into seeking solace from the storm inside the shack, the weight of adverse comment implied that had the weather been fine, even more stations would have forsaken amateur radio for family interests.

In Section A, John Warrington, G8AKE, is to be congratulated upon maintaining his position as the leading station in spite of a strong challenge by the runner-up, G8BBB, who scored only one QSO and four points less. G3REH, with nineteen points below the winner, returned third place.

Only two stations, G3SLJ/A and G3WXI/A, were entered for section B, and would have qualified for fourth and sixth positions respectively had their scores been included in with the fixed station, single operator entries.

The claimed scores in the portable section were exceptionally close; only five points separating the three highest contenders. It was found necessary to obtain confirmation of the details of several QSOs before the final placings could be resolved with any degree of certainty, and ultimately it was decided to declare a tie for first place.

The two winners, Arthur Russell, G8AWS/P, and the AERE (Harwell) Group operating under the call-sign, G3NNG/P, deserve every credit for their achievement; not the least part being their devotion to duty in the face of the stormy weather. G8AWS operated solo throughout the contest from a site 1600 ft asl, and submitted an exemplary log of his sixty-three contacts. G3NNG/P was operated by G3NNG, G3JKX and G8AGY who shared their 53 QSOs from a site 900 ft asl. G8AYB P, with sixty one contacts, came in a close third.

No station commented too unfavourably on the shorter duration of the contest which finished at 11.00 GMT in order to comply with last year's numerous requests to run the 23cm event as a separate contest. There were, however, stations which would prefer to see the contests running concurrently again, and in view of the small field for this latter event, the VHF Contest Committee will have to give fresh consideration to this point of view before formulating the rules for next year.

Check logs from G8AFA and G8AFA/P are gratefully acknowledged.

3rd 70 MHz Portable Contest

Posn	Call	Score	County Code	QSOs	Best DX Call	Km
1	G3RLE/P	559	SE	103	GI3TLT/P	312
2	GM3VPK/P	441	WG	55	G3WBQ	485
3	GW3UCB/P	417	CV	81	EI7AF/P	218
4	GW3OXD/P	403	RN	70	GM3VPK/P	315
5	G3WIN/P	396	CD	67	G3WYX/P	398
6	G3NJN/P	397	LE	66	G3GZJ	456
7	GW3NUE/P	373	BR	63	GM3VPK/P	—
8	GW3THQ/P	372	DB	77	G3SJV/P	340
9	GW3ITZ/P	311	FT	77	G3WMR	293
10	G3TDM/P	291	BS	70	G3WIN/P	320
11	G3SJV/P	254	SX	64	G3GZJ	385
12	G3VFD/P	248	WR	50	GM3VPK/P	352
13	G3PIA/P	240	BE	48	EI9AD/P	414
14	G3OGY/P	239	LE	69	G3JVL	320
15	GW3UZU/P	233	FL	66	GI3TLT/P	237
16	G3JHM/P	228	MR	39	G3JYL	288
17	G2DJ/P	226	DY	47	G3WYX/P	307
18	G3WYX/P	225	DN	42	GM3VPK/P	—
19	G3VPF/P	208	DT	35	G3WIN/P	390
20	GI3TLT/P	197	DW	61	—	—
21	G3VIR/P	190	SY	59	G3NJN/P	372
22	G3JEQ/P	188	SY	62	G3WYX/P	225
23	G3XLH/P	181	YS	39	GM3VPK/P	280
24	G3TND/P	179	ST	31	G3WIN/P	351
25	G3SLJ/P	161	BD	47	GW3THQ/P	220
26	G3MGS/P	155	SX	48	GW3THQ/P	330
27	G5UM/P	140	LR	31	GM3VPK/P	317
28	G3WCB/P	139	OX	45	G3WYZ/P	210
29	G3ERD/P	134	SD	40	G3PIA/P	167
30	G3LRP/P	121	YS	31	—	—
31	G3TLM/P	112	SY	39	GW3THQ/P	167
32	GW3ERB/P	111	FL	37	G3XLH/P	180
33	GI5ALP/P	104	LY	34	G3EPK	315
34	G3NEO/P	93	YS	24	G3GVM	260
35	GW3VXC/P	90	MH	21	G3JEQ/P	177
36	G2SU/P	83	YS	24	GW3NUE/P	220
37	G3WFM/P	71	SX	30	G3VPF/P	140
38	G3XVU/P	70	YS	25	GW3OXD/P	170
39	GI3PLL/P	69		22	GM3VPK/P	146
40	GW3XMW/P	60	BR	16	G3WIN/P	—
41	G3NQV/P	53	WD	12	GW3UHN/P	175
42	G2WS/P	38	ST	12	G3RLE/P	121
43	GM3KSU/P	20	WN	11	GM3TLA/P	128
44	G2AVC/P	11	MX	9	G3SJV/P	55
45	GM3TLA/P	6	KE	1	GM3KSU/P	120

Check logs were gratefully received from G3ABM, EI9F/P, G3OHC, G3GZJ.

In spite of indifferent conditions the contest was well supported with 45 entries. An unusual feature of the results is that the GW portables did not take the top honours. First place goes to G3RLE/P who diverted from a Welsh holiday to set up a station just east of Ludlow in Shropshire. GM3VPK went a long way from his normal QTH to become runner up with about half the number of QSOs of 'RLE. 'VPK worked the best DX at 485 km —a surprising distance in spite of the below average conditions.

Comments from entrants included " At long last VHF Rules are getting fairly close to an 'ideal' compromise G3WIN/P. " We've never heard so many GWs " G3NJN/P. " We had to close down several times due to static charged rain " GW3THQ/P. (This was reported by many stations.)

Subject to Council approval, Certificates of Merit will go to G3RLE/P and GM3VPK/P.

Salisbury RSGB DF Qualifying Event

Glorious weather tempted eighteen teams to check in at the start on 20 July. Particularly welcome was the Bournemouth contingent, which had come to gain experience of a major DF event. It is hoped that this will lead to a new centre of DF interest in the South.

The " A " station, G3OBW/P, located 11½ miles away on the top of Compton Down, was sited to reward the perceptive navigator. It did just that. Teams could have driven in from the back along two miles of the old Salisbury to Shaftesbury stage-coach road, but the majority committed themselves to a one mile footslog uphill in the sun. A glider descending as he circled the site suggested that a new dimension had been added to DFing, but the unfortunate pilot was only looking for somewhere to force land. He later found that trying to thumb down DF team cars in hot pursuit (and quite unaware of his predicament) was not a profitable occupation.

Most of the incidents which enrich DF events happened at the " B " station, G3CMJ/P. This was less than two miles from the start, nestling in an abandoned and overgrown canal cutting. The weather brought teams into the cutting wearing sports shirts or summer frocks, and the jungle of head-high nettles, brambles and thistles which concealed some very rough going took its toll. Lack of breeze and an abundance of flies, including the biting kind, added to the sweat, toil and tears. Competitors remarks audible at the transmitter site were hardly appropriate to a Sunday afternoon, but more than repaid the transmitter crew for its labours. One competitor, noted for his press-on spirit and not yet qualified this year, was heard to arrive into the cutting via a long, steep, nettle-covered bank sliding flat on his back. But there was a reasonable way in for those that studied the lie of the land.

Fifty-seven sat down in the Wilton Scout Hut to a tea laid on by the Salisbury and District Short Wave Club and their helpers. Mr Mollart conveyed the apologies of Mr G. T. Peck for his unavoidable absence, and appeared to accept that his own success may have been due to long experience. The ensuing rag-chew failed to establish just who was " over the hill " for these events but, subject to RSGB confirmation, Messrs North, Tyler and Butson qualified for the final.

Posn	Competitor	From	Time of Arrival A Stn	B Stn
1	E. L. Mollart	Marlow	1429	1521
2	W. J. North, G3TRY	HighWycombe	1436	1549½
3	P. T. Tyler	Oxford	1456½	1550
4	R. V. Pearce-Boby, G3JLE	Oxford	1554	1447½
5	I. R. Butson	HighWycombe	1507	1601
6	D. E. Newman, G8BGD	Rugby	1618	1517
7	T. C. Gage	Cookham	1458½	1622
8	M. P. Hawkins, G3WMM	Colchester	1511½	1629½
9	J. R. Vickers, G3ORI	Stratford-upon-Avon	1447	—
10	I. R. Bristow	HighWycombe	1454½	—
11	B. Mahony, G3NDM	Rugby	1506½	—
12	D. Nasey, GW3ATM	Newport, Mon.	—	1507
13	J. Sonley	Bournemouth	—	1510
14	G. Foster	Stratford-upon-Avon	—	1512½

(Four competitors failed to find either transmitter)

G.T.P.

Listener's 144 MHz Contest

Identification	Posn	Pnts	QSOs Heard	County Code	Best DX	RF Stage	Aerial
A5032	1	542	144	HF	PA0VVH/P	ECC84	6 ele
BRS28005	2	295	71	SX	PA0CML	AFZ12	8 ele
A6054	3	223	65	GR	GD3XAC/P	6CW4	10 ele
BRS30506	4	173	45	KT	GW8BVP/P	Nuvistor	4 ele
BRS30013	5	102	55	BD	F1AOV/P	6BQ7A	Halo
A6245	6	91	35	DT	G3PWJ	6CW4	5 ele
A5162	7	37	23	EX	G3UES/P	2N3819	3 ele indoor

The number of entries in this contest, held in conjunction with the July Open Contest, was the same as for the 1968 event, but only two operators appear in both tables. This year, Colin Baker, A5032, has pulled ahead of Terry Cooper, BRS28005, to achieve a convincing win and a score which will stand him in good stead for the Listeners' Championship.

A5032 suggests a section for portable stations, but this is unlikely to come about unless there is an increase in the number of entries. There were no portable stations active this time. BRS30013 heard many French stations calling CQ but was only able to log one QSO. Similarly, A5032 was only able to claim points for half of the continental stations heard.

Two of the entrants commented on defects in signals. In one case, a station on 144·34 was splattering up as far as 145·1 MHz. The other was heavily modulated with converter whine. Listeners' reports of this nature are very valuable to the Contests Committee as they may confirm comments received from transmitting stations.

Subject to Council approval, Certificates of Merit will be awarded to the winner and runner-up.

Most of the entrants agreed that conditions were best on the Saturday but BRS28005 noted an improvement to the West at 13.30 on Sunday. BRS30506 on the other hand felt that conditions fell off sharply at about this time.

October 1969 432 MHz Open Contest

This Contest has been added to the calendar at the request of members who were unable to take part in previous 432 MHz events due to their falling in holiday periods.

1. **Date and Time :** 09.00 GMT to 16.00 GMT on 5 October.
2. **All entries** and check logs must be sent to the Adjudicator at: VHF Contests Committee, c/o G3USB, 32 Harbour Avenue, Comberton, Cambridge, CB3 7DD.

In addition the following General Rules as published in the January issue of *Radio Communication* will apply: 3a, 4a, 5a, 6b, 7a, 8a, 9a, 10a, 11–28.

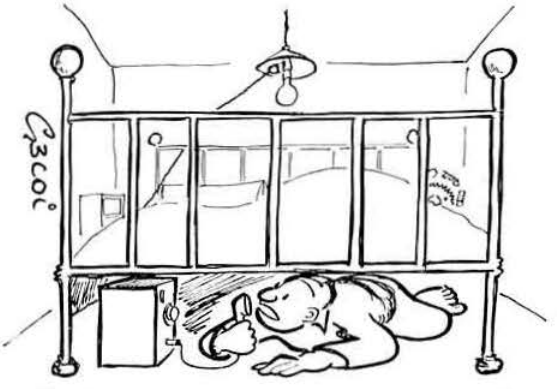
October 1969 1296 MHz Open Contest

1. **Date and Time :** 09.00 GMT to 16.00 GMT on 5 October.
2. **All entries** and check logs must be sent to the Adjudicator at: VHF Contests Committee, c/o G3USB, 32 Harbour Avenue, Comberton, Cambridge, CB3 7DD.

In addition the following General Rules as published in the January issue of *Radio Communication* will apply : 3a, 4b, 5b, 6b, 7a, 8a, 10a, 11–28.

Portable Operation in France under Reciprocal Licencing Conditions

REF have requested that amateurs intending to operate portable stations in France during contests should consult them in advance to avoid any difficulties with sites.



"... hoping to move to a bigger QTH soon ..."

Election of Council, 1970

In accordance with Article 52 of the Society's articles of Association, the Council has nominated the following Corporate Members to fill the vacancies on the Council which will occur on 31 December next.

Ordinary Members

J. C. GRAHAM, G3TR ; L. E. NEWNHAM, G6NZ ; E. W. YEOMANSON, G3IIR.

Not later than 10 October next any ten Corporate Members may nominate any other Corporate Member to serve on the Council by delivering their nomination in writing in a single document to the General Manager, together with the written consent of such nominee to accept office if elected, but each nominator shall be debarred from nominating any other person for this election.

Council Members Elected by Zones

Not later than 10 October next any ten Corporate Members resident in **Zone D** (Regions 6, 9 and 17) may nominate any other duly qualified Corporate Member resident in the Zone concerned to serve on the Council by delivering their nominations in writing in a single document to the General Manager, together with the written consent of such nominees to accept office if elected, but each such nominator shall be debarred from nominating any other person for this election.

Candidates for nomination as Council Members elected by Zone must be resident within the Zones for which they are nominated and the nominators must be resident in the same Zone.

The present Council Member for **Zone D** is **Mr G. Twist, G3LWH.**

RSGB QSL Bureau Sub-Managers

G2:	J. W. Russell, G2ZR, 45 Shakespeare Avenue, Bath.
G3, 4 and 5 two-letter calls and GC:	E. G. Allen, G3DRN, 65a Melbury Gardens, London, SW20.
G6 and G8:	A. J. Mathews, G6QM, 62 Ashlands Road, Hesters Way Estate, Cheltenham.
G3AAA-DZZ:	C. A. Bradbury, BRS1066, 13 Salisbury Avenue, Cheltenham.
G3EAA-HZZ:	W. J. Green, G3FBA, "Meadway," Links Avenue, Brundall, Norfolk, NOR 86Z.
G3IAA-KZZ, BRS and A numbers:	G. L. V. Butler, G2BUL, 9 The Heath, Chaldon, Caterham, Surrey.
G3LAA-NZZ:	F. Bliss, G3IFB, Coppalex North Road, The Reddings, Cheltenham, Glos.
G3OAA-PZZ:	J. H. Brazzill, G3WP, 43 Forest Drive, Chelmsford, Essex.
G3RAA-RZZ:	K. Walden, G3OLN, 250 Gloucester Road, Cheltenham, Gloucestershire.
G3SAA-TZZ:	E. G. Allen, G3DRN, 65a Melbury Gardens London, SW20.
G3UAA-VZZ:	D. Dell, G3PQF, 6 Rye Close, Cove, Farnborough, Hants.
G3WAA-G3XZZ:	R. W. Martin G3RWM, 76 St Paul's Crescent, Coleshill, Warks.
G3YAA series:	P. R. Cheesman, G3KDE, 10 Nursery Road, Hook End, Brentwood, Essex.
G5AAA series, all prefixes:	E. G. Allen, G3DRN, 65a Melbury Gardens London, SW20.
GD:	T. R. Moore, GD3ENK, "Glyn Moar," St John's, Isle of Man.
GI:	R. R. Parsons, GI3HXV, 45 Erinvale Avenue, Finaghy, Belfast.
GM:	D. Macadie, GM6MD, 154 Kingsacre Road, Glasgow, S4.
GW:	J. L. Reid, GW3ANU, 28 Waterston Road, Gabalfa, Cardiff.

The address of the QSL Bureau Manager (Mr A, O. Milne, G2MI) is 29 Kechill Gardens, Bromley, Kent. The QSL Bureau will be closed during May. Please do not send any cards to G2MI during this period.

Cards must be sent to G2MI but envelopes may be sent to the appropriate Sub-Manager or to G2MI. Printed, gummed labels are obtainable from G2MI by sending an sae.

RSGB SLOW MORSE PRACTICE TRANSMISSIONS

These Slow Morse Practice transmissions are sponsored by the RSGB. Alterations and additions to this list should be sent to the Honorary Organizer, M. MacBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

Clock Time	Call-sign	MHz	Town
Sundays			
09.30	G3TNF	1.920	Gateshead
09.30	† G3KZZ	1·920	South Shields, Co. Durham
10.00	† G3WNR	1·920	
09.30	G3HZL	1·940	Isleworth, Middlesex
09.45	G3USK	1·975	Mablethorpe, Lincs.
10.00	G2FXA	437·000 to North	Stockton-on-Tees
10.00	G3TTK	1·860	Coalville, Leics.
10.00	GM3PIP	3·590	Mintlaw, Aberdeen
10.15	G3CGD	1·875	Cheltenham
10.30	G3SJE	28·100	Harrow, Middlx.
10.30	G2FXA	437·000 to South	Stockton-on-Tees
10.30	G3NPB	1·875	St. Ives, Cornwall
11.00	G2FXA	1·900	Stockton-on-Tees
11.00	GW3UMB	1·880	Colwyn Bay
11.30	G3KKU	1·940	Liverpool
12.00	G3HVI	1·890	Stoke-on-Trent
12.00	G3GNS	1·910	Weston-super-Mare
13.30	G3FWW	1·880	Burnham-on-Sea, Soms.
13.30	G3XDV	1·910	Canterbury, Kent
14.00	G3XGJ	1·830	Huddersfield, Yorks.
17.30	G3TNF	1·920	Gateshead
Mondays			
17.30	G3TNF	1·920	Gateshead
18.00	G3SWR	1·980	Birmingham
18·30	G3NCZ	1·920	Blackburn, Lancs.
18.30	G3RXH	1·910	Skipton, Yorks.
19.00	G3WGU	1·880	Bispham, Lancs.
19.00	† GC4LI	3·600	Jersey, C.I.
	† GC2FMV		
19.00	G3YJA	1·920	Coventry, Warks.
20.00	G3KAN	1·990	Northampton
20.00	G3IBJ	1·910	Southampton, Hants.
20.00	GI3JEX	1·860	Belfast
20.00	† G3WDW	1·915	Leeds, Yorks.
	† G3VTY		
20.15	G3SAZ	1·845	Ashford, Middlesex
20.30	G3YEB	1·915	Harlow, Essex

† Alternately

Tuesdays

17·30	G3TNF	1·920	Gateshead
18.00	G3XDV	1·910	Canterbury, Kent
19.00	† G3UFO	1·930	Wirral, Cheshire
	† G3XAM		
19.30	G3SWP	1·850	Doncaster, Yorks.
19.30	G3WGU	433·500 to South-East	Bispham, Lancs.
20.00	G3UPA	1·850	Meriden, Warks.
20.00	† G3FAU	1·980	Stevenage, Herts.
	† G3KSS		
	† G3OVT		
20.00	G3FWW	1·880	Burnham-on-Sea, Soms.
20.00	G3TPV	1·910	Hythe, Hants.
20.00	GM3UWX	144·045	Bishopton, Renfrewshire
20.30	G3UNV	1·845	Ashford, Middlx.
20.30	G2ABC	1·915	Woodford, Essex
21.00	G4RS	1·865	Blandford, Dorset
21.30	G2ABC	144·750	Woodford, Essex
22.00	G3HZM	1·925	Manchester

Wednesdays

17.30	G3TNF	1·920	Gateshead
18.30	G2FXA	1·900	Stockton-on-Tees
19.30	G3WGU	433·500 to South-East	Bispham, Lancs.
19.30	G3UJD	1·825	Farnborough, Hants.
20.00	G8QU	1·970	London, N22
20.00	GM3PIP	3·590	Mintlaw, Aberdeen
20.30	G3HZL	1·845	Isleworth, Middlx.
20.30	G3KGU	1·915	Theydon Bois, Essex
21.00	G3HVI	1·890	Stoke-on-Trent
21.00	G3XUF	1·970	Newhaven

† Alternately

Thursdays

17.30	G3TNF	1·920	Gateshead
18.00	G3SWR	1·980	Birmingham
18.30	GW3VBP	3·590	Barry, Glam.
18.30	GW3UMB	1·880	Colwyn Bay
18.30	G3NC	1·968	Swindon, Wilts.
19.00	G3WGU	1·880	Bispham, Lancs.
19.30	G3GNS	1·910	Weston-super-Mare
20.00	GI3JEX	1·860	Belfast
20.30	G3SJE	1·875	Harrow, Middlx.
20.30	† G3ROE	1·915	Harlow, Essex
	† G3RSF		
	† G3TIQ		
	† G3YFC		
21.00	G4RS	1·865	Blandford, Dorset
21.00	GW3XNI	1·930	Crosskeys, Mon.

Fridays

17.30	G3TNF	1·920	Gateshead
18.00	G3XDV	1·910	Canterbury, Kent
18.30	G3NCZ	1·920	Blackburn, Lancs.
19.00	G3NPB	1·875	St Ives, Cornwall
19.30	G3PQF	1·825	Farnborough, Hants.
20.00	† G3WGW	1·915	Pudsey, Yorks.
	† G3WIX		Bradford, Yorks.
20.00	G3EEL	1·980	Peterborough
20.15	G3SAZ	1·845	Ashford, Middlesex

Saturdays

09·30	G3UNV	1·940	Ashford, Middlesex
10.00	G3PLE	1·820	Stourbridge, Worcs.
13·00	G2FXA	1·900	Stockton-on-Tees
14.00	† GC4LI	3·600	Jersey, C.I.
	† GC2FMV		
17.30	G3TNF	1·880	Gateshead
19.30	G3EFS	1·913	Bromley, Kent
20.00	G3KPO	1·980	Peterborough
21.00	G3TTK	1·823	Coalville, Leics.

† Alternately

Members might like to be reminded that the Royal Naval Amateur Radio Society using their call-sign G3BZU, transmits c.w. as a proficiency test at 19.00 GMT on the first Tuesday of each month. Frequencies used are 1·875 MHz for practice only, and 3·520 MHz for speed proficiency tests. Certificates are issued against correct copy submitted to: The Royal Naval Amateur Radio Society, HMS Mercury, Leydene, Hants. A small charge is made to cover costs.

Listeners: These slow Morse practice transmissions are promoted specifically to help you, and unless you play your part it will become increasingly difficult to keep the service going. If you benefit from any of these transmissions you owe it to the operator concerned to let him know you listen. This service is a call upon the operator's leisure time, and he is more likely to sacrifice it to help you, if he knows he has an audience.

CLUB NEWS

ATTENTION CLUB SECRETARIES ! ! !

We have been asked by a Regional Representative to mention some points regarding submission of copy.

Many secretaries are forgetting vital details when they send in their information. Please check your copy carefully. Apparently some secretaries are assuming that the copy that they submit on the first of a month will appear in the magazine of that month. Gentlemen, our printers are pretty good but they can't convert copy into a magazine in three days! Notes submitted by 1 October will be included in the November magazine and so on.

It would be helpful if the senders of notices would indicate their exact positions, ie secretaries, Area Representatives, etc. Finally, please do not expect a programme of your club's events for the next six months to let you out of sending further copy. It is not practical for a regional representative to survey a mass of programmes to glean out what is applicable for a particular month. It is up to you to submit your club's events monthly to the RR (never direct to RSGB HQ). Of course, it is a courtesy to let him have your long-term programme as well, as a confirmation. Your co-operation will be greatly appreciated.

REGION 1 RR B. O'Brien, G2AMV

Merseyside Luncheon Club—normally meets on the first Monday in every month but in September, because of the Bank Holiday, a lunch has been arranged for 8 September. HMS Landfall 12.30 for 12.45 meal. If you wish to attend please advise G3VQT or G2AMV beforehand.

Ainsdale (ARC)—3 and 17 September, 1 October, 8 pm. " Morris Dancers " Scarisbrick.

Allerton (Liverpool) Scout Amateur Radio Society, North West Region—First and third Thursdays each month, 8 pm. Liverpool County Scout Headquarters, Richmond Street, Liverpool.

Blackburn East Lancashire Amateur Radio Club—4 September (Surplus Equipment Sale), 2 October "Electronic Novelties" by R. Isherwood), 7.30 pm. Edinburgh House, Shearbank Road, Blackburn. Further details from *G4JS*.

Blackpool (B & FARS)—Mondays 8 pm. Pontins Holiday Camp, Squires Gate. Morse tuition from 7.30 pm.

Bury (B & RRS)—The next meeting takes place at the George Hotel on Tuesday 9 September commencing 8 pm. One of our own members (G3RSM) takes the floor at that time to give a talk on " Post Office Microwave Links " and it is hoped to follow up the talk by a visit to Heaton Park Radio Station a week later. Club Secretary *G3VVQ* 411 Holcombe Road, Greenmount, Bury.

Cheshire (Mid-Cheshire ARC)—Club nights every Wednesday 7 pm to 9.30 pm. Instruction nights every Thursday 7 pm to 9.00 pm. The latter includes theoretical work for the RAE, practical construction and morse practice. Further details from *G3JWK*. Technical Activities Centre, Winsford Verdin Grammar School, Winsford, Cheshire.

Chester (C & DARS)—Tuesdays 8 pm, YMCA.

Crewe and District—Local interest is being kept alive by R. Owen BRS26847, the local representative. He welcomes calls at his home from local enthusiasts and is searching diligently for a new meeting place. His address is 10 Circle Avenue, Willaston, Nantwich, Cheshire.

Douglas (D & DARS)—Second and fourth Wednesday each month 7.00 pm, 19 Rosemount, Douglas. Further information from W. T. McEvoy at same address. Tel Douglas 6146.

Eccles (E & DRC)—Tuesdays 8 pm, Bridgewater School, Worsley, Lancs. Every Thursday Club Top Band net 20.30. hours.

Leyland Hundred Amateur Radio Group—The Thursday night net at 20.00 hours GMT on 1.915 Mhz.

Liverpool (L & DARS)—Tuesdays 8 pm, Conservative Association Rooms, Church Road, Wavertree. Secretary—H. James, *G3MCN*, 448 East Prescot Road, Knotty Ash, Liverpool 14.

Liverpool (NLRC)—Meetings are alternate Fridays, that is 12, 26 September, 10 October at 8 pm, Labour Party Headquarters 13 Crosby Road South, Liverpool 22. Secretary Peter Jeffs, 38 College Road North, Liverpool 23. Telephone 051-924 3020.

Macclesfield (M & DRS)—9 and 23 September, 7 October, 8 pm, The George Hotel, Jordangate.

Manchester (M & DARS)—Wednesdays 7.30 pm, 203 Droylesden Road, Newton Heath, Manchester 10. Hon Secretary G. Tillson, *G3TJK*, 95 Kelverlow Street, Oldham, Lancs.

Manchester (SMRC)—Fridays 8 pm, Conservative Association Divisional Office, 449 Palatine Road, Northenden, Manchester 22.

North West VHF Group—Meetings take place every Monday at 8 pm, in the Club Caravan, Greeba, Shady Lane, Manchester 23.

Preston (PARS)—4, 18 September, 2 October, 7.30 pm. (Private Room) " Windsor Castle " St. Paul's Square.

Salford (Dial House Radio Society)—The Society is still quite active but has suffered a slight drop in attendance lately due to members being involved in various exams. At the moment we are hoping to move QTH to a hut on the roof of Dial House and if this comes off it is expected that there will be an increase in the vhf activities of the club. Every Wednesday evening at 6 o'clock the club meets on the 8th floor, river end, of Dial House. Anyone interested who is a GPO engineer should write to the secretary at Dial House, Chapel Street; Salford 3.

Southport (SRS)—Wednesdays 8 pm and Sundays 2.30 pm, The Esplanade, Secretary S. Miller, 72 Station Road, Banks, Southport.

Southport (73 SSB Society)—Thursdays at 8 pm. (All commencing with a talk on part of RAE Syllabus) 73 Avondale Road North, Southport.

Stockport (SRS)—3 and 17 September, 1 October 8 pm, The Brookfield Hotel, Wellington Road South, Stockport. New members are always welcome. Further details from the secretary who is D. I. Lunn *G3LSL*, 4 Farnham Avenue, Macclesfield (Tel 7903).

Warrington, Culcheth (CARC)—Fridays, 7.30 pm, Chat Moss Hotel, Glazebury. All visitors will be welcome. Secretary K. Bulgess, 32 Hendon Street, Leigh.

Westmorland—Fridays 7.30 pm, 24 Park Road, Milnthorpe. Additionally there is an RAE class on Mondays and Thursdays at the same time. Secretary *G3UEC*, 9 Castle View, Sedgwick, Kendal.

Wirral (WARS)—7.45 first and third Wednesdays each month at former Civil Defence Headquarters, Upton Road, Bidston, Birkenhead. 3 September (sale of members surplus equipment), 17 September (general discussion on interesting topics). On July 2 G3KEN brought along an *Inoue* tranceiver and gave a talk and demonstration to show its capabilities. On 16 July Roger Hatton gave an interesting talk on radio controlled models and showed the members a radio controlled boat which he had built. Unfortunately we did not have a lake to put it in! Fourteen of our members went on a DXpedition to Merionethshire from 25 to 27 July. On behalf of the members I would like to take this opportunity to thank all stations worked for the QSO's which made it such a very worthwhile weekend. Public Relations Officer *G3WSD*.

Wirral (Wirral DX Association)—Officers elected are G3UFO Chairman, G3VUY Treasurer, and *G3OKA* Secretary. The Wirral DX Association award has been presented to one W and a number of G stations. The August meeting was held at the Anchor Hotel Irby. For details of future meeting dates and place apply G3OKA. Member G3XAR is now in Cornwall and Ivan Davies is now signing as GM31ZD from Argyllshire on 160m.

Region 2 RR K. Skethaway, BRS20185.

Barnsley (B & DARC)—12 September (AGM), 26 September (" Transistorized Dip Oscillator " by P. Carbutt, G2AFV), 7.30 pm, King George Hotel, Peel Street, Barnsley. *G3LRP.*

Durham (DCARS)—11 September (" Medical Electronic Techniques " by J. Melvin, G3LIV), 25 September (" High Voltage Power Supplies " by A. Dowdell), 7 pm, Elvet Riverside Arts Block, Durham University, New Elvet, Durham.

Fulford (F & DARS)—Meetings every Tuesday 7.30 pm, New HQ Scout Council House, 31 George Street, York. Starting September series of lectures up to RAE standard, also Morse. *G5KC.*

Halifax (Northern Heights ARS)—Members still meet at the Sportsman Inn, Ogden, Halifax at 7.45 pm, 14 September (DF Foxhunt), 24 September (Junk Sale), 8 October (Lecture). The Club is hoping to run 2 Jamboree stations in the forthcoming ' Jamboree on the air,' using the calls G3MVH/A and GB3KSG.

Middlesbrough (TARS)—First, third Fridays each month, 8 pm, Settlement House, 132 Newport Road, Middlesbrough. *G3JMO.*

Pudsey (P & DRC)—The White Rose Rally was very successful. Thanks are expressed to all who came to the Rally, including the dealers. The Club members are so enthusiastic, that it is already been agreed to hold another rally next year. We hope that it will be bigger and better than ever. The date of next year's rally will be announced very soon. *G3WIX.*

Scarborough (SARS)—7.30 pm, Thursdays, c/o RAF Association Fulbeck House, 3 Westover Road, Scarborough. *G8KU.*

South Shields (SS & DARC)—19 September (AGM), Meetings Fridays 8 pm, Trinity House, Social Centre, Laygate, South Shields. *G3SFL.*

Spen Valley (SVARS)—25 September (G8AYI/G6AAS/T will demonstrate pictures on 470 cms), 2 October (Crystal Night—members invited to bring crystals and their frequencies will be measured), Visit to BBC Studios at Leeds on Thursday 18 September at 7.30 pm, limited to 12 members and the party is full. Syllabus for 1969/70 is now ready and Club Secs, and friends may obtain a copy by sending a sae to the Secretary, N. Pride, 100 Raikes Lane, Birstall, Near Leeds. Lectures held at Heckmondwike Grammar School, 7.30 pm. *G8BSC.*

Teeside—Second Saturday every month, Social Evening, 8 pm, The Crown Hotel, Yarm. *G3JMO.*

York (YARS)—Thursdays, 7.30 pm, British Legion Rooms, 61 Micklegate, York. *G8BOK.*

REGION 3 RR R. Fisher, G3PWJ.

Birmingham (MARS)—16 September (Talk and colour slides, G3BA/G3BHT GM Trip), 8pm. Visitors welcome, Midland Institute, Margaret Street, B,ham 3. At the July meeting Messrs. Amateur Electronics gave a demonstration of the well known Trio equipment. *G8BHE.*

(South)—3 September (" RSGB Matters " by G3PWJ, Region 3 Representative), 1 October (AGM), 8 pm, The Scouts Hut, Pershore Road, Stirchley, B,ham 29. The July meeting was the Veroboard Talk and Display by Mr Tony Woodhouse, meeting was well attended, enjoyed by all. *G8BHE.*

(University Aston)—Club meets every Wednesday, 1.30 pm Room 743, during term time. During New Students Conference, 2, 3 Oct the secretary will be available in the clubroom at 12.30 pm. *G3XXT.*

Coventry (CARS)—5 September (Preparation for VHF NFD), 12 September (" First Aid in the Ham Shack," Lecture By St John's Ambulance Brigade), 26 September (AGM), 19 September (Night on the Air). Scout HQ 121 St, Nicholas Rd, Radford, Coventry.

Dudley (DARC)—9 September, 23 September (Talk, " Pye mobile Radio equipment " by J. Preston G8BIU) 8 pm, Central Library, St James's Rd, Dudley. *G3PWJ.*

Hereford (HARS)—First and third Fridays of each month, Civil Defence, HQ, Goal St, Hereford. *G3RJB.*

Leamington Spa (MWARS)—Every Monday, 8 pm, 28 Hamilton Terrace, Leamington Spa.

Lichfield (LARS)—First Monday and third Tuesday of each month, 8 pm, The Swan Hotel, Bird Street, Lichfield. *G3NAS.*

Redditch (EWARG)—11 September (" Why VHF Well, Why not! " Talk by T. Douglas, G3BA), 8 pm, Old Peoples Centre, Park Road, Redditch. *G3EVT.*

Shrewsbury (SARS)—11 September (Contest with Chester and Hereford ARS), 18 September (Club Station), 25 September (Sale of Surplus Equipment), 8 pm Shrewsbury School, Signals Hut. *G3WNI.*

Solihull (SARS)—30 September (" Demonstration of Amateur TV " by G3PTM and G5QI), 8 pm, The Old Manor House, 126 High Street, Solihull. *G3VXV.*

Stafford (English Electric)—Wednesday and Friday Evenings, 7.30 pm, Visitors are most welcome. Association Hall, Stychfields, Stafford. *G3RLH.*

Stourbridge (STARS)—9 September (Amateur TV by H. Parker G6RKU/T), 23 September (Visit to Birmingham Airport Control), 2 October, (Annual Dinner at Lyttleton, Hagley), HQ Longlands School, Stourbridge. Informal meetings are held the third Tuesday each month at ' Shrubbery Cottage ' 8 pm, Heath Lane, Stourbridge.

Stratford (SUARC)—5 September (Preparations for Garrick Festival Station), 19 September (" The FT100 Transmitter " by G3III), 3 October (" Aerials " by G3OOQ), 7.30 pm, Hall's Croft, Old Town. *G3XFV.*

The Radio and Electronics Society of Heath School, Halifax, recently held a 24 hour " at home " for parents and friends. The club own several receivers, including an AR88D, an HE30, 19 and 22 sets, and a Hallicrafters Super Defiant. An impressive array of long wires and dipoles had been erected with a Joystick mounted at 50 ft (in the school bell-tower) with 200 ft of feeder.

" Round the clock " operation was provided by friends from the Northern Heights Club, with a KW2000 and 600 linear on the hf bands to a Mosley tri-band vertical. Home-brew 2m gear was provided by G8AFV. A 70cm tv link was made from the home of G8AXY, the boys were able to witness pictures of Appollo 11 quality.

The club was formed three years ago after the master i/c had attended the Ollerton Weekend, which was run for teachers and youth workers interested in forming school societies. All the gear is treasured by the boys, since they have earned the money to buy it themselves. A sponsored walk in September is intended to raise funds for a KW or Heathkit transceiver, and 2m gear.

The weekend proved so successful that the Northern Heights club is to form a junior section, based at Heath, to cater for the 90 members. The activities will be an extension of those run during school hours. Plans are also being made to run a second " Ollerton Weekend," and persons interested in helping are asked to contact R. Bellerby at Heath School, Halifax, as soon as possible. The photo shows G3UGF, BRS27315, plus some of the boys. *(Photo: Halifax Evening Courier).*

Sutton Coldfield (SCRS)—Second and fourth Mondays of each month. SCTFC Clubhouse, Coles Lane Sutton Coldfield. *G8AVH.*
Wolverhampton (WARS)—8 September (Veroboard Demonstration) 8 pm, Neachells Cottage, Stockwell Road, Tettenhall. *G3UBX.*
Worcester (W & DARC)—13 September (AGM), 8 pm meetings held Wednesday and Saturday evening, 35 Perdiswell Park, Droitwich Road, Worcester. *G3TQD.*

Region 4 RR T. Darn, G3FGY.
Nothing received from this Region.

Region 5 RR S. J. Granfield, G5BQ.

Bedford (B & DARC)—4 September (SWR & Wattmeter), 11 September ("Scope Talk" by David Viewing), 18 September (Informal), 25 September (Club Project—The Twoer). Thursdays at the Dolphin Inn, Broadway, Bedford at 8 pm (Morse Classes at 7.30 pm).
Bishop's Stortford (BS & DARC)—15 September (Tony Davis G3VTH on "Oscilloscopes"). 8 pm at the British Legion Club, Windhill, Bishop's Stortford, Hertfordshire.
Cambridge (C & DARC)—5 September (Grand Junk Sale—"Want an 'Atlanta' or a TA33 Snr—Well you never know"), 12 September (Informal), 19 September (Quiz), 26 September (Informal). Fridays 7.30 pm, Club Headquarters, Corporation Yard, Victoria Road, Cambridge.
Dunstable Downs (DDRC)—Meetings on Fridays at 8 pm at Chew's House, Dunstable.
Luton (L & DARS)—Meeting at 8 pm on first Thursday in the month at Club HQ, Putteridge Estate, Luton.
March (M & DRAS)—Meetings on Tuesdays at old Police HQ, High Street, March, Isle of Ely.
Peterborough (P & DARS)—Meeting at 7.30 pm on first Friday in the month in the Electronics Section, Peterborough Technical College, Eastfield Road. On other Friday evenings meetings are held at Club HQ in the Old Windmill, behind the Peacock Inn, London Road, Peterborough at 8 pm.
Shefford (S & DARS)—Meetings on Thursdays, 8 pm, Church Hall, High Street, Shefford.
Stevenage (S & DARS)—Meetings on first and third Tuesdays at 8 pm, Hawker-Siddeley Dynamics Ltd, Gunnels Wood Road, Stevenage.

Region 6 RR L. Owen, G8MC.

Cheltenham (RSGB Group)—First Thursday, 8 pm, Great Western Hotel, Clarence Street, Cheltenham.
Gloucester (GRC)—Meetings restart Thursday 11 September at new meeting place. RAFA Club, 6 Spa Road, Gloucester and thereafter on the second and fourth Thursdays at 7.30 pm.

Region 7 RR P.A. Thorogood, G4KD.

Club of the year: Congratulations to Guildford & District RS on winning club NFD for Region 7. **Club Newsletter of the year:** North Kent RS.
Acton, Brentford & Chiswick (ABCRC)—16 September, 7.30 pm ("Mobile Operation in France" by G3CCD/F0HCM). Chiswick Trades and Social Club, 66 High Road, Chiswick.
Addiscombe (AARC)—7.30 pm second and fourth Tuesdays, 7.30 pm. Toc H Hall, 158 Lower Addiscombe Road.
Ashford, (Echelford ARS)—8 September (display of members homebuilt gear), 25 September (lecture). Last meeting 42 members (25 RSGB) and 9 visitors heard talks by G8ASI and G2FNK on colour tv, 7.30 pm, St Martins Court, Kingston Crescent, Ashford, Middx.
Barking (B & DREC)—Tuesdays and Thursdays, 7.30 pm. Class for RAE will be held at Gascoigne Recreation Centre on Tuesdays at 7.30 pm, commencing 23 September. Applications to Warden at Centre. Club's stand at Dagenham Town Show proved quite eventful on the 13th, Capacitor on 2m blew up, smoke attracted large crowds. 2m tx failed but G3VEA and G3YEA brought transceivers along. Army helicopters prevented more QSO's.
Bexleyheath (NKRS)—Second and fourth Thursdays. 11 September, 7.30 pm (members current projects), 25 September, 7.30 pm ("Diplomatic Wireless Service" by J. D. Ralphs). Last meeting Junk Sale, large amounts of gear changed hands thanks to G3OFM. Congregational Church Hall, Chapel Road, Bexleyheath.
Cheshunt (CDRC)—First Friday of month, 7.30 pm, Methodist Church Hall, opposite Theobalds Station, Cheshunt.
Chingford (RSGB Group)—Fridays. Tel 01-524 0308.
Chingford (SRC)—Fridays, 8 pm. Friday Hill House, Simmons Lane, Chingford, E4.
Civil Service (CSRS)—First and third Tuesdays, 6.30 pm. 16 September (AGM). Full turn-out is request, new blood (not taken) is required. Committee vacancies! 21 October (C. V. Lea, a member will speak about "Early Days of Radio" and "Croydon Airport"). 6.30 pm, Civil Service Recreation Centre, Monck Street, Westminster.
Croydon (SRCC)—Third Tuesday, 7.30 pm. Swan and Sugarloaf, South Croydon.
Crystal Palace (CP & DRC)—20 September, 8 pm (Technical Film Show). Club cw net to start on 14 MHz band, G3OOU to report. 8 pm, Emmanuel Church Hall, Barry Road, SE22.
Dorking (DR & DRS)—Second and fourth Tuesdays. "Wheatsheaf", fourth Tuesday, "Star and Garter", Dorking.
Ealing (E & DARS)—Tuesday, 7.30 pm, Northfields Community Centre, Northcroft Road, W13.
East London—21 September, Sunday, first meeting of season, 2.30 pm, Wanstead House, The Green, Wanstead, E11.
Edgware & Hendon (E & DRS)—Second and fourth Mondays, 8 pm, St Georges Hall, Flower Lane, Mill Hill, NW7.
Farnham, Bucks (Burnham Beeches RC)—Fortnightly, Mondays, Farnham Common, Village Hall, Victoria Road.
Gravesend (GRS)—Wednesdays, 8 pm, Community Centre, Cedar Avenue, Kings Farm Estate, Gravesend.
Guildford (G & DRS)—Second and fourth Fridays. 5 September (VHF NFD), 14 September (3.5 MHz Contest), 19 September (prepare for MES), 20/21 September (MES Show—Model Engineering Society—at Stoke Park). Guildford Engineering Society, Stoke Park.
Hampton Court (TVARTS)—First Wednesday, 7.30 pm, The Three Pigeons, Portsmouth Road, Surbiton, Surrey.
Harlow (DRS)—Tuesdays (General), Thursdays (CW Practice), Fridays (Junior). 7.30 pm, Mark Hall, Barn, First Avenue.
Harrow (RSH)—Every Friday, 8 pm, Roxeth Manor School, Eastcote Lane, Harrow.
Havering (H & DARC)—Fortnightly, 8 pm, British Legion House, Western Road, Romford.
Hemel Hempstead (HH & DARS)—First and third Fridays, 7.30 pm, "Addmult" Sports Club, Hemel Hempstead.
Holloway (GRS)—Mondays (RAE) 7 pm, Wednesday (Morse) 7.30 pm, Fridays (Club) 7.30 pm, Montem School, Hornsey Road.
Ilford—Every Thursday, contact G3PCA, urgently. 8 pm, 50 Mortlake Road, (off Ilford lane), Ilford.
Kingston (K & DARS)—Second Wednesday, 8 pm, Penguin Lounge, 37 Brighton Road, Surbiton.
Leyton & Walthamstow—Tuesday, 7.30 pm, Leyton Senior Institute, Essex Road, E10.
London (UHF Group)—First Thursday, 4 September, 7.30 pm, ("High Power on 70 and 23 cms"). Whitehall Hotel, Bloomsbury Square, Holborn, WC1.
Loughton—Fortnightly, Fridays, Loughton Hall, Rectory Lane (near Debden Station).
Maidenhead (N & DARC)—Third Tuesday of month, 7.30 pm, Victoria Hall, Cox Green, Maidenhead.
New Cross—Wednesdays and Fridays. Full programme arranged for winter of lectures, contests and film shows. New members and visitors welcome. Lectures: G3GHN on the Air—Workshop facilities—Visit to BBC Receiving Station, Tatsfield. Our recent Field Day was won by Clive Jenner, G8APV/P on 144 MHz am with 45 contacts, 8 pm, 225 New Cross Rd, SE14.
Paddington (P & DARS)—Thursdays, 7.30 pm, Beauchamp Lodge, 2 Warwick Crescent, W2.
Purley (P & DRS)—First and third Fridays, 8 pm, Railwaymans Hall, Side Entrance, 58 Wytecliffe Road, Purley.
Reigate (RATS)—First Wednesday, 7.45 pm, George and Dragon, Cromwell Road, Redhill. 17 September, invitation to home of G8AMU, Johnson House Lodge, Hatchlands Road, Redhill. Tel Reigate 46622.
Romford (R & DRS)—Tuesday, 8.15 pm, RAFA House, 18 Calton Road.
Scouts (ARS)—Congratulations to G3YNP and G3YIC on getting their calls. New information of Kempston and Maldon Scouts Radio and Electronics Group with callsign G3YNS, meets Tuesday evenings, Blagden Road, Venture Hall on 18 September, 7.30 pm. Baden-Powell House, Queensgate, South Kensington, SW7.
Sidcup (CVRS)—First and third Thursday, 8 pm, 4 September (Film Show and RSGB 1968 News film). Congregational Church Hall, Court Road. 17 October (Surplus Sale), to stop rising costs and help our Society lease, Bring and Buy (good gear best). Newsletter report of Emley Moor mast collapse and what happened next is well worth reading. What a story of co-operation.

Slough (SDR Group)—First Wednesday, 7.30 pm, United Services Club, Wellington Street.
Southgate (SRC)—Second Thursday of month, 7.30 pm, Civil Defence Hut, Bowes Road, N11.
St Albans (Verulam ARC)—3 September, last informal meeting at Salisbury Hall. 17 September, 7.30 pm, start ("Home Brew Radio Astronomy" by an expert in the Art, J. R. Smith, MIEE, member of the Radio Astronomical Association). Town Hall, St Peters Street, St Albans.
Sutton & Cheam (SCRS)—Third Tuesday, 8 pm, The Harrow Inn, High Street, Cheam.
Welwyn (Mid-Herts ARS)—Second Thursday of the month. 11 September, 8 pm (Technical Topics by Pat Hawker, G3VA). 9 October (AGM). Welwyn Civic Centre, Welwyn.
Wimbledon (W & DRS)—Second and last Fridays, 8 pm, St John Hall, 124 Kingston Road, South Wimbledon, SW19.
Wembley (GECARS)—Thursday, 7 pm, Sports Club, St Augustin Avenue, North Wembley. (This Club is open to non-GEC employees by invitation. Tel ARN 1262 for details.)

Region 8 RR D. N. T. Williams, G3MDO.

Eastbourne (SARS)—Meetings held at the Victoria Hotel, 8 pm. Latimer Road, Eastbourne.
Thanet (TRS)—26 September (Opening session Natter), 3 October (Bring and Buy Sale). Meetings held at Hilderstone House, St Peters Road, Broadstairs.
Worthing (W & DARC)—Club Room at the Rose Wilmot Youth Centre, Littlehampton Road, Worthing will be closed on Tuesdays 2 and 9 September. 2 September (Visit to Swandean telephone exchange), 23 September (AGM), 8 pm.
Mid-Sussex (M-SARS)—Meetings at Marle Place Further Education Centre, Leylands Road, Burgess Hill.
Maidstone (M YMCA ARS)—Meetings held every Tuesday and Friday 8 pm, at "Y" Sports Centre, Melrose Close, Loose, Maidstone.
Canterbury (EKRS)—10 September (General Meeting). Further details of future meetings from Hon Sec D. N. T. Williams. *G3MDO.*

Region 9 RR J. Thorn, G3PQE.

Bristol (BARC)—Every Monday and Thursday, 7.30 pm. Club HQ (G3TAD), University Settlement, 41 Ducie Road, Barton Hill, Bristol 5. *G3WLZ.* (RSGB Group)—22 September (TVI and its prevention), 7.30 pm. Becket Hall, St Thomas Street, Bristol 1. The RSGB President paid the Group a visit and gave an insight into the workings of the RSGB at the July meeting. Home constructed gear was judged at the August meeting. *G3ULJ.*
Burnham-on-Sea (BOS-RS)—*G3GIW.*
Cornish (CRAC)—4 September ("DF Projects" by G3XFL), 7.30 pm. SWEB Clubroom, Pool, Camborne. *G3NKE.*
(VHF Group) —Third Thursday in each month, 7.30 pm, The People's Palace, Pydor Street, Truro. *G3XC.*
(Falmouth Group)—Meet alternate Tuesdays, Laburnham Drive Mission hall. *G3OJN.*
(Newquay Group)—Resume on Wednesdays alternating from 3 September, Treviglas School. *G3THT.*
Exeter (ERAS)—First Tuesday in each month, 7.30 pm, St Sidwells Methodist School Hall, Sidwell Street, Exeter. *G3HMY.*
Plymouth (PRC)—First and third Tuesdays in each month, 7.30 pm. Virginia House, Bretonside, Plymouth. *G3YDU.*
Saltash (S & DARC)—5 September Film Show, 19 September Junk Sale, both 7.30 pm. Burraton Toc H Hall, Warraton Road, Saltash, Local activity continues to be active with a fair number of mobiles, visitors and locals in action. *G3XWA.*
South Dorset (SDRS)—5 September pre VHF Field Day discussions on Operating techniques including demonstration of equipment being used. *G3RZG.*
Taunton (TARS)—Every Friday, 7.30 pm. SEVO HQ, Taunton Barracks, The Mount. *G3DTB.*
Torbay (TARS)—27 September ("Transistor Talk"). Every Tuesday and Friday evenings, Club night. Club HQ (G3NJA), Bath Lane, Rear of 94 Belgrave Road, Torquay. Very well attended meeting at the July business meeting to hear a tape by Mr Heather with excerpts featuring the voice of Marconi to the Moon landing talkback. *G3NQD.*
Wells (WARS)—*G3MQQ.*
Weston-super-Mare (WSMARS)—5 September, The Society are invited to enjoy the RAF ARS HQ amenities at Locking RAF Camp for their September, and 10 October meetings. *G3GNS.*
Yeovil (YARS)—Wednesdays, 7.30 pm. Park Lodge, The Park, Yeovil. *G3NOF.*

Region 10 RR C. H. Parsons, GW8NP.

Blackwood (ARC)—Fridays 7.0 pm, Blanche Cottage, off High St, Blackwood, Mon. *G6BK.*
Barry College of Further Education (ARS)—Next meeting will be on Thursday, September 25 at the College, Colcot Rd, Barry, Glam, at 7.0 pm. The AGM will be held on October 9. *GW3VPB.*
Cardiff (RSGB Group)—Monday, September 8, 7.30 pm, VHF Field Day discussion due to change of location, TA Centre, Park St, Cardiff. *GW3GHC.*
East Glamorgan Raynet Group—First Tuesday in each month, 7.30 pm at Cardiff Emergency Services Headquarters, Womanby St, Cardiff. *GW3VNO.*
Hoover (ARC)—Mondays 7.30 pm, Hoover Social Club, Hoover Factory, Merthyr. The Club operated a station on the occasion of the firm's Sports Day on June 28, in conjunction with an exhibition of home-built and converted ex-Service gear. A special station was also in operation on Investiture Day and the combined activities did much to stimulate local interest. Secretary, *F.E. Tribe.*
Port Talbot (ARC)—Meetings at Trefelin Club & Institute, Port Talbot. Further details from the Secretary, *GW5VX.*
Pontypool (ARC)—Tuesdays 7.0 pm, Educational Settlement, Rockhill Rd, Pontypool, Mon. *GW3JBH.*
Pembroke (ARC)—Last Friday of each month 7.30 pm, Defensible Barracks, Pembroke Dock.
Rhondda (ARS)—Meetings at Pengelli Hotel, Treorchy, Rhondda, Glam. Details from *GW3PHH.*
Sully & District Short Wave Club—7.0 pm Tuesdays, Annexe Sully Bowls & Social Club, 59, South Rd, Sully, Glam. The Club operated a successful station at the Sully Fete, using the call-sign GB2SI. Those interested in electronics in general and short-wave work in particular are cordially invited to the meetings. *GW3SLA.*
Swansea Telephone Area (ARS)—Meetings at Swansea Telephone Sports and Social Club. Morse practice, RAE course and constructional projects are catered for. Secretary M. D. E. Connor, 54, Talley Rd, Penlan, Swansea, Glam.
University College, Cardiff (ARS)—Students with an interest in radio who are entering College next session are advised to contact the Secretary of the Society, c/o Students Union, Dumfries Place, Cardiff as soon as possible.
University College, Swansea (ARS)—Activities suspended during the summer vacation. Fresher week starts on September 29, and the Club Station GW3UWS will be on the air for that week. Future meetings will be held in the Students Union Building, and not College House as formerly. New students to UCS should contact the Secretary as soon as possible, c/o UCS Radio Society. Engineering Society, Applied Sciences Building, University College Campus, Swansea.

Region 11 RR M. Williams, GW3LCQ

Colwyn Bay (CBARC)—The first meeting of the new season will be held on 18 September at the Parade Hotel, Llandudno. (J. Taylor, GW3UMB on "Learning Morse"), followed by (R. Jones, GW3JI describing the Heathkit SB101 transceiver).
Conway Valley (CVARC)—At the AGM on 19 June, the following Officers were elected; Chairman, GW3QN, Vice Chairman, GW3JI, Treasurer, GW3CW, Secretary Tel ABER 2532. During the meeting M. Williams, GW3LCQ, announced that as he was only serving temporarily as RR he would be grateful for the names of any volunteers who would like to take over from him. July 17 (Activity Evening).

Region 12 RR A. W. Smith, GM3AEL.

Aberdeen (AARS)—Fridays, 7.45 pm, 6 Blenheim Lane, Aberdeen. *GM3HGA.* Aberdeen 33838.
Lhanbryde (MFARS)—Mondays, 7.30 pm, St Andrews School, Lhanbryde, By Elgin, Morayshire. *GM3UKG.* Clochan, 225.
Dundee (RSGB Group)—Thursdays, 8 pm, 3 Magdalen Place (off Roseangle), Dundee. *GM3KYI.*
Lerwick Radio Club (Shetland)—Tuesdays and Thursdays, Annsbrae House, Lerwick. *GM3XPQ.* Bixter 249.

Region 13 RR V. W. Stewart, GM3OWU.

Edinburgh (ELRS)—First meeting of new session 11 September, 7.30 pm, Festival Station, GB3EIF, Mountbatten Building, Heriot-Watt University, Grassmarket, Edinburgh. 25 September ("Workshop Practice" by T. Simpson, GM3BCD), YMCA, 14 St Andrew St, Edinburgh.

Region 14 RR N. G. Cox GM3MUY.

Ayrshire (Ardeer Recreation Club ARC)—2, 4, 9, 11, 16, 18, 23, 25 September, 7.30 pm, Ardeer Recreation Club, Amateur Radio Section, Stevenston, Ayrshire, details J. F. McCreight, *GM3DJS*, 10 Auchenharvie Road, Saltcoats, Ayrshire.
Ayrshire (AARG)—28 September, 7.30 pm, ATC HQ, Kilmarnock.
Glasgow University (GURC)—Refer C. Weston, *GM3VAP*, Manchester Drive, Glasgow, W2. Tel 339 2074.
Greenock (G & DARC)—5, 12, 19, 26 September, 7.30 pm, Watt Library, Union Street, Greenock.
Mid-Lanark (RSGB Group)—19 September, 7.30 pm, YMCA Brandon Street, Motherwell.

Region 15 RR J. Thompson, GI3ILV.

Belfast (City of Belfast YMCA Radio Club)—Wednesdays and Saturdays, 8 pm, City YMCA (3rd Floor), 12 Wellington Place, Belfast, BT1 6GE. Information from YMCA General Office.
Belfast (B & D RSGB Group)—Third Wednesday, War Memorial Building, Waring Street, Belfast. *GI2DZG*.

Region 16 RR W. J. Green, G3FBA.

Chelmsford (CARS)—First Tuesday in each month, 7.30 pm, Marconi College, Arbour Lane, Chelmsford. *G3OZF*.
Colchester (CARC)—Details from *G3VAG*.
Gt. Yarmouth (GYRC)—Last Friday in each month 7.30 pm, 98, South Market Road, Gt Yarmouth. *G3HPR*.
Ipswich (IRC)—24 September (Junk Sale), 7.30 pm, Red Cross HQ, Gippeswyk Hall, Gippeswyk Avenue, Ipswich. *G3UJR*.
Maldon Essex, Maldon Youth Centre Radio Group—Meetings every Thursday, 7.30-9.30 pm, commencing 25 September at the Friary, Chequers Lane, Maldon, Essex. These meetings are under the auspices of the County Council of Essex, and all are welcome. *G3LRG*.
Norwich (NARC)—8 September Informal Meeting, 15 September (Junk Sale, Bring and Buy), 22 September (Harmonic Absorption, by Reg Hammans, G2IG), 29 September (RTTY, by Roger Cooke, G3LDI). All meetings 7.30 pm, at the Brickmakers Arms, Sprowston Road, Norwich. *G3PTB*.
Southend (SDRS)—8 pm Staff Canteen, Ekco Electronics, details from *G8BSB*.

Region 17 RR C. Sharpe, G2HIF.

Chippenham (C & DARC)—9 September (The last mini DF Hunt of the season starting at 7.15 pm), 30 September (" A simple tx for 160 metres " by G3VBH). *G3UTO*.
NW Berks (AERE, Harwell, ARC)—Meetings on the third Tuesday in each month, 7.30 pm, Social Club, AERE, Harwell, Berks. *G2HIF*.
Reading (R & DARC)—Meetings fortnightly, dates at the HQ, Victory PH, Tilehurst. Forthcoming meetings will include discussions on (Computer Software, the G2DAF ssb tx and " VHF/UHF working " by G3PWU). *G3TEB*.
Southampton (So'ton Group)—Meetings held on the second Saturday in each month, 7.00 pm, Lanchester Bldg, Southampton University. Visitors welcome. *G3GOY*.

Many thanks for publications received from the clubs, especially **FOC**, **RAIBC**, and **RNARS**.

High Wycombe Qualifying DF Contest

The High Wycombe Qualifying DF Event was held in good weather on the afternoon of Sunday, 3 August, 22 contestants starting from high ground near Princes Risborough.

Signals heard from both stations were so strong that many of the competitors were misled into believing that the transmitters were relatively near at hand whereas they were both more than 11 miles away. Every competitor headed first for the B transmitter G3TRY/P, concealed at Berkhamstead Common amidst man high undergrowth some 400 yards from the nearest road. At least one contestant decided that the easiest way of arriving was to cross the Common from the remote side which involved a journey of 1½ miles on foot with a drop into a valley of about 200 feet. Fifteen contestants successfully located this transmitter in the first 2½ hours.

The A transmitter G3WHO/P was situated on the towpath on the north bank of the Thames midway between Hambledon and Medmenham, the gear and crew being more conveniently delivered and collected by boat whereas competitors had a lengthy walk along the river bank. Five teams successfully located the A station. The first team rushed past the transmitter when they saw the boat in which the organizers were preparing to serve cups of tea to exhausted contestants, but Eric Mollart, hard on their heels, was more cautious and found the transmitter before the boat to win by half a minute.

Over 50 people sat down to tea at Bergers café in Marlow, Mrs Mollart and her helpers providing generous and excellent fare. Welcome visitors were Doug Findlay, G3BZG of the RSGB and Miss Findlay who kindly presented the High Wycombe challenge cup and other prizes to the first three successful competitors. Mr Findlay expressed his pleasure at being present and congratulated the competitors on their success in what had undoubtedly been a very successful but arduous event. The complete results are appended below, Messrs B. Bristow, E. Bristow and A. Newman qualifying for the final.

Posn	Competitor	Call-sign	Club	Time of Arrival Trans-mitter A	Trans-mitter B
1	E. Mollart	—	Oxford	15.43	14.23
2	B. Bristow	—	High Wycombe	15.43½	14.46
3	E. Bristow	G3WNN	High Wycombe	16.04	14.47½
4	T. Gage	—	Oxford	16.24	15.06
5	A. Newman	G2FIX	Salisbury	16.29	15.07
6	R. Pearce-Boby	G3JLE	Oxford	—	14.46½
7	M. Hawkins	G3WMM	Oxford (Colchester)	—	14.47
8	A. Simmons	—	Oxford	—	14.48
9	G. Taylor	G3MDC	Rugby	—	14.48½
10	R. Parsons	G3RBP	Oxford	—	14.51
11	R. North	—	Oxford	—	15.18
12	R. Vickers	G3ORI	Stratford	—	15.23
13	P. Tyler	—	Oxford	—	15.26
14	G. Peck	—	High Wycombe	—	15.28
15	J. Samworth	—	High Wycombe	—	15.35
16	M. Arnold	—		—	—
17	D. Findlay	G3BZG	Watford	—	—
18	G. Forster	—	Stratford	—	—
19	D. Newman	G8BGD	Rugby	—	—
20	J. Reynolds	G3RSD	Grimsby	—	—
21	R. J. Robson	G8AGI	Grimsby	—	—
22	P. Woollett	G3RQJ	Edenbridge	—	—

Provisional List of Qualifiers for DF Final 21 September, 1969.

Qualified at	Date	Name	Society or District
Stratford on Avon	27 April	R. J. Pearce-Boby	Oxford
		M. J. Gee	Oxford
		M. P. Hawkins	Oxford
Grimsby	18 May	E. Mollart	Oxford
		B. Mahoney	Rugby
		T. C. Gage	Oxford
Oxford	29 June	R. Vickers	Stratford on Avon
		D. Newman	Rugby
		A. Simmons	Oxford
Salisbury	20 July	W. North	High Wycombe
		P. Tyler	Oxford
		I. Butson	Oxford
High Wycombe	3 August	B. Bristow	High Wycombe
		E. Bristow	Oxford
		A. Newman	Salisbury

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Ringwood Carnival

On Saturday, 20 September 1969 a station using the call GB3RC will be operating from the display tent of the Ringwood Rotary Club in conjunction with the Ringwood Carnival. Rotarians throughout the world are being informed and a special QSL card will be sent to all contacts.

Operation will be on SSB on 80, 20, 15 and 10 metres and will take place from 0900 to 2000 GMT.

MEMBERS' ADS

These advertisements are free to members and limited to 32 words, discounting the name, address and telephone number. Ads must be typed or printed on the form, or on a post card similarly laid out. They should be accompanied by a *recent* Radio Communication wrapper. No trade advertisements can be accepted in this section, although these and others requiring immediate inclusion should be sent to our classified advertisements department. Inclusion is *NOT* guaranteed and unused advertisements are *NOT* held over to the following issue.

Entry period for Oct. .. 1 Sept. to 5 Sept.
Entry period for Nov. .. 6 Oct. to 10 Oct.
Entry period for Dec. .. 7 Nov. to 12 Nov.

Two metre station, fixed or mobile, comprising latest issue Heath HW-17 transceiver, HWA 17 dc supply, J-Beam 8 el Yagi, Halo new £75. Sony solid state tape recorder, automatic level, mains/battery £26 (list £36). D. Barry (Mrs), G3XLY, 15 Fairlawn Court, London, W4.

Heathkit OS2 scope as new £18. Heathkit Q-mult for RA1 or similar £5. Philips battery tape recorder, upright model in perfect order plus mike £15. R. Hooper, G3WEV, 8 Pitchcombe Gdns, Bristol BS9 2RH. Tel OBR2 683717.

Heath SB620 Scanalyzer £50. Advance ac valve mV meter, (half price) £20. Sanwa multi-meter, brand new £2 10s. Mark Heliwhip for 2m, fibre glass single hole mount. unused £5 5s. J.Barry,G3UFU 15 Fairlawn Court, London W4.

AR88D with instruction book, excellent cond £40. free delivery 50 miles radius of Pontypool. W. Chew, GW2HIN, QTHR. Tel Pontypool 2759.

KW Viceroy Mk4, extra filter, aerial relay, one owner, mint. Eddystone 680X 30 MHz —5 MHz, 5 bands, xtal phasing, S-meter. KW Top Band A3/A1 tx. Variac 230 V, 10A. 888A S-meter. TW 70cm converter 28–30 MHz. Offers S. Roberts, G3AQX, Cottage Farm, Wessington, Derby. Tel Alfreton 2943.

Ptfe sleeving, 25 yds, 5 different colours 3/-. A. Rogers, 137 Queens Parade, Scarborough, Yorkshire.

FR100B rx £85. FL200B tx £95. Both units in excellent cond. P. Bailey, G3TFP, 3 Garden Close, Harbledown, Canterbury, Kent. Tel Canterbury 62617.

BCC 25W base station tx £12. Matching rx £4. Capacitors 12 μF (8) block paper (new) 1500 V 7/6 ea. Several lengths flanged 3cm waveguide 10/- ea. Old 6S tape reader £2 10s. T. Preece, G3TRP, 28 Stoneyfield Road, Old Coulsdon, Surrey, CR3 2HG.

Pye Reporter, high-band, manual 35/-. GEC 912 fm tuner 17/6. 9 in 3 ohm spkr 7/6. Xtal conv, 10, 15, 20, if 4–5 MHz, separate psu £4. Wanted octal skirts, screening cans for CR100 rx. C. Cooper, 45 Nightingale Cres, Harmans Water, Bracknell, Berks. Tel Bracknell 4168.

HRO, 9 coils, psu and ls £15. DX100U £45. Byr collects. R. Sills, G3IQM, 61 Walsingham Rd, Woodthorpe, Nottingham. Tel 0602 264988.

Marconi CR150, double super, 1·95–60 MHz, vry gd cond with matching ac psu. Byr collects £24 ono. R. Ireland, 11 Berkeley Rd, Shirley, Solihull, Warks. Tel 021-744 6128.

Plastic silicon rectifiers, new and tested, 1 A, qty 50, 1/- ea or the lot for £2. P. Bailey, Clydra, Thorpe Lane, South Hykeham, Lincoln. Tel North Hykeham 531.

Parabeam, 14 el for 2m, unused, also 2m tx and fet converter in respectable case. Byr collects. S. Gall, G3UCM, QTHR. Tel 71 55342.

Pye Ranger PTC 2002V. unmodified with 12·7 MHz xtal, low-band £5 5s. A. Walter, G3WXL, 31 Lansdowne Ave, Maidstone.

Mobile rig, compact, 40W, 5 band tx/rx/psu, complete excluding whip £18 ono. carriage extra. R. Duesbury, G3CTE, QTHR. Tel Sunderland 69489.

Trio SP-5D spkr, boxed as new £2 10s or QSL cards to value. E. Greenwood, 10 Naze View, Gauxholme, Todmorden, Lancs.

Eddystone 680X, rack/angles £60. Dynatron hi-fi amp 12 W £15. Joystick, de-luxe, 4 rf tuner £9. Command rx's, Top-Band, 6 V £4, Medium-wave, ac unit £6, Long-wave, 12 V £4. 2m 8 el Yagi £4. J. Barnes, G3AOS, 5 Prospect Drive, Hale Barns, Cheshire. Tel Ringway 2415.

R1949 rx, am/fm/cw, 27–145 MHz, mains psu, ls £25. Marconi sig gen TF995A £275. Marconi TF144G, 85 kHz-25 MHz. Marconi TF390G, 4–16 MHz and 32–100 MHz £25. E. Page, G3HKV, 16 Abbey Street, Crewkerne, Som. Tel Crewkerne 2662.

DX40/VF 1U immaculate new model one year old £30. Heathkit RA1 with Q-mult, matching spkr £35. Codar preselector £5. A.Sanderson G3UQZ, 175 Johnson Rd, Birmingham 23. Tel 021-373 8806.

R1155B, 160m, psu, s-meter, o/p stage, in gd cond with RF24 unit £10 ono. Byr collects. P. Koker, 65 Bronte Farm Rd, Shirley, Solihull, Warks. Tel 021-744 2698.

Self extending mobile ant, eight 17 in sections with internal spring and wire £2. Adjustable pot cores (2) wound, 3 transistors, 2 pots, switch, data for ssb. Two tone oscillator 25/-. Post free. M. Mann, G8ABR, 71 Queens Rd, Tewkesbury, Glos.

BC342 rx fair cond, wkg with auto-trans £10 ono. Also large horn spkr for pa, 15 ohm, 20 W 30/- carriage extra. R. Johnson, 87 Esther Grove, Wakefield, Yorks.

TW Twomobile rx, perfect £18. Home-brew 2m tx less psu £5. Eddystone 898 dial, unused £4. Various xtals, sae list. J. Darrington, G3WHL, 182 Thorne Rd, Doncaster, Yorks. Tel Doncaster 3564.

CR100 in gd cond, prefer byr collects or carriage poss arranged £15 ono. P. McGuire. QTHR. Tel Hertford 4806.

Vespa 2, ac psu, £100. Hallicrafters SX117 triple super £110. Both in A1 cond, prefer byr collects, sae further details. A. Ward, G3SHP, 47 Wash Lane, Kessingland, Lowestoft, Suffolk.

Heathkit RA1 rx, little used, excellent cond £32. G. Winter, G3XCW, 48 Ann Rd, Wythall, Nr Birmingham. Tel Wythall 6036.

Balanced mod valves, RCA 7360, new in makers cartons, 10 available at 15/- ea. Also a few 6BN6 product det valves at 10/- ea new in GE cartons. E. Clarke, G3UYD, 65 Oakmount Rd, Chandlersford, Eastleigh, Hants. Tel Chandlersford 2309.

Kits for the G3PDM Wattmeter. FX1596 ferrite ring, matched 27 ohm 2 W resistors and 3 15 K ohm 2 W resistors 6/6 ea post paid. P. Martin, Oak Cottage, Witton Gilbert, Durham.

Pye 2166/B tv camera, control unit, bc quality, gd cond. Offers or exchange. R. Harris, 41 Shaftesbury Rd, Weston-super-Mare, Somerset.

DX4OU/VFO manuals, reasonable offer, going ssb, deliver 50 miles, W. Dowsett, G3XNA, 159 Hawthorn Cres, Cosham, Portsmouth, Hants. Tel Cosham 70351 (ext 44).

Harmonic osc G46, o/p every 10, 1, ·1 MHz (not xtal), mod and own psu £1 5s plus postage. Wanted Jan and Feb " Rad Com " 1969 in gd cond. C. Debney, 111 Penn Lea Rd, Bath, Soms.

Psu for KW2000 mint £23 10s. AR88D in vry gd cond £42 10s. Matched pair 6BG6G, boxed, unused for ssb 1 in 17/6. Pye 5 band car radio sep spkr, bs £10 10s. Pse add carriage. All ono. D. Byrne, G3KPO Jersey House, Eye, Peterborough. Tel Eye 351.

KW2000A £180. 10m 4 el beam by J-Beam, CDR 22 rotator, cable, feeder tubular mast, winch £35. AVO meter No 7 £10. WEE Megger £12. G2DAF tx, mech filt, psu, gdo £8. Heathkit CR bridge £8. A. Poole, G3MLP, 10 Roberts St, Rushden, Northants. Tel Rushden 2469.

Marconi sig gen TF390G, covers 16–150 MHz, o/p voltage 1 mV–100 mV, fine freq control, complete with manual and charts. W. Ball, 76 Warrington Rd, Penketh, Warrington, Lancs.

Hammond L100 drawbar type electronic organ, mahogany with bench £440 or exchange for SB34, SB33, FT100 transceiver or similar with cash adjust. J. Armstrong, G3JRL, 36 Hallamshire Rd, Fulwood, Sheffield.

2m, 6 W driver, wks fb but ugly. Green 70cm conv proff aligned. 10 W amp (af), turntable and cabinet. Klystron and waveguide. Stab psu 200 -350 V at 150 mA. No reasonable offer refused. J. Oliver, G8ANJ, 45 Selborne Rd, London N22.

AR77, wkg £8. Cossor 339, trolley and handbook £12. US Army 45 ft (2 in × 5 ft) dural mast, fittings £12. Cowlgill rotator, belt, pulleys £4. Indicator for same £1. Vhf sig gen/wavemeter type W1649 25/-. Furzehill xtal cal £2. Byr collects. G3MDM, QTHR. Tel Weybridge 46672.

BC342. RF26 converter. KW Valiant tx plus psu. Offers. Also Class D wavemeter, mains i/p, D. Owen, G3MCA, 13 Greenfield Gdns, Orpington, Kent. Tel Orpington 28790.

Codar CR45RB (factory built), mint cond, 4 coils, 550 kHz-30 MHz, excellent rx for swl £8 ono. Wanted: Trio 9R59DE, must be in gd cond. M. Kent, 4 Haig Rd, Bedlington, Northumberland.

EMI scope WM2TV, needs slight attention. Line selector Type 1 lab trolley, manuals, exchange for servicescope S52 or why. G73 wavemeter 50/-. Pair KT88 new 30/-. Pair EL34 new 20/-. 4 EL84 new 25/-. G. Morrison, G3MOU, 85 Sutton Rd, Heston, Middx. Tel 01-570 6181.

National NC173 postwar rx, all amateur bands, ok on ssb, xtal filt, S-meter, in excellent cond, sae details. L. Marshall, 61 The Dale, Abergale. Tel Abergale 2532.

Codar T28 /M rx with separate spkr, cabinet £12 10s in excellent cond. Also brand new Juliette rx, 160/80, fm and vhf inc aircraft and 2m, up to 174 MHz £35, in makers carton. Ex-gov tx/rx No 18 (2), new £3 ea. J. Thexton, G3URE, QTHR. Tel Wideopen (Northumberland) 3044.

Pye Ranger 6/2007V, transistorised psu, in wkg cond on 2m, mods inc tunable rx, AF139 preamp, 2X OC35 mod, new ptt mike £12. Printset 2m rx, manual £4. HW17 manual new 15/-. Wanted TW Twomobile. R. Perrin, G8ALY, 30 Franchise St, Kidderminster, Worcs.

Tech 15 gdo £8. Hamgear preselector atu self powered £5, both gd cond, wanted Class D wavemeter, xtal mike, part exchange considered. R. Andreang, 10 Vermont St, Beverley Rd, Hull, E Yorkshire.

R216, cw, psu, handbk, best offer. PTC330 18 W, A3, 4m, tx recently overhauled by Pye, new 3/20, 2 xtals £30. Tw 4m nuvistor converter, 28 MHz if £8. D. Haylock, G3ADZ, Bowyers, Steepmarsh, Petersfield, Hants. Tel Liss 3314.

Ssb tx, 480 W pep on 80, 20, 15 and 10m (28·2–28·7), cct as Viceroy but 6HF5's in pa, built in psu, vox, break-in cw, grey hammer finish, screened cabinet £28. A. Edwards, G3GKN, 126 Danescroft Drive, Leigh-on-Sea, Essex.

Minimitter tx 160 to 40m, control box, transistor psu, /M whip for 80 to 40m, KW76 rx, perfect cond with ccts, byr collects £30. F Crowther, 8 Beverley Close, Wrea Green, Preston, Lancs. Tel Wrea Green 3390.

PCR3 rx, 160m added with vfo, int psu, spkr £6. De-luxe 6 valve elbug £2. Sinclair fm tuner, £4. Wanted, thermocouple of Marconi TF144G sig gen. P. Hart, G2SJX, 42 Gravel Hill, Addington, Croydon, Surrey. Tel 01-656 9054.

ASB8 70cm co-axial amp with 2C40 £5. Cathodeon oven (2 × HC6U), 6/12 V, 75 deg C with 1 MHz. ·0015 per cent xtal, unused £3. Stabilized psu 300 V /150, 150/15, 28/150, 6 V at 6 A. prof styled cabinet £8 ono. (from 15 Sept only). S. F. Weber, G8ACC, 8 Merton Hall Rd, Wimbledon, London SW9.

Canadian 52 set rx with built in psu and spare valves, handbk £11 the lot carriage extra. G. Lugton, 26 Oxgangs Farm Ave, Edinburgh.

RCA Model CR91 (AR88) gd cond with extal cal and muting relay, Some spare valves and manual, deliver 25 miles otherwise byr arr transport £37 10s ono. A. Kirkby, G3BRJ, Trefaes, Westella Rd, Yelverton, Devon.

Xtals, HC6U, 8·01625, 8·04791, 8·05203, 8·03125, 8·10525, 8·02291, 8·01875 MHz, will exchange for similar type on freqs between 8·0830–8·10, G3RHR, QTHR.

Lafayette KT34 rx, fitted 1 MHz and 100 kHz cal, perfect £18. Codar PR30 preselector £2 10s. Lafeyette vfo, as new £7. (cost £14), vry stable, has int psu, buffer and OA2, 80–10m. P. Brumfitt, G3XMH, Home-port, Northgate, Beccles, Suffolk. Tel Beccles 2360.

No 53 tx, 1–17 MHz, pa 2 813's, heater and bias psu built-in ideal for big linear £25 ono. P. Plunkett, G8BQZ, 29 Margetson Ave, Norwich, Norfolk.

Heathkit HW32A 20m transceiver with HP23 ac psu, realigned by makers in April, gd cond £55. National Stereo tape recorder 755S with matching spkr (cost £120) sell for £60. A. Foster, G3OXA, 5 Eunice Grove, Chesham, Bucks. Tel Chesham 71425.

EF91, EF92 valves, marked but untested, not in makers boxes 2/- ea. 8d postage. Transceiver 17 set in gd wkg order, needs psu £3 10s. Byr must pay carriage or collect. A. Kenyon, 66 Wisden Rd, Trotts Hill, Stevenage, Herts.

Mast, galvanized steel tube, 2 sections, 15 ft, 2 in dia with 20 in jointing sleeve plus 9 ft × 1½ in dia guy ring, tensioners etc £2 10s. J-Beam 2m 6 over 6 el with 10 yds of super Aeraxial coax £2 10s. Byr collects. L. Williams, G8AVX, 19 Burcote Rd, Birmingham 24.

Near new AR88D with tuning meter (not RCA) and manual £47 10s, would take Cossor scope 1035 Mk3 or poss Mk2 in part exchange with cash adjustment, could deliver. J. Allsop, 15 Woodland Grove, Mansfield Woodhouse, Notts.

Cheap Brush xtal mike. Hvy duty smoothing chokes, instant heat soldering iron. Few GU50. Wanted small mains transformer, sec of 100 V at 50 mA and xtal for 6·5 MHz. A. Parkes, 133 Station Rd, Cropston, Leicester.

Equipment cases (2), 19 × 9 × 9 in, hammer grey, hinged lids £1 ea. Taylor model 88A multi-test meter with hndbk (similar to AVO 8 but in wooden case) fault in movement £4, carriage extra. J. Lepper, GM3JHL, 42 Inch Cres, Bathgate, West Lothian, Scotland.

Control unit type 384 for use with rotary beam 30/-. Valves QV0–47 5/-. Postage extra. R. Hill, G2ATD, 42 Northumberland Way, Erith, Kent.

Valves, 6AT6, (9), 6BJ6 (24), 6BH6 (23), 6CB6 (11), EC91 (35), ECC81 (12), ECC83 (11), ECF80 (26), EL90 (11), EZ81, new, all 2/- ea, post extra. E. Handcocks, G5HN, 1 Conisboro Way, Caversham, Reading, Berks. Tel Reading 73650.

2BP1 scope tubes with mu-metal screen and base. J. Morris, G3PHA, 3 Astley Road, Bradshaw, Nr Bolton, Lancs. Tel Bolton 52384.

Xtals, unused, FT243, 352, 485·18 kHz, 6·317, 6·40625, 7·58188, 7·58188, 8·25375, 8·4 MHz. Min wire type, 10·245, 71·7, 78·0, 79·075, 80·0 MHz All types 2/6 ea, post and packing 9d. R. Smith, 1 Count Alan Rd. Skegness, Lincs.

Minimitter converter, 1·6–30 MHz, 1·5 MHz if, gd cond £5 or will haggle. D. Fleet, 24 Cranberry Lane, Alsager, Stoke-on-Trent, ST7 2LE.

FT243 8 MHz fund xtals for 2m band. Mostly zones 4, 5 and 6, my choice of freq, 8/6 ea plus sae. Wanted 2m TW Communicator. G. Tibbetts, G3NUE, Spinney Cottage, Tunnel Hill, Upton-upon-Severn, Worcester.

Bliley 1000 xtal for BC221. HRO S-meter. 813 (2). New Viceroy Mk 1, 4 extra filter, mint cond, take gd quality rx in part exchange. Also FRDX500 Summerkamp, new last Nov. Offers please sae. G2UZ, QTHR.

QST Nov '58, May and June '63, May and Sept '52, Nov and Dec '51, Jan, Mar and Nov '50, Dec '49, for binding. Your price paid. A. Taylor G3JMO. 8 Heythrop Drive, Middlesbrough.

Labgear 160m twin £10. 800 W 4 × 6HF5 Line 10–80m psu in base stn case £30. 2m 120 W amp, with psu £12, will haggle. G. Shirville, G3VZV, 2 Bradford Way, Toddington, Dunstable, Beds. Tel Toddington 470.

Heathkit Mohican in gd cond with manual £20. M. Herring, G3VHU, Bush Common House, Abingdon, Berks.

Heathkit RA1 in gd cond £25. Prefer byr collects but could send A. Attenborough, G3WKD, 364 Jessop Rd, Stevenage, Herts.

KW2000A and ac psu in vry gd cond £175. Cossor scope model 339, double beam, wkg £8. Perdio Town and Country portable £10. BC348 internal ac psu in gd cond. B. Little, G3TLS, 28 Fitzgerald Rd, Bristol 3.

Amateur Communications rx, ideal for the swl, built few months ago, may require a little attention £12. Stab psu, 150-300 V £7. 12 W audio amp £10. L. Ellison, 84 Duke St, Windsor, Berks. Tel Windsor 62066.

BC348 in original cond with dyno £14. BCC 5 channel 69G with manual £10. AD94 rx with xtal cal and dyno £15. Deliver local. G. Layton, G3IUL, 4 Edward Rd, East Bedford, Feltham, Middx. Tel 01-890 7091.

KW Vanguard, 160-10m, excellent cond, deliver 50 miles £30. 1155N 160-20m with psu £5. G. Jones, G3VSB, 134 Leek Rd, Cheadle, Stoke on Trent, Staffs. Tel Cheadle 2103.

R220 £5. R1466 £2. B44Mk2, transistor psu £6. TR1935, modulator 15/-. UHF tv tuner, valved 30/-. RF27 30/-. Carriage extra on all. B. Robertson, G3TTV, 12 Hazel Close, Thetford Rd, Mildenhall, Suffolk.

Eddystone 888A rx in really mint cond, superb performance, little used £75. Various Minimitter /M whips £3 10s ea. Taylor 45C valve tester £15. Various Dow relays, xtal mikes, meters and other components. R. Reynolds, G3IDW, 6 Church Way, Lower Stratton, Swindon, Wilts.

Printset 2m transistor rx and af amp/mod nearly completed inc all transistors, transformers, resistors and capacitors, cost over £10. offers. A. Elliott, Woodridge, Woodway Rd. Teignmouth, Devon.

R107 in vry gd cond, modified with S-meter and ht stab £15 ono inc spare valves. To arrange inspection. J. Parker, 19 Tenby Ave, Kenton, Harrow, Middx.

Eddystone 640X in gd cond, offers. E. Burrell, G3NLD, 139 Hewitt Ave, Woodgreen, London N22. Tel 01-889 4431.

Xtals, HC6U, 1·70 (3), 2·462, 4·33889, 4·35944 (5), 4·425, 6·55833, 39·6, 10XJ type, 6·19333, 6·726€6, 6·7822. All 2/6 each. Colour tv HC6U xtal 4·43351875 (freqs in MHz) 10/-. Please send strong sae. Wanted, G3LOK rx. C. Collins, G3THX, 32 Albany Rd, Skegness, Lincs.

Top Band vfo, many special features £5. Third edition Handbook £1. Post extra. R. Morris, GW3HJR, Parc House, Y-Parc, Groesfaen, Pontyclum, Glam. Tel Pentyrch 544.

Tv links (5/6 GHz) with 2 pan/tilt heads, 2 tripods, 2–4 ft alloy dishes, rx/tx and psu, some intercom cables available, also a few 1 in Vidicons, offers. O. Diplock, G3NXK, 8 Holly Way, Tiptree, Colchester, Essex. Tel Tiptree 6265.

JXK 2m fet converter, if 24–26 MHz, in gd cond £13. R. Neilson, 18 Willow Close, Penarth, Glam, CF62NS. Tel Penarth 707954.

Foot operated change over switch. 12V relays for /M. Brush xtal mike. Pickstone instant heat soldering iron. Rectifiers GU50. Wanted 6·50 MHz FT243 xtal. A. Parker, G3KA, 133 Station Rd, Cropston, Leicester. LE7 7HH.

Post War *SWMs*, 1/3 per copy, post free or 12/- per doz. TCS5 slightly modified £7. Hy-Gain 3 el 10m beam £12. S. Kharbanda, 39 London Rd, Harston, Cambs. Tel 0223-822 454.

Solartron Lab quality scope type CD 643·2, dc—12 MHz, fully wkg in excellent cond, complete with all 88 valves and crt plus hndbk at a giveaway price £20. To view contact G8AKT. Halcyon, Lawday Link, Upper Hale, Farnham, Surrey. Tel Farnham 5765.

Hammarlund SP600JX communications rx, 540 kHz-54 MHz, excellent cond £90. R209 Mk2 communications rx, new £13. A. Williams, GW3NZK, 71 Station Rd, Llanishen, Cardiff. Tel Cardiff 753743.

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Hallicrafters rx R 19 1/TRC-1 vhf 70–100 MHz, with cct, brand new £5 10s. J-Beam 10m 4 el beam £7. Pye Ranger, high-band, rough £5. Murphy MR880, high-band /M tx/rx, 12V less Mike £7 10s. R. Hill, 11 Three Crosses Rd, Ross-on-Wye, Herefordshire. Tel Ross-on-Wye 3723.

Heathkit OS1 £20. 110*SWMs* to 1966 £2. Ssb xtals, 4 channel 69, 2 channel 357, 2 channel 359 £1 the lot. Pair 4X150As £1. 2m halo 10/-. R. Nolan, G3KWK, 186 Plymouth Road, Redditch, Worcs. Tel Redditch 3817.

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RA1 with xtal cal, just overhauled by Daystrom £23, no offers, buyer collects or pays carr. A. Viney, 13 Buckhurst Close, Redhill, Surrey.

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THE RSGB SHOW

INTERNATIONAL RADIO ENGINEERING & COMMUNICATIONS EXHIBITION

Where: Royal Horticultural Society's New Hall, Greycoat Street, Westminster, London, SW1.

When: 1 to 4 October 1969—10 am to 9 pm.

This year's exhibition will be opened on 1 October by Mr. R. J. Halsey, CMG, FCGI, DIC, BSc(Eng), FIEE, FIC, a Director of Cable & Wireless. The special exhibit on the stage of the hall will be provided by Cable & Wireless.

The John Rouse Memorial Trophy will be awarded for the best piece of equipment submitted by a member aged 16 years and under; the rules in (ii) below will not apply in respect of entries for this trophy.

All the usual Exhibition attractions will be present and correct, but in particular we should like to draw Members' attention to the display of Home Constructed Equipment. The Society invites items for display, subject to the following conditions:

i All items submitted for exhibition will be subject to acceptance by the Exhibition Committee.

ii Entries will be accepted (*a*) as items which have been the subject of published articles in the RSGB BULLETIN or *Radio Communication* during the period January 1967 to date. It should be made clear that only the member writing the original article will be allowed to enter; (*b*) from members who are prepared, if required, to write a constructional article for publication in *Radio Communication* featuring their entry, this article to be paid for at the normal rates.

iii Entrants will be required to certify that their entries were constructed entirely by themselves from commonly available materials and components.

iv RSGB members only will be eligible.

v The Horace Freeman Trophy will be awarded for the most original piece of equipment on show.

vi Additional prizes may be awarded at the discretion of the judging Committee.

vii Members wishing to exhibit should write to the organizer of the Home Constructed Equipment Exhibition.

M. ELLIOTT, G3VWS, 23 Filbert Crescent, Gossops Green, Crawley, Sussex.

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AN APOLOGY

Due to very heavy demand of time in both shop and service work, the Echelcom 2 2 metre transmitter and companion FET converter have been delayed. The sales literature, for which many of you have written, should be coming through about the same time as you read this apology in the *Radio Communications* Mag. and will be sent as soon as possible. Please forgive the delay.

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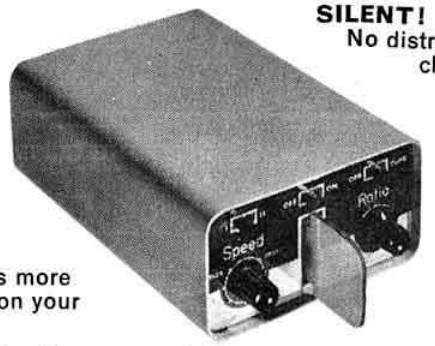

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(FOUNDED 1913) (INCORPORATED 1926)

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* Being under 21 years of age and not holding a current Amateur Radio Transmitting Licence I hereby apply for election as a Non-Corporate (Associate) Member of the Society and enclose herewith a remittance of £1/5/- being the amount of my first annual subscription.

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