

THE T&R

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BULLETIN

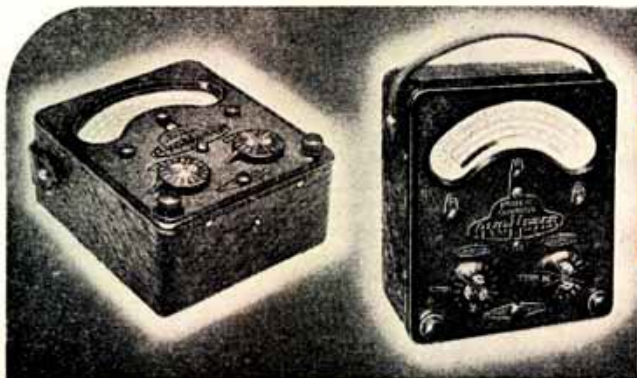
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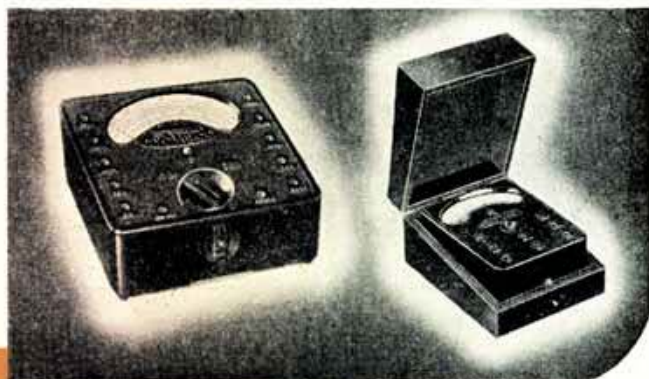
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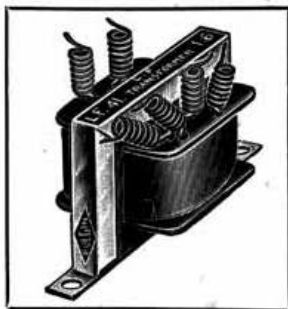
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VOL. XVII.

APRIL, 1942

No. 10

PAPER IS A MUNITION OF WAR

OUR first inclination was to begin this Editorial with an apology—a sort of “Sorry Chaps”—but on reflection we think it better to face up to the fact that the drastic reduction in the size of THE BULLETIN, is directly due to the vigorous paper rationing system which the Government has instituted as part of the war effort.

Naturally we are sorry that our Journal—the main link between members everywhere—should, through circumstances beyond our control, be reduced to less than one quarter the size of pre-war issues, but we take this cut as a contribution to the successful prosecution of the war. The radio amateur is world famed for his ability to improvise. Your Council and the Editorial Staff have attempted, in this issue, to show that the gift of improvisation is not confined to the field of radio equipment!

Let us consider the problem which faced us as recently as March 18. A new Government Order made it an offence to use, during the period March—June, 1942, more than 19.5 per cent. of the weight of paper used for the corresponding period in 1939. Converted to more tangible figures this meant that our next three issues could not exceed 16 pages each.

The “headache” which had begun to develop on March 18 assumed really serious proportions the following day when an emergency meeting took place between representatives of Council, our Advertising Manager and our Printers.

As a result of their deliberations the following decisions were reached:—

1. Advertising would be confined to the four cover pages.
2. The length of each column of type would be increased by $\frac{1}{2}$ in.
3. Smaller type would be employed for certain non-technical features.
4. “The Month off the Air” and “The 28 Mc. Band” commentaries, and Experimental Section notes, would be omitted.

It was estimated that by effecting the changes referred to in 1, 2 and 3, we should be able to publish in this issue, approximately the same amount of editorial material as was contained in a 20-page issue of the pre-rationing era.

There has been insufficient time to advise D.R.’s and others of the changes now announced, therefore, we crave their indulgence for having cut down their contributions—in some cases rather drastically. Now that they appreciate the position we know they will co-operate fully by restricting their reports to such items as are of *real* interest. To provide a fair allocation, no District report in future may exceed 200 words, and again to save space each D.R. is asked to submit his report with his name and address at the top of the page as shown under “British Isles Notes and News.”

The emergency committee has recognised that technical material must still take pride of place.

For this reason at least 50 per cent. of the space in every issue will be devoted to technical contributions. “Khaki and Blue” which is probably the most popular non-technical feature at the present time will remain, but there will be no room for half-tone blocks of individual members. We shall endeavour to continue the publication of “73” but no list may in future contain more than six calls arranged in call-sign order.

Our record of members on active service will be continued, whilst an attempt will be made to publish the names and addresses of new members, because it is appreciated that the information is of value to D.R.’s, T.R.’s and others.

We are sorry to see “M.O.T.A.” disappear but even if THE BULLETIN had not been compelled to shrink it is doubtful whether it would have been possible to continue the feature for much longer. The same applies to “The 28 Mc. Band.” The grateful thanks of all members are extended to Mr. Arthur Milne, G2MI, and Miss Nelly Corry, G2YL, who in spite of many difficulties have conducted their columns without a break since amateur transmitting shut down 31 months ago. A wonderful achievement.

The decision to dispense with Experimental Section notes is based on the fact that for the past 12 months the notes have, in effect, taken the form of technical contributions—and very welcome ones too—from the pen of our Receiver Group Manager, Mr. H. R. Heap, G5HF. When the necessity arises, Experimental Section notes will be published, whilst Mr. Heap’s articles will appear as normal technical contributions.

This then is how we plan to preserve the essential features of THE BULLETIN. By enlisting the full support of every member we feel sure it will be possible to maintain the high standard reached in recent years.

J. C.

Forthcoming Events

- | | |
|----------|---|
| April 19 | District 4, 6.30 p.m., at G8DZ, 14 Epperstone Road, West Bridgford, Nottingham. |
| April 19 | District 13, 11 a.m., at G3ST, 62 Dumbarton Road, Brixton, S.W.2. |
| April 25 | District 15, 6.30 p.m., at 2ADI, 106 Cavendish Avenue, West Ealing, W.13. |
| April 26 | District 5, 3 p.m., at 17 Colston Avenue, Centre, Bristol. |
| April 26 | District 12, 3 p.m., at The Nightingale, High Road, Wood Green (opposite Wood Green Town Hall.) |
| April 26 | Scottish “A” District, at 2.45 p.m., in the Coffee Room, Y.M.C.A. Residential Club, 100, Bothwell Street, Glasgow. |
| May 2 | London Meeting, 2 p.m., at I.E.E., Savoy Place, Victoria Embankment, W.C.2. Lecture-Demonstration, 2.30 p.m., “Vibrator Operated Power Supply Units,” by R. Pollock, G5KU <i>Masteradio, Ltd.</i> |
| May 3 | District 7 (Croydon), 3 p.m., at G4NI, 86 Whitehorse Road, West Croydon. |
| May 30 | London Meeting, 2 p.m., at I.E.E. Details next month. |

TIME BASES

By 2HMN (Sheffield)

In this article the author describes various types of Time Base circuits for use with Cathode Ray Oscillographs.

Introduction

AS the war progresses, more and more interest is being shown in Cathode Ray Oscillography. A few years ago the C.R. tube was regarded by most experimenters as a laboratory instrument rather than as a device essential to the efficient operation of their stations. This was due to the fact that C.R. tubes were expensive, but with the coming of high definition television, and the introduction of cheaper models, many pre-war amateurs included a tube in their station equipment.

All who have used a C.R. tube realise that it is as important in its sphere as is the ubiquitous millimeter which no amateur would think of doing without.

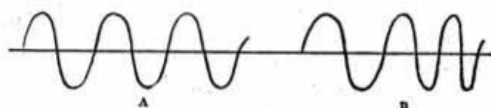


Fig. 1.

- (a) Normal undistorted Sine wave.
(b) Form of Sine wave seen when non-linear time base is used.

The question of a suitable time base did, however, often cause some difficulty, especially when one of the basic tube outfits had been purchased without time base equipment. The purpose of this article therefore is to describe a number of suitable circuits, any one of which can be constructed at home by the keen experimenter. The circuits differ considerably in "quality," depending upon the degree of accuracy required.

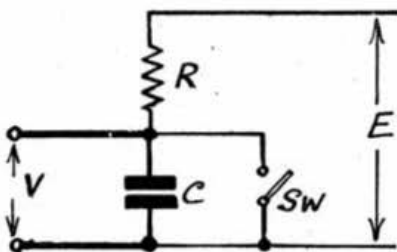


Fig. 2.

Condenser charging through a resistance.

Fundamental Requirements

For an oscilloscope to be of real value it must be capable of producing a trace, which is a true picture of the phenomena being examined. For example, if a sine wave generator is being studied and its output was actually a good sine wave such as shown in Fig. 1a, then the measurements would have little meaning if a trace similar to Fig. 1b, was produced, because the wavelength of the oscillation differs along the length of the trace.

Thus the first and main requirement is that the time base must be linear, which means the spot moves across the screen at a constant velocity. Secondly, as it is necessary only to see the wave form travelling in one direction, a slow velocity of traverse for the one direction, is required, together

with an extremely fast "fly back." It should be noted that the velocity with which the trace traverses the screen determines the brightness. Thus the fast "fly back" becomes almost invisible. It is sometimes required that this fly back is completely suppressed, but the methods of doing this will not be discussed here.

Obtaining a Trace

One of the simplest methods of obtaining a trace, is to connect the plates of an oscilloscope across a condenser, which is charged from a source of potential, through a resistance (Fig. 2). The time



Fig. 3.

- (a) Exponential charging and discharging of condenser.
(b) Linear part of the exponential curve.

that the condenser takes to charge, and hence the time taken by the spot to move across the screen, is a function of the value of resistance and condenser⁽¹⁾. This would give only one trace (as the condenser charged up) so that before the next could be obtained, the condenser would have to be discharged. If, however, a switch is introduced to discharge the condenser periodically a succession of traces is obtained. These condenser traces are however exponential and not linear as will be seen from Fig. 3a. If the charging is not complete, when the discharge takes place, then the trace approximates to a straight line, and for all useful purposes can be so considered (Fig. 3b). When this is done however, the voltage available for sweeping is much reduced, a condition which sometimes leads to the need for an amplifier.

As mechanical switching for the discharge is not

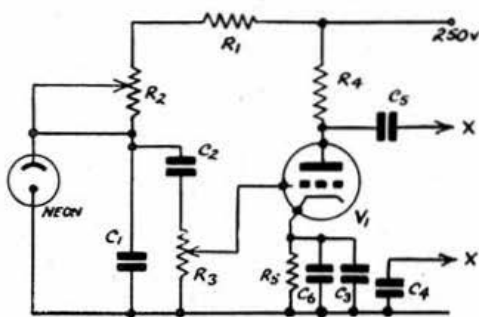


Fig. 4.

Neon lamp time base. Range approximately 10 to 1,000 sweeps per second.

- | | | | |
|-------|----------------------|-------|-------------------|
| R1, 4 | 50,000 ohms | C2 | 0.01 μ F |
| R2 | 5 megohms | C3 | 50 μ F |
| R3 | 2 megohms | C4, 5 | 0.1 μ F |
| R5 | 1,000 ohms | C6 | 0.01 μ F Mica |
| C1 | 0.01, 0.1, 1 μ F | V1 | ML4 |
- Neon Osglim, Philips, etc., with base resistance removed.

very certain, and is somewhat cumbersome, it is usual to use an electronic device, but any such device must be of such a nature that the discharge is extremely rapid. The simplest method is to use a neon lamp across the condenser. This will discharge automatically when the voltage across it reaches a certain value, and will cease when the potential has fallen to another given value. There are however limitations: (1) the two potentials are only about 40 volts different, and (2) for most purposes the sweep voltage must be amplified. A suitable circuit

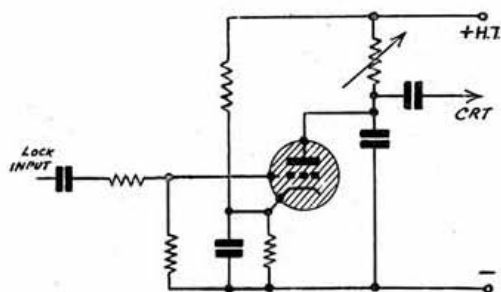


Fig. 5.
Time base using gas filled triode.

is given in Fig. 4. This method has a major drawback, in that the striking and extinguishing voltages of the neon vary considerably, and consequently the length of the trace is variable and usually shows as a "jitter."

When making measurements on the trace, it must be kept stationary on the screen—or synchronised. The only method of achieving this with the neon, is continually to reset the charging resistor which determines, along with the condenser, the recurrence frequency of the sweep. This frequency is often better expressed as the sweep velocity, i.e. the total distance swept out by the trace in one second is equal to the length of each trace, times the number of traces per second.

Mercury Grid-controlled Time Bases

It is possible to introduce synchronism, by using a mercury grid-controlled valve, an example of which

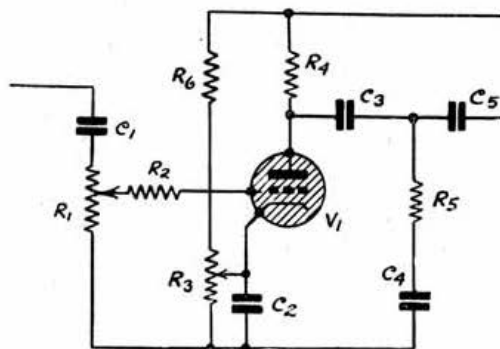


Fig. 6.

Modified gas triode time base which may be used for a range of 10 to 1,000 sweeps per second.

R1	50,000 ohms	R5	1,000 ohms
R2	150,000 ohms	R6	200,000 ohms
R3	10,000 ohms	C1, 5	0.001 μ F
R4	1 megohm	C2	50 μ F
C3	0.001 μ F	and others for different speeds	
C4	0.001 μ F		
V1	GTIC		

is the "thyatron⁽²⁾." This method is very similar in operation to that which employs a neon, except that the grid is used to trigger off the discharge at a particular part of the wave form, so that a stationary trace is obtained. This is done by applying part of the vertical sweep voltage (i.e. the voltage being studied) to the grid of the discharge valve. When this type of valve is used the amplitude of the sweep becomes quite steady. A circuit is given in Fig. 5. The linearity of the trace is much improved if the total voltage is very high, so that the condenser is only charged to a small proportion of the total potential. This sweep potential however, may be a hundred volts or even more, and still be reasonably linear, thus removing the necessity for an amplifier, when small type low voltage C.R. tubes are used.

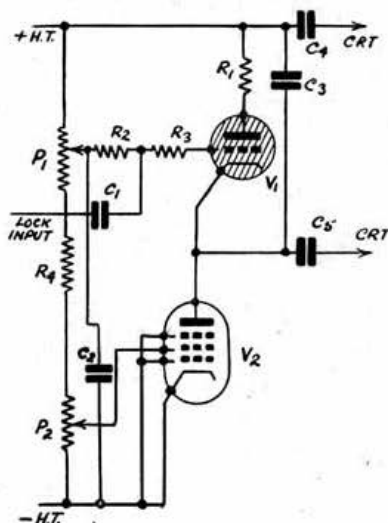


Fig. 7.

Linear gas triode time base for 10 to 10,000 sweeps per second.

C1, 2, 4, 5	0.1 μ F	R4	50,000 ohms
C3	1 μ F, 0.1 μ F, 0.01 μ F	P1	50,000 ohms
R1	200 ohms	P2	25,000 ohms
R2	20,000 ohms	V1	GTIC, T31
R3	200,000 ohms	V2	MSP4

Modified Forms of "Thyatron" Circuits

Although the anode resistor and charging condenser should be the main controlling factors of the discharge, the grid bias (cathode) resistor affords some variation of frequency, but over wide ranges this sometimes makes the charging non-linear.

A widely used circuit is given in Fig. 6. It will be noted that the charging capacity is split into two parts, and that the lead to the cathode ray tube is taken from the centre. This reduces the voltage available for sweeping, but is usual when a stage of amplification is required after the time base. The inclusion of a series resistor (R5) of about 1,000 ohms prevents too high a discharge current through the valve. Synchronising is attained by means of the condenser and resistance network in the grid circuit. The grid stopper reduces grid current, which in a "thyatron" is often quite high, thus helping towards stability. The synchronising impulses are injected via the condenser C, and the amount of synchronisation is varied by the potentiometer. The synchronising input should never be greater than that necessary to just lock the time base, otherwise the recurrence tends to pull into line with the synchronising voltage, and

in extreme cases only one complete period of the waveform being studied, will appear on the screen. Under such circumstances, the recurrence resistor and condenser have lost control completely, and the time base is running at the same recurrence as the synchronising voltage, instead of at a submultiple.

It will be noted that it is standard practice to earth the positive lead in cathode ray oscillographs.

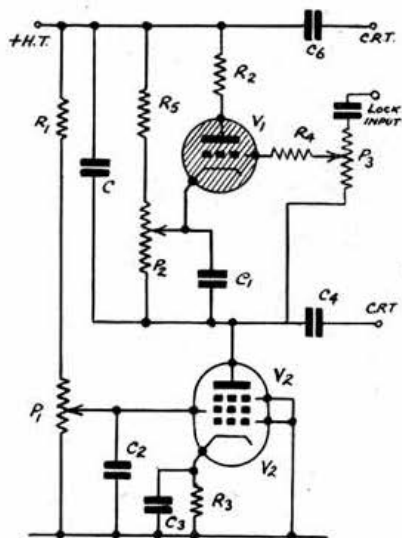


Fig. 8.

Modified linear gas triode time base giving approximately 30 to 8,000 sweeps per second.

C1	50 μ F	R3	1,000 ohms
C2, 4, 5, 6	1 μ F	R4, 5	100,000 ohms
C3	1 μ F	P1	100,000 ohms
C	1, .05, .01, .005, .001, .0005, .0001 μ F	P2, 3	50,000 ohms
R1	50,000 ohms	V1	GTIC, T31
R2	200 ohms	V2	MSP4

If the same source of voltage is used for the time base, then the system already outlined becomes a little cumbersome, because one of the feed condensers to the C.R. tube plates has to be capable of withstanding almost the full voltage of the power unit. To obviate this, the charging resistor is placed on the cathode side of the "thyatron." In the interests of linearity this is often replaced by a charging valve, usually a pentode, arranged to act as

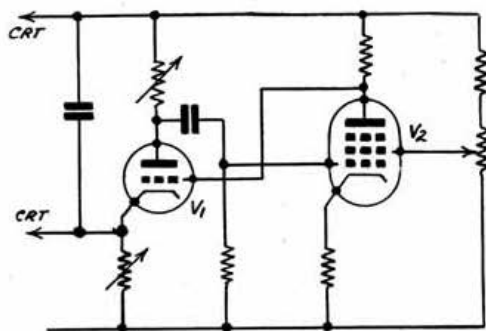


Fig. 9.

Puckle time base.

a variable impedance. Such an arrangement is given in Fig. 7.

This modification allows the time base to be operated, if desired, at a lower voltage instead of from the high voltage source, and a larger portion of the charging potential is then utilised for the sweep, while still retaining linear charging. A slight modification, using both pentode and "thyatron," is sometimes used, since biasing arrangements on the "thyatron" are somewhat simplified. See Fig. 8.

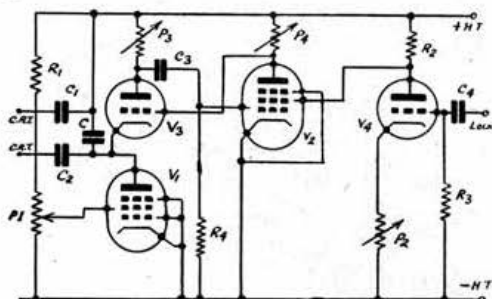


Fig. 10.

Linear hard valve time base with lock giving sweep recurrences of 10 to 5,000 per second.

C	.001, .01, .1, 1 μ F	P1	50,000 ohms
C1, 2, 4	1 μ F	P2	25,000 ohms
C3	.002 μ F	P3	2,000 ohms
R1, 2	40,000 ohms	P4	30,000 ohms
R3	500,000 ohms	V1, 2	MSP4
R4	1 megohm	V3	ML4
		V4	MH4

Time Base Circuits Using Hard Valves

The mercury vapour relay valve referred to above has very definite limitations. In particular it becomes difficult to operate it at recurrences of more than about 15,000 per second, although the modern

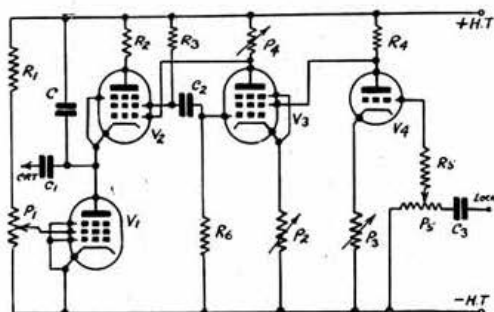


Fig. 11.

Modification of Fig. 10. Sweep frequencies 15 to 20,000 per second.

C	.5, .1, .02, .004	P1	100,000 ohms
C2	.02, .005, .001, .002 μ F	P2	1,000 ohms
C1, 3	.01 μ F	P3	25,000 ohms
R1, 4	50,000 ohms	P4, 5	100,000 ohms
R2	1,000 ohms	V1, 2, 3	MSP4
R3	25,000 ohms	V4	MH4
R5	5,000 ohms		
R6	1 megohm		

gaseous relay tube, using argon, has extended this figure to 20,000 and in some cases 25,000 per second. Several time bases have however been developed, using hard valves exclusively. One of the best known is that due to Puckle, and as this is

capable of being operated up to 1 Mc./s, if well designed, it is quite suitable for studying wave forms up to 20 Mc./s, while individual waves can be seen up to 60 Mc./s, although not in any detail. The "free running" system is illustrated in Fig. 9, but synchronisation can be added, as also can a charging pentode as in the "thyatron" system. (See Fig. 10.) It is possible to synchronise the system without the addition of the separate valve, by taking the synchronising lead direct to the screen grid of the triggering valve V 2, in Fig. 9.

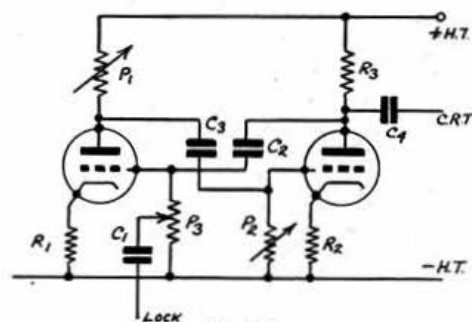


Fig. 12.

Multi-vibrator for use as time base (not quite linear).

R1, 2	1,000 ohms	P2	1 megohm
R3	25,000 ohms	P3	.5 megohm
P1	30,000 ohms	C1	.01 μ F
C2	1, .01, .0002 μ F		
C3	.5, .005, .0001 μ F		
C4	.1 μ F		

A further modification of this time base, is to use a pentode for the discharge valve and to take the lead to the triggering valve, from the screen grid. The complete circuit is given in Fig. 11.

Multi-Vibrator Method

A very old method, and possibly one of the simplest, is to use a multivibrator as a time base. If the sweep voltage is taken from the grid of either valve, a good linear trace is obtained. The multivibrator will operate up to very high frequencies, and is extremely easy to lock, thus it is eminently suited to amateur use. A circuit for use up to about 30 kc./s is given in Fig. 12. This uses triodes, but by employing pentodes connected as triodes (KTZ 41 or 6K7), the circuit can, with the aid of suitable resistances and condensers, be made to operate to much higher frequencies. A difficulty sometimes

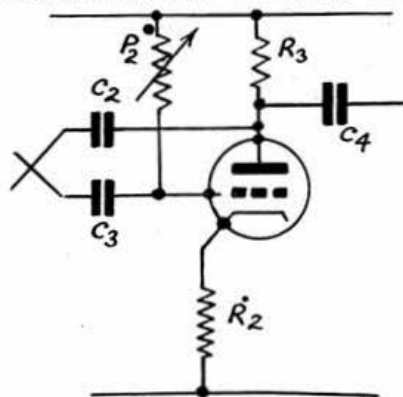


Fig. 13.

Modification to quicken the fly back. Values as for Fig. 12.

encountered is in making the "fly back" fast enough. This can be improved considerably by taking the grid leak, of the valve being used for the

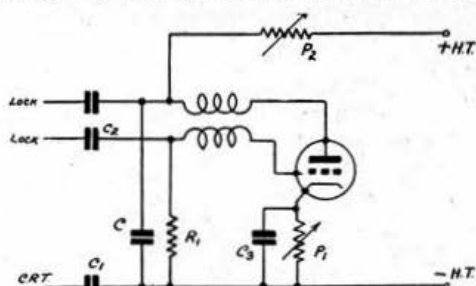


Fig. 14.

Hard valve time base using coupling coils. Values as for Fig. 12.

sweep voltage, back to H.T. positive instead of to earth, as shown in Fig. 13.

Other Forms of Time Bases

The practice is sometimes followed of using a sine wave oscillator, and distorting the output, by suitable networks, in such a way that the final waveform is a "saw tooth." Such schemes, although giving good results, are clumsy, and difficult to operate unless another oscillograph is available to check the waveform occasionally. Adjustment of the recurrence is very often accompanied by a change in the waveform.

It will have been noted that the previously described hard-valve time bases have, basically,

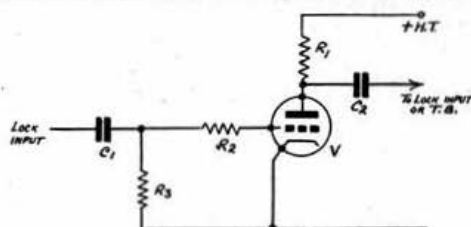


Fig. 15.

Circuit of "squaring" valve.

R1	50,000 ohms	C1	.001 μ F
R2	150,000 ohms	C2	.01 μ F
R3	.5 megohm	V	MH4

consisted of two valves, one the discharge valve and the other the triggering valve. These functions can, by suitable coupling, be embodied in one valve. The simplest method, and the only one to be discussed here, is to use coils for the coupling arrangement, rather in the style of the old-time reaction for receivers. The circuit diagram Fig. 14 will explain the action better than words. It must be remembered that the coils are only being used to provide coupling, and do not (or should not) control the frequency of operation, this being controlled by the charging resistance and condenser.

Miscellaneous Notes

It is usual, when synchronising to apply part of the vertical deflection voltage to the synchronising lead in the time base. Such methods often lead to difficulties and unsatisfactory operation, particularly if the vertical wave form is approximately a sine wave. It is often much better to start off the discharge by applying a sharp kick to the time base.

This is done first by applying the input to a distorting valve and then applying the output of this valve to the time base. A simple "squaring" arrangement for sine waves is shown in Fig. 15, and this should in general be quite suitable.

Another matter, of interest if not of real importance for most purposes, is that of suppressing the "fly back." This is usually attained, not by actual suppression of the "fly back" trace, but by brightening the forward trace. The method employed is to

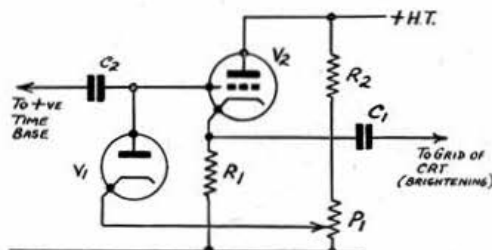


Fig. 16.
Fly-back suppressor.

R1	20,000 ohms	C1, 2	·1 μ F
R2	100,000 ohms	V1	Diode
P1	50,000 ohms	V2	MH4

take the charging potential of the condenser on to the brightening control of the cathode ray tube in such a way that as the charge increases, the volts on the brightening grid of the C.R. tube also increase, but after a small fraction of the total sweep voltage, this is made to follow a flat characteristic, by means of a limiting device. It should be noted here that either positive or negative brightening pulses may be used, the former applied to the grid and the latter to the cathode of the tube. The voltage limiting is usually effected by placing a diode across the suppression lead^(a). A circuit is given in Fig. 16, but the individual should work out a scheme for each particular case.

Finally, a word of warning. Saw tooth oscillations contain large numbers of powerful harmonics, and unless screening is adequate, trouble is bound to arise if receivers and transmitters are being used at the same time as the time base. If "thyratrons" are used, careful design is necessary in order to ensure good screening with good ventilation, since the operating conditions of such tubes depend to some extent on the temperature of the valve. Overheating may well be the cause of a short valve life.

Valves for Time Bases

Suitable valves for use in the various time bases are as follows:

Thyratrons*	...	GTIC	T31	T41	855
Charging pentodes	...	KTZ41	MSP4	W21	SJ7
Triggering pentodes	...	KTZ41	MSP4	VP41	SP41 6K7
Triodes	MH4	ML4	6C5 76

* Permit is required to purchase these valves.

References

(1) *The Amateur Radio Handbook*, 2nd Ed., Page 289.

(2) The word "Thyratron" is registered by one manufacturer.

(3) See circuits for D.C. restoration in television receivers.

* * *

Thanks are tendered by the author to Mr. H. A. M. Clark, B.Sc. (G6OT), for his help in reading and suggesting alterations in the above article.

A USEFUL CALIBRATION HINT

THE writer, after building a super-het, whilst on leave, found that no marker station was available to locate the 7 Mc/s. band. The following method was adopted and found to be satisfactory.

The receiver was first lined up on the B.B.C. station operating on 6186 kc/s with the H.F. oscillator set on the high frequency side as is normally the case. The oscillator was thus on 6186 kc/s + 456 kc/s (the I.F.). Leaving the oscillator unaltered, the R.F. circuits were swung lower in capacity until the characteristic rushing sound showed the set was again "alive."

As the oscillator was still set to 6642 kc/s the R.F. circuits must have been tuned to 7098 kc/s (6642 kc/s + 456 kc/s).

This method of calibration, locates the 7 Mc/s. band, although it is not in accordance with modern radio practice because the H.F. oscillator is now set on the low frequency side of the R.F. circuits which makes it more difficult to gang.

With this in mind the H.F. oscillator condenser was swung lower in capacity until the rushing sound was again heard, thereby indicating that the H.F. oscillator was now set to the correct (i.e. the high frequency) side of the R.F. circuits.

A similar method, although reverse in action, can be used to locate the 14 Mc/s. band from the 15 Mc/s. broadcast stations. For example, using WGEA on 15330 kc/s would give 14418 kc/s (15330 kc/s—twice the I.F., 912 kc/s) which is just outside the high frequency end of the amateur band.

GM8FR.

(The suggestions made above can only be applied to those receivers incorporating separate tuning of the radio frequency oscillator.—Ed.).

New Books Received

HANDBOOK OF TECHNICAL INSTRUCTION FOR WIRELESS TELEGRAPHISTS (Seventh Edition). By H. M. Dowsett and L. E. Q. Walker. Iliffe & Sons, Ltd., 25s., by post 25s. 9d.

An extensively revised and enlarged edition of this popular manual. New chapter on valve and metal rectifiers. Chapter on aerials and radiation expanded to cover simple theory and more short-wave practice. Text fully illustrated. An invaluable book which should appeal as strongly as all the earlier editions.

RADIO RECEIVER CIRCUITS HANDBOOK. By E. M. Squire. (Second edition.) Pitman, 5s.

An excellent book from the pen of a popular writer. Written for those who do not like too much theory, but wish to know more about the fundamentals of radio receiver design. The new edition is rather similar to the first but some of the original circuits have been modified to make the book more representative of modern practice.

Silent Keys

We record with regret the names of the following members who have made the supreme sacrifice whilst serving their King and Country.

To their parents, relatives and friends we extend our sincere sympathies.

Leading Aircraftman G. E. Cooper, G3PP, of Sheffield.

Leading Telegraphist L. J. C. Robertson, BRS3587, of Dundee.

Sergeant Observer J. A. Tyrrell, BRS3569, of Lowestoft.

MATHEMATICS FOR THE RADIO AMATEUR

By T. R. THEAKSTON, B.Sc. (2DBK).*

SECOND SERIES—PART IX. VECTORS

It has already been seen that to give information in a comprehensive and clear form, graphical methods are of great value.

With quantities such as velocities, forces (either mechanical or electrical) and electric current it is important to know their magnitude, but this is not enough. It is essential that there should be an indication of the *direction* of the quantity.

Thus an aeroplane may have a speed of 200 miles per hour. Its velocity cannot however be expressed quite as simply, because velocity must combine the speed with the direction in which it is travelling. It is only by stating, for example, that the aeroplane has a velocity of 200 miles per hour on a bearing of 300° that a complete picture is presented.

In the same way, a certain voltage may be applied to an inductance. There will be an opposing voltage set up. Consideration of the magnitudes only, will not give an idea of the resulting voltage; it is necessary to know and consider their *relative* directions.

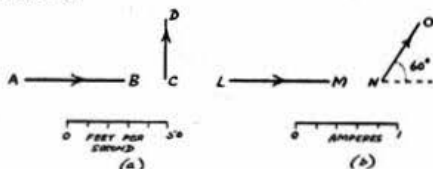


Fig. 17

Vectorial Representations

It follows that certain quantities not only may be represented so as to give information with regard to their magnitude and direction, but they *should* be so represented.

Since, by choosing any suitable scale, a quantity of any magnitude can be represented numerically by a straight line, lines of certain lengths, in conjunction with an arranged scale, can give the size of any quantities. Further, a line can be drawn in any desired direction, and this direction can be chosen so as to indicate the direction of the quantity.

These quantities which can be represented in magnitude and direction by straight lines are *vector quantities*. The lines are termed *vectors*.

Thus in Fig. 17a, AB represents in magnitude and direction a velocity of 50 ft. per second. CD represents a velocity of 30 ft. per second in a direction at right angles to that of AB.

In Fig. 17b, LM represents a current strength of 1 ampere passing in the direction indicated. NO represents a current of 0.75 amperes in a direction which makes an angle of 60° with the direction of AB.

It is clear that whereas absolute values are given for the size of the velocities or current strengths, yet the directions are only given relative to one another. There must be then, in addition to a scale of magnitude, a "scale" of direction. This will be referred to later.

The Addition of Vectors

In Fig. 18a and b, let AB be the vector for the velocity of an object moving originally in the direction AB. At the same time another velocity,

the vector for which is AC, is impressed upon the object.

[In Fig. 18a, AC is at right angles to AB. In Fig. 18b, AC is at an angle θ to AB.]

If AC were in the same direction as AB, the *resultant* velocity (i.e. the single velocity resulting from the two velocities applied) would be, $AB + AC$, in the direction AB.

If AC were in the exactly opposite direction, the resultant velocity would be, $AB - AC$, in the direction AB.

In other words, the resultant would be the algebraic sum of the components.

- E.g. (i) 50 f.p.s. in direction AB; 30 f.p.s. in direction AB. Resultant = $50 + 30 = 80$ f.p.s. along AB.
(ii) 50 f.p.s. in direction AB; 30 f.p.s. in direction BA. Resultant = $50 - 30 = 20$ f.p.s. along AB.
(iii) 50 f.p.s. in direction AB; 80 f.p.s. in direction BA. Resultant = $50 - 80 = -30$ f.p.s. along AB = 30 f.p.s. along BA.

Note.—A velocity of x f.p.s. along AB = A velocity of $-x$ f.p.s. along BA.

This is exactly the same as saying that, + 4 miles South is -4 miles North; or -4 miles West is + 4 miles East; where the sign gives the "sense" or direction of the movement or distance.

This algebraic addition is *not* applicable when the vectors to be compounded show different directions.

For, considering again Fig. 18, under the influence of V_1 along AB, the body would arrive at B in unit time. Meanwhile, the vectorial component V_2 has acted in the direction AC, and has resulted in a movement equivalent to $BD = AC$ in unit time. That is, in each case the effect of the vectors V_1 and V_2 is equivalent to the vector $AD = R$ or, $V_1 + V_2 = R$, where R is the resultant of the vector addition.

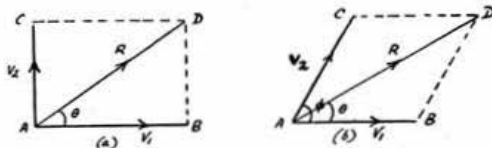


Fig. 18

R is, in each case, the diagonal of the parallelogram, which gives the rule for vectorial addition:—

If two vectors are represented by the sides of a parallelogram, their sum is, in magnitude and direction, given by the diagonal of the parallelogram.

It is only when the method above is used, that one can write:—

$$V_1 + V_2 = R.$$

Problems (On Parts viii and ix).

(34) The vertical height (s feet) traversed in t seconds by a particle projected upwards with a velocity of 100 f/s is given by $s = 100t - 16t^2$.

(Continued on page 356)

KHAKI AND BLUE

● Cpl. N. Horrocks, 2CUZ, Isle of Wight, seeks news of Stan Saddington, 2FXQ, last heard of in Singapore. He wishes to be remembered to G3JR who was with him for several months before taking his commission. The only ham on his station at present is VE3TY.

● From Beirut, Syria, comes news of Tel. R. Jones, GW3JI, whose home is in Llandudno. He has met several foreign and Empire amateurs but has drawn a blank with G's. He laments the fact that he cannot get the chance to remuster as a Radio Mechanic. Greetings are sent to his friends in District 11 and elsewhere.

● Ft./Sgt. D. C. Derry, G8PQ, inaugurated the new Airgraph service between India and Headquarters, with a letter from Panitola, Upper Assam, dated February 4. Derry who has been overseas for 3½ years wishes to be remembered to all who served with him at Cranwell in pre-war days. He has met two amateurs named Pearce and Godsan, but does not mention their calls.

● A.C.1 R. Kenny, BRS3825, having recently returned from a spell of duty with the R.A.F. in GI sends his greetings to all who extended hospitality. He visited GI6YM (Y.M.C.A. Radio Club) and had pleasant contacts with GI6HN, 6TK, ZL1FI, 1LZ, 2IO and W6FSI. He renewed acquaintance with VE3AAR by accident.

● Cadet N. F. Young, G8VM (No. 7 I.T.W.), would like to meet local amateurs. He also seeks news of old friends from District 12. Home address: 20 Bryanstone Road, Crouch End, London, N.8.

● Douglas Bagg, VP4TO, a Corporal in the Trinidad Artillery Volunteers, would be glad to extend hospitality to any member who finds himself in Trinidad. Douglas can be contacted at 4 Regent Road, Pointe-a-Pierre.

● Douglas Manson, G8PW, now a Sergeant R. Mech. in the R.A.O.C., has "made W.B.E." in personal QSO's during the time he has been in the Army. His contacts have been with VK2KS and 3UH (R.A. Navy), VE4ATE (R.C.C. of Signals), Ex VS7CE (R.A.O.C.) and ZS2P (S.A. Navy). Any other claimants? Headquarters Visitors Book shows contacts with VE, VK, VQ8, ZL, VS1, ZB2, F, LA, SP, GM, GW.

● L. Frank, G4NU, also a Sergeant in the R.A.O.C., is with G8PW, 8NI, 6FK and GW2GK. They indulge in lengthy ragchews about the V.H.F. rigs they hope to build after the war.

● Cpl. Ken Evans, BRS3899, R. Signals, wishes to be remembered to BRS1066 (to whom he offers congrats on his promotion to C.Q.M.S.) and to BRS1060 (who entertained him whilst in Wales). He would like to hear from "William the Conqueror" and other old friends. Home address: 63 Penns Lane, Erdington, Birmingham 24.

● Sgt. J. Williams, ex BERS354, and until recently stationed in Egypt, with the R.A.F., has now returned to England. He is anxious to hear from G2PF, 8RO and 2AAH, who are asked to write via 30 Chancery Lane, Maidstone.

● DX enthusiasts will be interested to hear that Cpl. E. J. Roberts, BRS4021 (R.A.F., Coastal Command), has received an official verification card from KC4USA—the call used by the Baird Antarctic Expedition at or near the South Pole. Roberts

logged the station QSA3 R5 on 14 Mc. phone during the early part of 1940. Any other lucky lad or lass?

● Mr. Leonard Heys, of Blackpool, joined the R.A.C. early in April. As a consequence his radio and electrical business has been closed down for the duration.

● A.C.2 Mal Geddes, G2SO, located only 14 miles from home, reports that his twin brother, BRS4023, was in Tobruk at Christmas. Whilst there he contracted diphtheria and was moved to Cairo. He is now fit and well and has returned to his unit. Mal sends 73 to his friends in District 14.

● L.A.C. Frank Lane, G3GW, was surprised to find, after reading the December BULL., that his pal G3WC was in Ontario. Surprised—because he also is in that Province! Frank who can be reached c/o 273 Glasgow Street, Kitchener, Ontario, expected to spend his leave with an American amateur in Tennessee.

● Mrs. H. K. Ayres, wife of 2FRG, of Stroud, in sending a welcome donation to the P. of W. Fund gives the news that her husband is serving with the R.A.F. Medical Branch in the M.E. Mrs. 2FRG finds the BULL. of much interest, especially the Morse articles.

● R. M. Bangay, G3DW, now a S./Ldr. serving with the R.A.F. in E. Canada, is the father of a junior op.—Christopher John. Congrats. He wishes to be remembered to all old friends.

● L.A.C. M. Selby, G4LV, now in Basrah, would like to hear from old friends of the Hoddesdon Radio Club. Letters should be sent via G8UO, 13 Chandos Street, Keighley, Yorks.

● F./Sgt. W. Hartley, G8UY, who was one of the original members of the famous "ZQ party," in a letter to G2MI says he met dozens of hams at the 60 odd R.A.F. stations he visited as "travelling instructor." He asks "is the G2VO recently reported as having been on holiday, the same as the old timer who used to visit me in Harrogate when I was G6YR?" He would like to hear from Geoff Ramsden, G6BR, and G2JP.

● Writer T. L. Stevens, G3XV, stationed at Brighton seeks news of G4FX, 6KR, 8JC, 2BMN and other Wrekinites. Letters to Post Office, Donnington Wood, Wellington, Salop.

● Heartiest congrats to R. H. Candow (R.A.O.C.), GM5SC, on his promotion to Lt. Col. He is at present on loan to the Canadian Corps in England, and is serving as Assistant Director of Ordnance Services (Engineering).

● From the "Country Farmyard" comes the news that our worthy Hon. Editor, G6LL, has been elected Chairman of the newly formed "Farm Hams Club." At the March meeting no less than 20 of the 35 present were fully fledged hams. The Vice-Chairman is G8OM and 8VG is Secretary.

● Further news of G hams in ZE1 comes in a letter from Cpl. Hubbard, 2FRM, who reports that G3GD 2AJW and 2BMJ are with him at an R.A.F. station near Salisbury. A conventionette is contemplated. Contacts have been established with ZE1JA, 1JR, 1JZ and G5FF who is serving with the Rhodesian army. He says "THE BULL. gets through O.K. although delayed at times. I hate to think what would happen if we didn't receive it. It's manna from heaven to us out here."

● 2FRM would like to contact 2HBG, last heard of in ST, and any member in Nairobi. He requests us to publish his service address. Sorry o.c. it can't be done. Your correspondents had better write *via* G.P.O., Salisbury, as we have no civilian members in that town at present.

● Service members visiting New York are invited to contact Hugo Bondy, W2CMY, Bill Simpson, 2BUY and Eddie Hopper 2GT. Business address of 2BUY and 2CMY is 501 Madison Avenue ('Phone, Plaza, 3-3300, 1, 2). Ask for Max Weiner, W2KM, if 2BUY and 2CMY are off duty. W2CMY's home address is 158 Hope Street, Ridgewood, N. J. ('Phone, Ridgewood 6-1259.) W2GT can be reached on Bryant 9-7800.

● W./O. H. D. Bramwell, G2RF, just back from a spell of duty with the R.A.F. in VP4 and 6 reports personal QSO's with VP2AT and 6MR. He is now at W.D.

● R. H. Gatland, 2FTP, now a Sergeant at No. 3 S.S. sends the news that S75 gets busier every evening. Chief interest centres around quality amplifiers, steel wire recording and test meters. Members in regular attendance include G4AI and 4AY. G2FZ lives out of camp. GW2XZ and G4GG have left the school, the latter is believed to be in ZS.

● Reconstruction of the C.B.A.R.S. presents many problems but it is hoped to arrange occasional ragchews from time to time.

● Those who attended the Farnborough meetings in 1940 will be glad to hear that Lt. Peter Mackay, G8AY, is fit and well somewhere in the Middle East. During one of the original Libyan battles he spent some while trying to get his signals through some severe key interference. Eventually he gave it up and listened to the interference—it was a QSO between a W4 and a W5! The only ham he has met is G5ZM although he believes 5QY is "somewhere around." Peter sends 73 to Jim Kirk, G6ZO and other old friends.

● L./Cpl. J. Cairns, G3UC, who is now abroad again would welcome letters from his friends. Home address 45 Denmark St., Lancaster.

● Congrats to R. C. Wilkinson, D.F.M. (G4HW), on his promotion to S./Ldr. He is now i/c of a Squadron, near Margate and would like to meet local members. Home address, Green Banks, Tylers Bridge, Chapel St. Leonards, nr. Skegness.

● Sgm. J. Moseley, 2CIW, R.C. of S., now at the "Country Farmyard" seeks news of G4FN (R.A.F.). Letters to 54 Clarence Road, Grays, Essex.

● Sig. L. G. Lacey, 2AMY, wishes to be remembered to all old friends especially those met at Huddersfield. He requires a *Wireless World* Diary. Any offers?

● Friends of Cpl. J. W. Russell, G2ZR, will join us in offering him congrats on his engagement. The story of "their first meeting" via a teleprinter exchange will make interesting reading one day! G2ZR is undertaking station mechanic duties at an R.A.F. coastal station in Hants.

● The many friends of Lt. Heyerdahl, LA6A, will be glad to hear that his wife has reached Great Britain safely. Shortly after her arrival she presented 6A with a son. As Master Heyerdahl was born in Edinburgh he will, presumably, assume the call GMLA6AJOP!

● Friends of Lt. T. P. Douglas, G3BA (Daventry), will be sorry to hear that he has been reported missing in Malaya. Mrs. Douglas is very anxious to get in touch with anyone who might have been with him on active service. Her address is "Hunstan," 43 New Street, Daventry.

● Sig. J. F. Higgins, G8JI, of Birmingham, in a valiant attempt to put District 3 on the map, sends a lengthy report from the Hall frequented by Batchelors and others. Although he has plenty of hams for company from other Districts he has had much difficulty in convincing them that his *own* District has any at all! He seeks news of G5QG and 8HO.

● G8JI puts forward the claim that he was the first ham to go overseas on active service. He was flown to Rheims on September 2, 1939, landing on French soil at 13.00 hours. He left from Brest on June 22, 1940.

● R. M. Jeremy, 2CNJ, now serving in the R.A.O.C. as a Radio Mechanic would like to meet members living in the Dagenham area. Contact can be established *via* his home address 4 Linkfield Street, Redhill, Surrey. 2CNJ recently met Lt. Cotten, W8GOO, who is stationed near Hadleigh, Essex.

● Congrats to R. Postill, G8NO, on the arrival of a Junior op. and on his promotion to Major, R. Signals. He can be contacted *via* Tonbridge School, Kent, or c/o Church Hill Farm, Stoke Trister, Wincanton, Somerset.

● W.O. H. Bennett, G8PF, writing from Britain's Hellfire Corner (no prizes for a correct guess) tells of an enjoyable visit he paid recently to Harold Merriman, G6GM, of "Hen Roost" fame. PF records his thanks to the Merriman family and other Devon hams for their hospitality. Since arriving in Kent his only ham contact has been with "our Maths. Master," Dick Theakston, 2DBK, who incidentally has now moved from York to 29 Hambro Avenue, Hayes, Kent.

● Cyril Turner's ham experience stood him in good stead at a Scottish R.T.C. After skipping half the course he pulled top place, in radio practice, out of 170 in the final exam. In all subjects he finished with 84 per cent.—top 88 per cent. G8NL says "it certainly spoke well for the R.S.G.B. when we all received a copy of the Handbook before we left R.T.C." He is now at No. 3 R.S. but bemoans the fact that hams are conspicuous by their absence.

● Writing from the M.E.F. on November 15, Cpl. John Raven, G3HG, reported all well at that date. L.A.C. Harry Willets, 2FPI, and F./O. Maurice Brookes, G5OI, have left his unit, but he has met N. D. Glass, 2FFM, whilst on leave. He sends 73 to "The Early Birds" and other old friends.

Strays

George Schuler, 2BMU, 4 Jutland Avenue, Ravenstown, Cork-in-Carmel, Lancs., is anxious to trace G3XN, 3GS, 4LI and 8OK. Prior to the war G3XN operated 2BMU's transmitter, with G.P.O. permission, from Alderney, C. Isles. Mr. Schuler would also like to hear from other old C.I. friends.

Cpl. D. Appleby, BRS4706, requires a circuit of a portable radio compass that can be constructed from parts generally available, Letters *via* H.Q.

Mr. James Bramhill, 2BMI, 10 Orchard Way, Uxbridge, Middlesex, has kindly offered a complete set of back issues of THE T. & R. BULLETIN from May, 1937, to December, 1941, for sale to the highest bidder. The proceeds will be given to the Prisoners of War Fund.

Here is a chance for one of our new members to acquire an historical set of recent issues of the Society's Journal. Offers to be made in writing to the General Secretary by not later than April 25.

Cpl. R. F. Blake, G8QR, 115 Goddard Avenue, Swindon, wishes to borrow a blue-print of the Sky-Chief circuit. Can anyone oblige?

Condolences

Sincere condolences are offered to Mr. H. D. Cullen, G5KH, of West Hill, Putney, whose son, F./Lt. R. H. Cullen, D.F.C., was lost during the campaign in Greece.

ON ACTIVE SERVICE

Thirty-first List

WE publish below our thirty-first list of radio amateurs on Active Service. Additional details and corrections should be advised to Headquarters as early as possible. The present list contains information received up to March 26, 1942.

Rank and Name	Regiment or Branch of Service	Pre-war Call or B.R.S.
P./O. D. A. Appleby	R.A.F.	2ALP
A.C.2 J. C. Benson	"	4825
L./Cpl. C. Blagg	R.C. of S.	4827
A.C.2 E. D. Bugg	R.A.F.	4110
A.C.2 I. G. Campbell	"	2DDI
L.A.C. F. O. Catling	"	4823
Spr. S. F. Cochrane	R.E.	4871
A.C.2 B. G. Collins	R.A.F.	4116
L./Sgt. D. L. Coppendale	R.C. of S.	4842
2nd Lt. W. Crossland	R.A.O.C.	G5CI
A.C.2 V. Cundall	R.A.F.	4655
Cpl. C. R. Davis	"	G4OP
A.C.2 K. A. Day	"	4832
Cpl. G. W. Doggett	"	4858
Bdr. J. R. Dunne	R.A.	4870
A.C.1 W. J. E. Dyer	R.A.F.	4120
Tel. T. O. Edkins	R.N.V.(W.)R.	4838
Sig. G. Edwards	R.C. of S.	G2UX
F./Sgt. R. W. Edwards	R.A.F.	4096
Sig. C. J. Ellett	R.C. of S.	3585
A.C.2 F. W. Ellis	R.A.F.	4043
P./O. J. F. Ennos	"	2480
Cpl. J. Field	R.A.O.C.	1386
A.C.2 R. W. Fisher	R.A.F.	2DZN
A.C.2 S. M. Forrester	"	4872
Sig. L. E. Fragle	R.C. of S.	4818
A.C.2 P. W. Gifford	R.A.F.	4694
A.C.1 L. Gist	"	4845
Gnr. P. H. Gledhill	R.A.	4851
Cpl. F. J. Grant	R.A.F.	4867
A.C.1 P. H. Green	"	4820
L.A.C. F. H. Hall	"	4830
A.C.2 H. H. Herd	"	4859
A.C.1 N. T. Hodgson	"	2AUR
Ldg. Radio/Mech. S. Hollingsworth	R.N.	4873
Sig. S. W. Hosking	R.C. of S.	4826
W./Tel. F. Jackson	R.N.V.R.	G5MT
P./O. J. N. Jarvis	R.A.F.	4864
Tel. D. A. Jeffrey	R.N.	2AJO
L./Cpl. L. D. Jeffery	R.E.	4865
Cpl. D. Kentfield	R.A.F.	2AOF
A.C.2 B. T. King	"	G5TA
O./Tel. J. Lamdin	R.N.	4511
L./Cpl. A. Marsden	R.C. of S.	4829
Bdr. G. M. Marston	R.A.	4840
L.A.C. W. E. Maxwell	R.A.F.	4824
F./Lt. W. G. M. Money	"	G2UP
Sig. J. F. Moseley	R.C. of S.	2CIW
L.A.C. J. W. Oldfield	R.A.F.	4869
Sig. C. W. Pettifor	R.C. of S.	2DPQ
A.C.1 D. P. Pickering	R.A.F.	4828
Tel. W. Pitman	R.N.	4855
A.C.2 D. Powell	R.A.F.	GW5MD
L./Cpl. E. L. Priest	R.A.O.C.	4868
P./O. C. B. Proudlove, B.Sc.	R.A.F.	4846
A.C.2 F. Pygmy	"	4065
L./Bdr. S. V. Taylor	R.A.	4137
Sig. J. S. Tickle	R.C. of S.	G5TC
A.C.1 H. J. Tomlinson	R.A.F.	4837
Dvr. W. Twigg	R.E.	4819
Cpl. D. Wayman	R.A.F.	4857
L.A.C. H. C. Weatherhead	R.A.F.	4844
L.A.C. P. Weaver	"	2HLM
L.A.C. R. W. Wheeler	"	4220
A.C.2 P. Whittle	"	2AOW
A.C.2 N. F. Young	"	G8VM

Ham Hospitality

The following members have offered ham hospitality.
London, S.W.12.—R. F. R. Clark (G5PY), 18 Parkthorne Road, Clapham Park. (Phone: Tulse Hill 7133.)
London, E.11.—E. W. Bonson (BR54702), 68 Wellington Road, Wanstade.
Bournemouth.—J. D. Kay (BR53789), 24a Watcombe Road, Southbourne.
Burton-on-Trent.—F. R. Joyce (BR53831), Thorntree House, Newhall.
Gainsborough, Lincs.—F. Green (G3OS), c/o 2 Melville Street. (Please advise beforehand).
Norwich.—M. Nicholson (G2MN), 78 Wroxham Road. (Phone: 21524.)
Welwyn, Herts.—D. Price-Jones (G5SA), Maid Marian, Robin Hood Green.

73.

G2HR (Hitchin), to G3XS, 3YF, 4BZ, 5NC, 5UM, 5JM, 6KA, 6LL, 6UT, 8JM and old friends of District 14.

G2MN (Norwich), to G2UJ, 2UT, 2YI, 2XS, 3QF, 5IX, 5LW, 5QO, 5UD, 5UF, 6TI, GMSMQ, 8IV, 2CWO and BR53766.

G2ZR (R.A.F.), to G2VV, 2XC, 5LC, 5TZ, 6NZ, 8BD, 8JB, 8WC, W9DXX.

G3BW (R.N.S.R.), to G3HJ, 4CB, 4PS, 6JZ, 6WR, 6ZT, 8RZ, 2AUM, BR53766, 4541 and other old friends.

G3DW (R.A.F.), to G2KO, 3GJ and 5UJ.

G4HW (R.A.F.), to G2BB, 5AN, 5YV, 8BX, 8KP, SU1SG and rest of SU gang.

G4LV (R.A.F.), to G4AK, 4HJ, 2DGW, 2FUU.

G4NG (R.A.F., M.E.), to G5IJ, 5WP, 6NF, and all old friends.

G6CO to G2IJ, 2IM, 3XI, 3YM, 4AR, 6RW, 6VP, 8FA, 8IH, 8MA, 8WR, and all District 15 members.

G6SO (Scarborough), to G2VO, 3MI, 4FO, 4HK, 6BC, 6LN, 8TI, 8TK, 8UL.

G6VQ (Darlington), to G3IC, 3IV, 3KL, 5MS, 5ZN, 8GG, 8TD, G15OV, 5ZY, 2AYY.

G8JM (R.A.F., Malta), to G2HR, 2XG, 3GH, 3XS, 3YF, 4BZ, 6PK, 6SG, 8NL, 2HIY, BR51060, 3044.

G8KZ (London, W.10), to G2RX, 3AD, 3GY, 5RR, 6BW, 6BY, 8BK, 8NY, GMRV, 6WD, E18J, W1DQ, and all other old friends.

2AMY (R.C. of S.), to G4CD, 5UG, 8RF, 8VK, GW2GV, 2BAG, and old friends in District 3.

2BMU (Ravensthorpe, Lancs.), to G2HN, 2RX, 2SU, 3AC, 3BG, 3KB, 3ZI, 6BW, 6JB, 8BK, 8OK, 2BVR.

BR53825 (R.A.F.), to G6OQ, 8BQ, G15HN, 6TK, 2FQH, VE3AAR and all at G16YM.

BR53783 (R.A.F.), to G2LT, 3RP, 3RZ, 3MY, 6TV, 8IO, and old friends at R.A.F.A.R.S. H.Q.

BR53585 (R.C. of S.), to G4OC, 5FG, 8KP, 2CRD, 2DPQ, 2DTD, 2FFG.

BR54120 (R.A.F.), to G3HT, 3IM, 3ZA, 4KD, BR53831, and all members of the Edgware Radio Society.

2CVA (R.A.F.), to G2KH, 2MY, 3UG, 4AD, 4BJ, 4GT, 4IX, 5RV, 6CT, 6IF, 8RY, 2ATB.

Prisoners of War Fund

PARCELS.—Parcels to a total value of £17 8s. 10d. were sent last month to the 17 members who are known to be Prisoners of War. Next month a P.O. valued 10s. will be sent to the nearest relative of each Prisoner of War, for the purpose of purchasing chocolate or sweets. Relatives only may send foodstuffs to prisoners.

BOOKS.—G8TL acknowledges the receipt of books from H. Tee, G8UA, and F. H. Trowell, 2HKU.

DONATIONS.—The General Secretary acknowledges, with thanks, receipt of donations from:—E. W. Taylor, G3FK, 5s.; P. Bradley, G8KZ, £2 12s. 3d.; E. Fiddian, BR51008, 2s. 3d.; T. M. Wood, BR5381, £1 1s.; J. M. Kirk, G6ZO, 12s.; H. Kemp, G4OT, £1; A. G. Davies, G2PC, 2s. 6d.; R. W. Edwards, BR54096, 5s.; Q. S. Stephenson, G3KS, 10s.; R. Watson, G3ZZ, 10s. 6d.; R. G. Taylor, BR53619, 5s.; "Tuesday," 18s.; E. Malings, G3TM, 5s.; District 10 (Cardiff), per G4KQ, 18s. 6d.; D. Purzey, BR53783, £1 1s.; Romford and District A.R.S., per G3FT, £1; E. W. Fair, BR54095, 5s.; W. F. Narbey, 2DWW, 10s.; F. J. Forbes, 2BFC, 2s.; Midland Amateur Radio Society per 2FDR (2nd don.), £1 13s. 6d.; Mrs. H. Ayres, 2FRG, 5s.; F. Hopewell, G8LH, 10s.; T. M. Bowd, BR53756, 17s. 3d.; E. S. Elliott, BR53341, 10s.; R. D. Mackenzie, G3SX, 5s.; "Eight Hams," per G3AO, £1; N. F. Waring, E18J, 5s.; W. M. Vandy, G6VD, 10s.; District 13, per G2GZ (4th don.), 10s. 6d.; W. Ralph, BR54154, 5s.; R. C. Wilkinson, G4HW, 7s. 3d.; District 7, per G2DP (5th don.), £1 2s.; H. J. Gwillim, G6GW, £1 1s.; W. C. Gault, G2WG, 10s. 6d.; G. A. Jeapes, G2XV, 10s.; S. H. Jones, BR53864, 2s. 6d.; A. Jotcham, 2FWB, 10s.; C. R. Beaven, 2BVD, 10s.; P. C. Knife, BR54687, 5s.; H. V. and I. Wilkins, G6WN, 10s.; District 15, Proceeds of Sale and Collection, per G6WN, £2 10s.; J. Fairley, G2IX, £3 12s. 6d.; Anon, 2s. 11d.; Anon, £2 18s. 3d. Previously acknowledged, £212 2s. 6d. Total to date, £245 10s. 8d.

Mr. and Mrs. Fairley, G2IX, of Leicester, raised £2 11s. 8d. as the result of a whist drive organised on behalf of the Fund. Their ten years' old daughter embroidered a tray cloth which realised £1 0s. 10d. when raffled.

Mr. Alec Jotcham, 2FWB, received 10s. for doing a few odd radio repairs. The Fund benefited by that amount.

Mr. W. M. Vandy, G6VD, added a welcome 10s. to the Fund by selling for salvage to the local newspaper office a bundle of old wireless periodicals.

BRITISH ISLES NOTES AND NEWS

DISTRICT 1 (North Western)

D.R.: H. W. Stacey (G6CX), "Sandleas," Eddisbury Road, West Kirby, Cheshire. Hoylake 357.

Whitehaven.—G3BW managed to attend his first home town war-time meeting during a spot of leave. The meeting was held at 6WR and attended by 4PZ, 3BW, 6WR, 4225, 4547 and 6ZT. 2AUL is still in East Africa making friends with monkeys, camels and a couple of VQ4's. There is no news from 2AYH, 6JZ or 8RZ. (via G6ZT.)

No further reports have been received. G6CX.

DISTRICT 3 (West Midlands)

D.R.: V. M. Desmond (G5VM), The Chestnuts, Hanley Castle, Worcs. Hanley Swan 41. Scribe: E. Wilson (2FDR), 48 Westbourne Road, Olton, Birmingham, 27.

Coventry.—C.A.R.S. members will be interested to hear that G5QN and VE4QS are fit and well with the R.A.F. in M.E. Congrats to G2YS on his recent marriage and to 8MK on the arrival of Junior op. G8YO visited the T.R. whilst on leave. (Via G5GR.)

Birmingham.—Mr. C. N. Strong completed his series of lectures on his 2-valve receiver at the March meeting of M.A.R.S. Seventeen members were present. 2FDR.

DISTRICT 4 (East Midlands)

Deputy D.R.: W. M. Vandy (G6VD), 9 Cecilia Road, Clarendon Park, Leicester.

Leicester.—A very worthy effort was made by G2IX and family when the sum of £3 12s. 6d. was raised for the Prisoners of War Fund. (See page 350.) VS2AR is now working in Calcutta. Congrats to 2CFC, now a Ft./Lieut.; he is still in the northern extremes of G.M.

Nottingham.—The attendance was slightly better at the last meeting, eleven members being present. The V.H.F. receiver being built by the NottingHAMS was on show, but was found to have teething troubles, which it is hoped to cure shortly. The next meeting will be held at G8DZ, 14 Epperstone Road, West Bridgford, at 6.30 p.m. on April 19. The Radio Editor of the *Nottingham Evening Post* is thanked for the help he has given the Society through the medium of his Journal.

Derby.—G2OU hopes to arrange a meeting as soon as some of the "locals" get their leave to coincide "!"

It is now known that the YL referred to in these notes last month was no other than 5YL. 2BCC is swotting for a full ticket. G6VD.

DISTRICT 5 (Western)

D.R.: R. A. Bartlett (G6RB), 31 Kings Drive, Bishopston, Bristol. Bristol 46960.

Bristol.—Only three members attended the March meeting. This may have been due in part to the fact that the usual notice was not inserted in "Forthcoming Events," for which omission the D.R. apologises. The next meeting will be held at 17 Colston Avenue, Centre, Bristol, on April 26, at 3 p.m.

The D.R. was pleased to receive a visit from SPIHA recently, and also to have a chat with G6BY who is now residing at Weston-super-Mare.

There is no news from any other part of the District. What about it? G6RB.

DISTRICT 6 (South Western)

D.R.: W. B. Sydenham, B.Sc. (G5SY), "Sherrington," Cleveland Road, Torquay. Torquay 2097.

As no reports have been received from any area, other than Torquay, it is hoped that the T.R.'s concerned will remember that the D.R. welcomes items of interest, particularly news of visits by other members, including those in the Services.

Torquay.—The D.R. has received welcome visits from G5IF and 6RF, both home on leave. A hearty welcome is always extended to any Service member who is in the neighbourhood of Torquay. Ring Torquay 2097 for a ragchew.

Exeter.—Though no official report has been received, G2AT tells us that several local members are interested in 112 Mc. receivers, and have had a fair amount of success with them. It is hoped that more details will be forthcoming. G5SY.

DISTRICT 7 (Southern)

D.R.: W. E. Russell (G5WP), "Milestones," Westfield Road, Mayford, Woking, Surrey. Woking 1589.

Croydon.—The March meeting held at 4150's was attended by 17 members including 2DP, 2LW, 2PL, 2VB, 3ST, 4NI, 5BT, 5PY, 5XW, 2ASD, 1545, 3003, 3766, 4150, 4324, 4584 and 4641.

G4NI has kindly offered his QRA for the next meeting, which will be held on May 3 at 86 Whitehorse Road, West Croydon, at the usual time. Buses 68, 75, 133, 159 and trolleybus 654 pass the door. (via G2DP.)

Coulsdon and Purley.—G8TB acted as best man at the recent wedding of 2BQC, both of whom were among the "Early Birds." A welcome is extended to new members 4808 and 4812 (via BRS3003.).

Bournemouth.—VE4ASH called on 3789, who was unluckily out at the time. ZL1GI of the R.N.Z.A.F. also found 2HNO out on calling, but was able to contact him later by phone. 1GI, who hails from Auckland, reported that several other ZL's are fellow Radio Mechs. in his unit.

Good luck to Paul Gifford, 4694, who has joined the R.A.F. as an observer. 4MY recently met with rather a serious accident at work, and we wish him a speedy and complete recovery. 4IJ has started his career in the R.C.S. well by being promoted L./Cpl. almost immediately. New members 4784 and 4817 are welcomed. (via 2HNO.)

Guildford.—G6GS has recovered from his spell in hospital and has moved on to SU. It is rumoured that 6LK has also hit the trail for SU. The March meeting at Guildford was well attended and the fine weather brought out two old-timers we have not seen for some time—5NF and 5OJ.

The next meeting will be held at 2ZC, "Three-ways," Churt, Surrey, on April 26, at 2.45 p.m. All are welcome and 2YL has promised to give a demonstration run on her new bike! G5WP.

DISTRICT 8 (Home Counties)

D.R.: S. Granfield (G5BQ), 47 Warren Road, Cambridge. Cambridge 54644.

Cambridge.—G2PU is making a satisfactory recovery from the serious accident reported last month. 5DQ is busy with his O.C.T.U. His instructor is 6ZO. 2XV and 5BQ recently spent an enjoyable evening trying out a new speech-amplifier built by

5BQ. 5BQ has been granted a commission in the Cambridge Cadet Battalion, and is now a Company Commander. 5JO has recovered from his attack of mumps. 8SY has rigged up a 35 mm. film projector, including a speech-amplifier of his own design, with very satisfactory results.

Bedford.—2DPQ has had a wrist in plaster for ten weeks as the result of an accident. BRS3585 has joined the same unit as 2DPQ and 3QP. 2FFG (R.A.F.) is touring in Stirlingshire. Welcome to J. E. Oliffe (BRS4792), who is attached to the B.B.C. He sends an interesting letter, and mentions some of his experiences while monitoring broadcasts.

Luton.—New member J. A. Plowman (BRS4760) seems to have a wealth of equipment in the way of receivers, a description of which should make an interesting talk one of these days. His chief interest is in V.H.F.'s.

St. Ives.—G5RL is now L.A.C. 8ST's mother had a cable from Singapore on February 10, since when there has been no news. 4AZ is running his receiver successfully off vibrators. 2DSL writes from Yorkshire to say that his home address is now Offord Cluny.

There is still time to contribute to the Prisoners of War Fund. Only one contribution this month.

G5BQ.

DISTRICT 9 (East Anglia)

D.R.: H. W. Sadler (G2XS), The Warren Farm, South Wootton, Kings Lynn, Norfolk. Castle Rising 233.

A letter from J. H. Brazzill, G3WP, brings news of T. C. R. Littlemore, G8AX, who is stationed in Gibraltar. AX sends 73 to old friends and asks for old radio magazines. These should be sent c/o G3WP, 41 Queens Street, Brighton, via Colchester.

2FOH (Norwich) regrets that more members do not partake of ham hospitality offered. So far only one has called. G2MN reports, but has no news.

G2XS.

DISTRICT 10 (South Wales & Monmouthshire)

Scribe: S. Howell (G5FN), 90 Coleridge Avenue, Penarth, Glam.

Eight members attended the March meeting held at G8UH, Cardiff. Those present included 2UH, 4KQ, 5FN, 8AM, 8UH, 2FQQ and BRS2008. G6HB was cordially welcomed to the area.

The next meeting will be held at 29 Ladysmith Road, Cardiff, at 3 p.m. on April 26.

G5FN.

DISTRICT 11 (North Wales)

Deputy D.R.: C. Spillaine (BRS1060), "Woodside," Melidon Road, Prestatyn.

The March meeting took place at BRS4762 when 20 members and others were present. The company included VE5EK, GW4CX, G3IR, 6HQ, 2HCZ, 2HIY, BRS1060, 2731, 3245, 3044, 4040, 4027, 4410, 4761, 4762, Sig. Wilson, R.C.S., and L.A.C. Moon, N.Z.R.A.F. Unfortunately the film show previously announced was not possible, but BRS2731 filled the breach by exhibiting a few home-movie films, including several reels taken by BRS1060 at an N.F.D. before the war.

The next meeting will take place at "Vale View," Melidon Road, Prestatyn, on April 26, at 3 p.m.

Congrats are offered to VE4YG who was married at Weymouth on March 21 to Miss Eleanor Smith, a member of the W.A.A.F., whom he met at an R.A.F. Station. (Best of luck to you both from your friends in District 11.) VE4YG is due for posting abroad at any time, and decided to take the step

during his embarkation leave. BRS4728 who is on a Radio Mechs. course with the R.A.O.C. hopes to meet District members during one of his future leaves. His home town is Ruthin. 2ARB is welcomed to membership. 2HCZ received only two replies in reply to the announcement in a recent issue regarding a meeting in Bangor. How about it you chaps in Bangor, Anglesey and surrounding towns? Write 2HCZ, 5 Station Road, Bethesda, North Wales, and offer your support. BRS1060.

DISTRICT 12 (London North and Herts)

D.R.: S. Buckingham (G5QF), 41 Brunswick Park Road, New Southgate, N.11. Enterprise 3112. Scribe: P. R. Solder (G5FA), 35 Torrington Gardens, New Southgate, N.11. Enterprise 4347.

The March meeting held at G6CL was supported by 21 members including Sgt. Waddington, ex ZB2B. The high spot of the afternoon was provided by Capt. A. W. Phillips, BRS4486, who described his early experiments under the call PXL. Although blind, Capt. Phillips held his audience spell-bound with anecdotes ranging from an account of kite aerial tests from Parliament Hill Fields in 1913, to a description of experiments carried out in Yugoslavia during the last war. A series of historical photographs were examined with much interest as was his original P.M.G. licence dated May, 1914.

The question "Should District 12 give up its notes now that space is limited" was debated and although no decision was reached it was agreed that in principle it would be desirable, in the interests of members on active service, to publish a resume of District meetings and items of special importance.

Due to rationing restrictions it has not been found possible to arrange the projected District Supper.

The next meeting will be held, as an experiment, at The Nightingale, High Road, Wood Green (opposite Wood Green Town Hall), at 3 p.m., Sunday, April 26. As a large hall is being provided free of cost to the District it is hoped that a goodly company will attend. G5QF.

DISTRICT 13 (London South)

A.R.'s: L. H. Shersby (G2GZ), 41 Reverdy Road, S.E.1 (South Eastern); S. E. Langley (G3ST), 62 Dumbarton Road, S.W.2 (Central).

South Central and South Eastern Areas.—The 16 members who attended the March meeting at G5AW, were much interested in the apparatus contained in his radio shack, all of which showed great ingenuity. S. G. Weeden, BRS3812, of Brixton is reported missing and presumed to be a prisoner of war in Malaya. G8TN who has been busy with intensive training, sends his 73.

BRS members are asked to attend the April meeting as a matter will be discussed which we feel will be of special interest to them. Colonial or U.S.A. amateurs also welcome. The meeting will be held at G3ST, 62 Dumbarton Road, Brixton, S.W.2, on Sunday, April 19, at 11 a.m. G2GZ and G3ST.

D.R.: E. H. Simmonds (G8QH), 17 Roedean Crescent, Rochampton, S.W.15. Prospect 1990.

South-Western Area.—The smaller BULLETIN will mean briefer District Notes, and the logs will be more valuable than ever. One has turned up—with G2JK, 4180, 4GD, 3AD and 8IL contributing some of the most interesting notes we've had yet. 8IL produced almost a Handbook on his own! Tnx O.M.! In view of long delays and disappearances, will members who wish to receive the log and will undertake to keep it moving please send a card with present address to G8QH who will compile a new rota. 73 to all!

G8QH.

DISTRICT 14 (Eastern)

D.R.: R. L. Varney (G5RV), 184 Galleywood Road, Chelmsford, Essex. Chelmsford 3994.

Chelmsford.—G6LB has turned gardener again but still plods on with his *Super* superhet. 2KG writes from the M.E. with vivid descriptions of the surrounding Desert!

News is wanted of Jack Ridley, 2AJF, R.A.F., last heard of in Singapore. 2SA, 3BS, BRS3650 and 4122 keep in touch but have little to report. 2FSR (late of Chingford) has had a pleasant meeting with 5HS. 2FSR would appreciate radio magazines for distribution to lads in his unit. Please send via 2 Parkhill Road, Chingford. BRS4634 is a radio mechanic in the R.A.F. with 3WN for his C.O.

G5RV is convalescent after his second operation in five months. It is much regretted that District 14 notes were not sent in last month . . . the first time the D.R. has lapsed! However, as he was under the influence of ether just about the time they would normally be compiled he asks to be forgiven.

Ilford.—G3MD reports that 3OA, 8UO, 3YY and 2HNP, as well as 4LV who is on active service, are keeping up their interest in radio. 6AH and 2HNP are now in the R.C. of S. and like it. Sympathy is extended to 2XP in his recent bereavement. 8TL is meeting Service lads at Sudbury, Suffolk. Speedy recovery to 3WP who is in hospital. News is wanted of 3MV and 3JW who have disappeared from ken since the war started. Congrats to 6AB who has been recommended for a commission in the R.N.V.R. G5RV.

DISTRICT 15 (London West, Middlesex and Buckinghamshire)

D.R.: H. V. Wilkins (G6WN), 539 Oldfields Lane, Sudbury Hill, Greenford, Middlesex. Byron 3369.

A welcome visitor to the March meeting was ZL3JF. Others present included G2IY, 2OL, 3UQ, 4IH, 4KG, 5IJ, 6WN, 8DG, 2ADL, BRS3811 and 4784. The chief feature of the meeting was a sale of radio gear which was left behind by 2BCN as a gift to the lady with whom he lodged. The donor before leaving for Australia, had suggested that the gear be sold for her on a fifty-fifty basis. On the recommendation of the D.R. it was agreed that our half should be devoted to the P.O.W. Fund, to which everyone agreed. In addition to the sum of £1 10s. raised as a result of the sale, a further collection made at the meeting brought the total up to £2 10s.

There are still a few useful articles in the hands of G2OL, so if any member happens to require a condenser, choke, transformer or resistance, he should give Mr. Cutler a call on Perivale 4152.

The D.R. wishes to thank everyone who helped to make the evening a success, especially our host G2OL. The date and venue of the next meeting appears under Forthcoming Events.

G3GY, in an airgraph from the M.E., reports all well and sends 73 to G8KZ and all old friends. He says the boys out there still have a great affection for the R.S.G.B. Congratulations to Mr. and Mrs. Spencer (G2KI) on their recent marriage. KI sends 73 to G6VP and family. OK2HY forwards photographs of his fiancée and himself. G6CO now a Corporal "down on the Farm" sends greetings to all in the District and reports that 5FG and 6RC have joined him. 8WR is still in London giving technical instruction, 6RW is now located in the Darlington area.

District Members who wish to contribute to the P.O.W. Fund may pass their donations through the D.R. who will arrange to forward them monthly to Headquarters. G6WN.

DISTRICT 16 (South Eastern)

Deputy D.R.: W. A. Scarr, M.A. (G2WS), 8 Beckenham Grove, Shortlands, Bromley, Kent. Beckenham 1131.

G6CY with his usual regularity sends news of Brighton activities. Sgt. Pluck, 4AY, of Tunbridge Wells, reports from an R.A.F. station in Wilts that 2FTP (Forest Row) is with him. Both are carrying out constructional work in their spare time. Fl./Sgt. Taylor, BRS4237, writes from Tonbridge where he hopes to start a Radio Club.

The District is still behind others in arranging Conventionettes. Will those willing to assist in arranging a representative meeting in their area communicate with the Deputy D.R.? G2WS.

DISTRICT 17 (Mid East)

D.R.: Dr. A. Gee (G2UK), "Stonehaven," Horncastle Road, Boston, Lincs.

Boston.—Congrats to G8BQ on his recent marriage. 2BQC would like news of 2DLC (Holbeach). 2ARU (Woodhall Spa) reports from Yorks. Until recently the S.O. at his station was G2LR. He sends 73 to 6GH, 6LH, 6LI, 2AAS and 5BD.

Grimsby.—Welcome to G4KS and to new members BRS4724 and 4765. 4KS is anxious to contact local members, particularly 8DI. BRS4657 reports from Exmouth that he is Sergeant Signal Instructor R.M. He has met BRS4433.

Congrats to G6TV on his recent engagement to a Lincoln lady. 2DRT of Pinchbeck has met SPIHA at a R.A.F. station in Somerset, where they spend much time talking ham radio. G2UK.

Scotland

Scottish Records Officer: J. Hunter (GM6ZV), 51 Camphill Avenue, Glasgow, S.1. Langside 237.

At the March meeting of "A" District which was again well supported we were glad to welcome our first visitor from overseas in the person of Roy Rockstroem (W9YNO), U.S.N. Other visitors were G3JM and GM8FM who was home on holiday. Congratulations to GM4JO on the safe arrival of a Junior Op. The next meeting will take place on April 26 at the usual time and place.

Lancashire Conventionette

A successful Conventionette, the first of its kind ever to be held in Bolton, took place on Sunday, March 29, in the Aspin Hall.

After a period devoted to the greeting of old and new friends, including six of our Trans-Atlantic Allies, the company moved into the adjoining hall where an informal meeting was presided over by Captain S. W. Chapple (G6SC). G2XU, Hon. Secretary of the R.A.F. Bolton A.R.S. and prime organiser of the gathering, read a telegram of greeting from 6CL. Frequency modulation, receiver design, the merits of rotary and fixed beam aerials and plans for after the war were amongst the subjects raised by the speakers who included G2XU, 2DH, 2HW, GM8MJ, W5AKD and W5EAP.

Amongst those recorded as being present were: G2DH, 2HW, 2XU (and Mrs. Carr), 4NU, 6SC, 8PW, 8SA, GM8MJ, 2ABF, 2ABT, 2BDA, 2DRR, 2DVQ, W3GOL, W5AKD, 5EAP, 5IBY, 5JM, W8NFW, BRS3702, 4245, 4618, 4714 and 4795. The absence of the D.R. (6CX) is regretted.

At the close of the meeting, 2XU announced that all expenses had been cleared, leaving a surplus of £1 13s. It was decided to forward this to the P.O.W. Fund. 2DVQ.

HEADQUARTERS CALLING

THE attention of District Representatives and Scribes is directed to the Editorial announcement on page 341. In future, reports must be limited to 200 words and headed in accordance with the style adopted in this issue.

Closing date for copy is the 28th of each month. Notes received after that date cannot be used.

February Council Meeting

Resume of the Minutes of a Council Meeting held at the Institution of Electrical Engineers, Savoy Place, London, W.C.2, on Saturday, February 14, 1942.

Present.—Messrs. A. D. Gay (President), A. E. Watts, H. A. M. Clark, G. A. Jessup, S. K. Lewer, W. H. Matthews, W. A. Scarr, E. H. Simmonds, A. J. H. Watson and J. Clarricoats (General Secretary).

Apologies.—Messrs. E. L. Gardiner and J. W. Mathews.

1. One hundred and forty-seven applications for election to membership were approved and two resignations accepted. One hundred and twenty-four of the applications for membership were sponsored by Corporate members, and 23 were supported by references.

2. Mr. Langley, G3ST, was appointed Central Area Representative for South London (District 13).

3. It was reported that printing charges had again been increased by 10 per cent.

4. It was reported that the sum of £18 15s. 2d. had been recovered from the sale of postage stamps affixed to old QSL envelopes, held by the Section Manager. It was agreed to devote this sum to the Prisoners of War Fund.

5. It was agreed to place on record that the Council is opposed in principle to the policy of paying for contributions to Society publications, but it agrees with offering honoraria from time to time.

6. It was agreed to modify the style and format of the Society's Journal as from the July, 1942, issue. The new style and format will agree with that approved for the Handbook Supplement.

7. Suggestions for changing the title of the

Society's Journal were discussed, but in view of the wide divergence of opinion expressed, it was agreed to defer a decision until later.

8. It was agreed to reprint the Memorandum and Articles of Association, and to publish same in THE T. & R. BULLETIN. It was also agreed to furnish new members on election with a copy of the Memorandum and Articles of Association.

9. It was decided that the time is not yet opportune to formulate a policy in regard to the question as to whether, as an experiment, post-war D.R.'s should be elected by the membership or appointed by Council.

The Supplement in Cloth Binding

To meet the wishes of members the Supplement is now available in a cloth binding similar to that adopted for the Handbook. Copies can be obtained from Headquarters price 5s. post free. The Handbook in cloth binding is available at 6s. 6d. post free. Both publications if ordered together will be supplied at the special price of 10s. 6d. post free.

I.E.E. Meetings

Council announces with pleasure that *Masteradio* has accepted their invitation to arrange a lecture-demonstration on "Vibrator Operated Power Supply Units," at the Institution of Electrical Engineers, on Saturday, May 2, 1942. The Lecturer will be Mr. R. Pollock, G5KU. The meeting will commence at 2.30 p.m. but the I.E.E. will be open for informal discussions from 2 p.m. Members free for lunch should meet at Slaters Restaurant, 393 Strand, at 12.30 p.m.

A further meeting has been arranged for May 30. Details next month.

Concentric Pipe Tuned Circuits

An attendance of 75 was recorded at the I.E.E. meeting held on March 28 when Mr. D. N. Corfield, G5CD, lectured on the subject of Concentric Pipe Tuned Circuits. It is hoped to publish an account of the lecture in the July and August issues of this Journal.

Book Reviews

THE ELEMENTS OF RADIO COMMUNICATION. By O. F. Brown, M.A., B.Sc., and E. L. Gardiner, B.Sc. (Second edition, 551 pp.) Oxford University Press, 16s. 6d.

Mr. E. L. Gardiner, familiar to members as Executive Vice-President of the R.S.G.B., is largely responsible for the second edition of this outstanding publication. First published in 1927 the new edition has been modernised in many respects whilst still retaining most of the features which made the earlier edition so popular. The book is intended to cover the syllabus of the City and Guilds examination in Radio Communication Grade 1 (preliminary grade), but this appears to be an under-estimation of its utility, for the subject matter dealt with is so varied, and so comprehensive as to place it among those publications specially recommended for degree courses. In particular Mr. Gardiner's extensive treatment of Wave Propagation, Directional Reception and the Basic Principles of Television goes far beyond the average person's conception of the subjects covered by a preliminary grade examination.

As would be expected the Valve Chapter has been extended to include recent developments in Cathode Ray Tube technique and valve applications. The Quartz Crystal Filter, with which device Mr. Gardiner was closely associated with Dr. James Robinson, is discussed in some detail.

Having studied this excellent publication we are tempted to enquire why it has not been more extensively advertised among radio engineers and experimenters? It is well written and fully illustrated and could, with advantage, be adopted as an example of a standard text book for radio amateurs if the G.P.O. should decide that all new applicants for transmitting licences must (unless qualified) pass an examination to test their technical ability.

J. C.

THE RADIO HANDBOOK. Eighth (1942) edition. Editors and Engineers Ltd., Santa Barbara, Calif. (Obtained through R.S.G.B., 11s.)

Needs no introduction. Usual increase in size and quality associated with this annual publication has taken place. One of the most complete compendia of radio theory, design information and general data available to the amateur. Comprehensive tabulation of American receiving, transmitting and rectifying valves.

Practical construction of receivers and transmitters forms large part of book and fullest possible information given on all types including V.H.F. and F.M. equipment.

New departures include sub-division of subject of aerials into three chapters covering theory, directional and V.H.F. types respectively.

Half tones especially good. Whole book has been entirely reset in a new type face which allows an increase in contents more than proportional to increase in number of pages.

H. A. M. C.

THERMIONIC VALVE CIRCUITS. By E. Williams, Ph.D. Pitman, 12s. 6d.

Heavy going but excellent for the advanced student. Based on a lecture course given by the author to third year students for the degree of B.Sc. in Electrical Engineering. It represents an attempt to include in its 170 pages the theory of the operation and design of thermionic valve circuits. The book assumes a sound knowledge of A.C. theory and of maths up to the standard of a university student at the end of his second year. The scope is comprehensive ranging from amplifiers to frequency modulators and changers.

Should become a "front line" publication within a short time.

J. C.

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MATHEMATICS FOR THE RADIO AMATEUR—

(Continued from page 347)

By graphing s and t for values of t from 0 to 7 seconds, find:—

- The maximum height of the particle.
- The time taken to reach this height.
- The time that elapses before the particle is falling past the point of projection.
- The height of the particle after 2½ seconds.

(35) Find θ if:—

$$0 = \tan^{-1} \frac{1}{2}; \quad \theta = \sin^{-1} \frac{1}{2}; \quad \theta = \cos^{-1} \frac{1}{2}$$

(36) What is the angle of slope of the lines,

$$(a) y = 2x + 6$$

$$(b) y = 4 - \frac{1}{2}x$$

$$(c) 3y = 6 + 4x$$

(37) By drawing as accurately as possible, find the slope of the curve $y = x^2 - x$ at the point,

$$(a) (1, 0)$$

$$(b) (3, 6)$$

(38) Find the resultant velocity of a body which is moving East with a velocity of 40 f.p.s., and also moving North with a velocity of 60 f.p.s.

Solution to Problems

(33) (a) $x = -4.7$ or $.7$ (approx.).

(b) $x = 2.8$ or $.17$ (approx.).

(To be continued next month.)

EXCHANGE AND MART.

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FREE.—"Book of Facts." Tells you all about The Candler System of Code Training. Courses for beginners and operators. Write CANDLER SYSTEM CO. (Room 55), 121 Kingsway, London, W.C.2.

MORSE KEYS and Buzzers.—(See special announcement on p. 305 of the March issue).—RAYMART, 48 Holloway Head, Birmingham, 1.

NEW 80, and box components, transformers (Ferranti, Thordarson) condensers, resistors, coils, holders, 30s. lot. "W.W." transverse current mike, 10s. New 14ct. fountain pen, 10s. 6d. "Modern Motor Cars," 3 large volumes by Caxton, unused, cost 3gns., best offer accepted. Preselector, complete new tube, 50s. 100 per cent. SG215, 220SG, 7s. 6d. each.—G8KP, 125 Oakwood Avenue, Flanshaw, Wakefield.

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SINCE last month's issue I have had several enquiries regarding servicing of BCL receivers. I can do them, but do not send them unless you are really stuck, and local channels have failed. Valve replacements are very limited, therefore please enquire before you send anything. 2½d. stamp must accompany enquiries, please. Forces excepted.—H. BINNS (Radio Engineer) 119 Raistrick Common, Brighouse, Yorks.

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WANTED.—Bulgin CV4. Epicyclic drive slow-motion dial. Short-wave dials with right-angle screw to condenser spindle.—Moss, White Street, Topsham, Devon.

WANTED.—S.W. Magazines. All numbers except 1938. Morse records, also Eddystone AW2, with A.C. Eliminator.—BRS3842, 95 Warren Drive, Elm Park, Romford, Essex.

WANTED.—Copy of Short-Wave Wireless Communication by Ladner and Stoner.—BRS4274, 20 St. Anne's Road, East Lytham, St. Anne's.

WANTED.—Valves. Two each of 230XP, PEN220A, PP2 or where same can be obtained. New or secondhand. BRS4706.—CPL. APPLEBY, c/o "Parrs," 121 Kingsway, London, W.C.2.

WANTED.—Hallicrafter "S" Meter, also 41 MXP or equivalent.—G2LT, 11a, Welwyn Close, Intake, Sheffield.

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WANTED.—Budlong's "Story of the A.R.R.L." QST, Jan. 1938, June, Sept. Dec. 1941. Radio Times Xmas, 1932-3. World Radio Jubilee, 1935, Xmas 1932-5 and Dec. 16th, 1938. Any copies Radio 1939-41.—BURTT, Weaver's House Burleigh, Stroud, Glos.

WANTED.—QST, November, 1938. Three Telsen RG4. Interval transformers, new or used.—G8MU, Fairway, Bucklesham Road, Ipswich.

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**PAGE 337
MARCH ISSUE**

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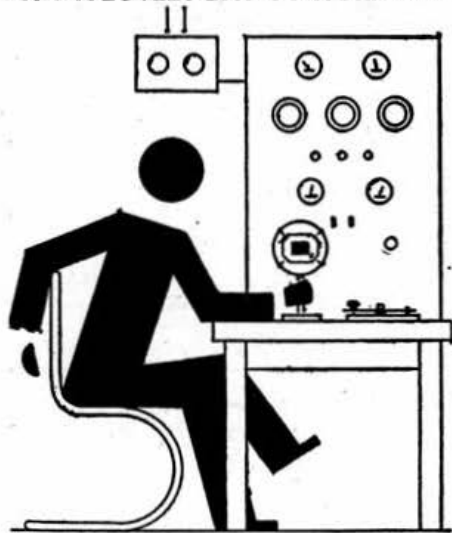
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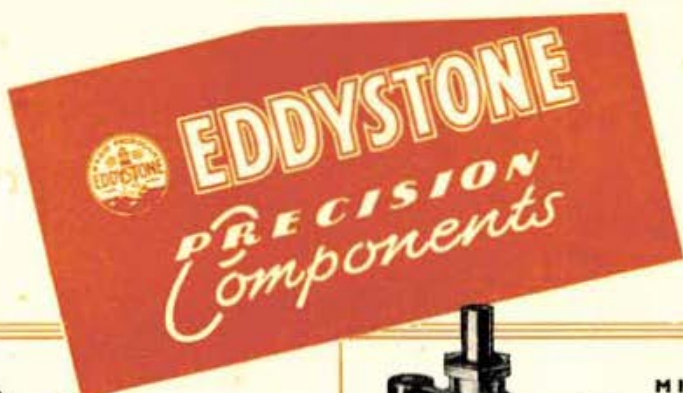
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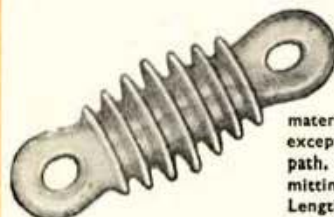
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