The

SHORT-WAVE MAGAZINE

6D

No. 2

APRIL, 1937

Columbia Broadcasting System commentators at work during an inside broadcast of a sporting event. Courtesy of the C.B.S. Inc.

G2NO H. R. ADAMS, WOLVERHAMPTON

AND WIJYN TED McELROY, BOSTON, MASS.

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See page 22

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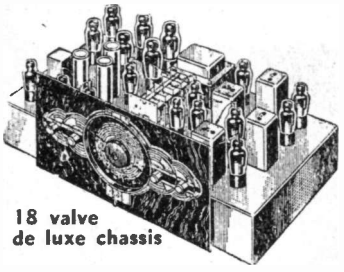

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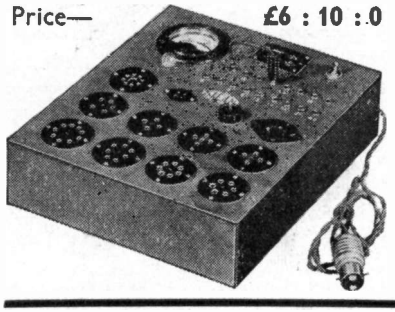

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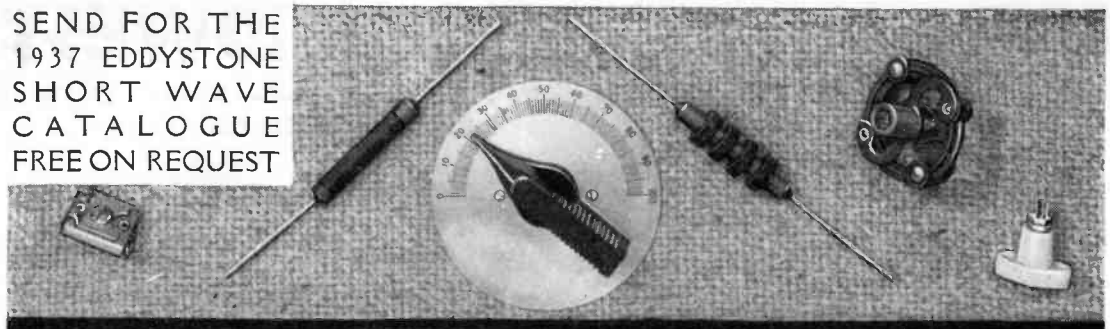

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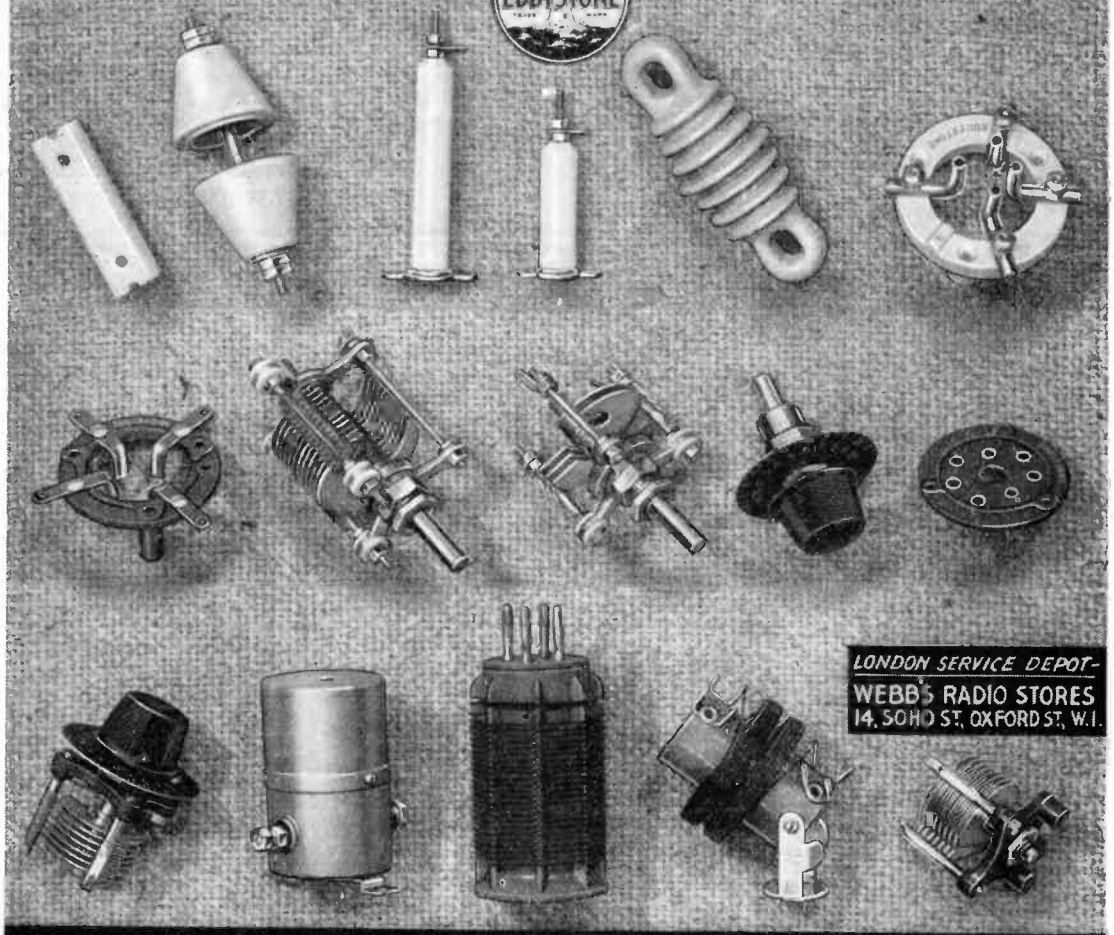

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THE SHORT-WAVE MAGAZINE

Vol. 1. APRIL 1937 No. 2

Editor : BASIL WARDMAN (65GQ) Editorial Asst.: S. W. CLARK

Advertisement Manager : C. T. MILDENHALL

Correspondence

In our editorial of last month, an invitation was issued to our readers to send us their suggestions and criticism.

The response has been overwhelming. Daily our mailbag has contained letters from all over the British Isles, letters of congratulation, suggestion, and criticism from short-wave broadcast listeners, "D.X. Fans," amateur transmitters, all the many types interested in short-wave radio.

Many and varied were the suggestions and comments, but on one point they were unanimous—in their welcome to a magazine dealing entirely with short waves.

To cater for all the various interests is no mean problem. If we become technical our non-technical readers will complain; if we become entirely non-technical our technical readers will cry out. We aim to strike the happy medium, so that our readers, no matter what be their particular interest in short-wave radio, may always find matter of value to them.

Readers' correspondence is the life blood of a magazine. Lack of it indicates apathy, abundance interest. It tells us whether our readers are satisfied, it enables us to adjust our programme to their requirements.

All who have sent us their congratulations, criticism, or suggestions, we thank; to those who have not, we again extend the invitation.

CONTENTS

Contributions for publication in our editorial pages will be given consideration and payment will be made for matter used. Only manuscript accompanied by a stamped, addressed envelope will be returned. Whilst we are willing to advise on suggested articles no guarantee of acceptance can be given.

The publisher does not necessarily agree with the views expressed by all correspondents and contributors, the aim being to open the columns to every phase of opinion.

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Collecting Q.S.L. Cards

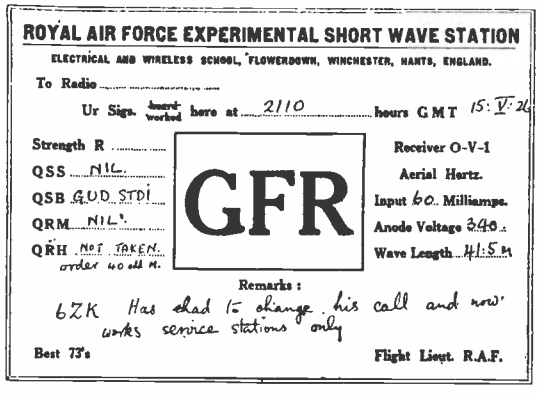
By Charles Lawrence

MANY A TIME I have spoken to listeners who have bemoaned the fact that they have failed to verify some particular station before it has closed down. The excuse, though perhaps varied in wording, is almost always "I never dreamed he would close down—now I can't convince anyone I heard him!"

That is just the point. Why not verify your reception *now*? Don't wait until it is too late. Consider the opportunity missed by a terrific number of enthusiasts in not verifying reception of ETA at Addis Ababa when it was in the hands of its former rulers.

● Spanish Cards

UGG, EAQ, EA-8AB, EGB, ECMI, CNE5 and many other Spanish, and Spanish Moroccan stations transmit regularly and are glad to verify reception—it giving the operators a chance of spreading propaganda. Before many months have passed those stations will be non-existent, or, if operating, their cards will not compare in value with those obtained at the present time.



ROYAL AIR FORCE EXPERIMENTAL SHORT WAVE STATION

ELECTRICAL AND WIRELESS SCHOOL, FLOWERDOWN, WINCHESTER, HANTS, ENGLAND.

To Radio .....

Ur Sigs. heard/worked here at 2110 hours G M T 15: V: 26

Strength R .....

QSS NIL.

QSB GUD STDI

QRM NIL.

QRH NOT TAKEN. order 40 odd M.

GFR

Receiver O-V-1

Aerial Hertz.

Input 60. Milliamps.

Anode Voltage 340.

Wave Length 41.5 M

Remarks:

6ZK Has had to change his call and now works service stations only

Best 73's

Flight Lieut. R.A.F.

In 1926 Government stations carried out tests with Amateurs. Here is an example of a rare card.

QSL or verification cards, like postage stamps, have a value dependent upon their scarcity.

Cards from stations operated by expeditions in the Arctic, Antarctic, heart of Brazil, Africa or the Dutch East Indies, or from an aeroplane flying the Atlantic, or a ship in the Arctic circle are all of value because reception is unlikely to be duplicated.

● Obtaining Cards

If you are desirous of collecting cards—and it is a very interesting hobby—there are a few points which are worth remembering.

First, make a full and concise report of items heard, including any unusual incident such as a slip of the tongue by the announcer, along with the time you heard each item. It is best to give times in G.M.T. as it is very easy to make an error in conversion which loses a verification.

Do not expect a verification from a station that is relaying a chain programme unless you have some item included which was broadcast by that station alone.

The average station receives so many requests for verification that it is advisable, and only fair to the station, to enclose return postage. It is, of course, useless to send English stamps to an overseas station, but, fortunately, many radio clubs now sell unused foreign stamps to their members. These can be sent with the certainty that they are usable the other end. If you prefer you can obtain reply coupons (at 3d. each for use in the Dominions and at 6d. for International use) from your post office. When received by the station they are exchanged for the correct postage.

● Addressing Letters

In most instances the call of the station followed by the town or city in which it is situated is sufficient address.

Ship transmissions, however, are not so readily dealt with. If you know the route the ship is taking you can address your report to a port at which the ship has to call. Address your letter to the chief radio operator to whom it will be handed on the arrival of the ship. If you prefer you can send the request for confirmation to the company to whom the ship belongs.

Police stations, contrary to the opinions of many, verify reception in most instances. Reports should be addressed to the radio operator at the police station concerned.

● Helpful Reports

Some enthusiasts write to practically every station they hear and consequently British amateurs are often flooded with requests for cards from listeners a few miles away. Unless the amateur is operating on 5 or 10 metres such reports are of little or no value and consequently if you are very desirous of obtaining a verification from an amateur working on the more usual waves you can help the station operator and generally get your card by sending in a report covering a period of time—a week or so.

All reports should endeavour to be helpful to the station concerned. Details of the receiver employed

(number of valves), your aerial system, strength and quality of signal, interference (if any) all interest the station engineer.

The secret of successful card collecting is to send clear and concise reports and a reply coupon.

If you are lucky you may receive a small gift with your card. Moscow and Bandoeng have been known to send sets of stamps and most stations send details of the city in which they are situated. An enthusiast I know received a box of cigars from an American station. His pleasure at the receipt of this gift was short-lived when he discovered that he had to pay duty on it!

W2XE AND W3XAU SCHEDULES

From 12.30 a.m. to 11.0 p.m. W2XE uses European aerial array. At 11.0 p.m. and until 3.0 a.m. the transmission is beamed to South America (13.9 and 25.3 metres). From 3.0 am. until close-down at 4.0 a.m. a non-directional aerial is used for the 49 metre transmission.

W3XAU commences daily at 5.0 p.m. A wavelength of 31.2 metres is used until 10.0 a.m. From this hour the 49.5 metre wave is in operation until 4.0 a.m.

PILOT U650. ALL-WAVER

On inspection of the short-wave markings on this model I was at first doubtful as to its capabilities of station separation: it appeared impossible to obtain the many stations known to operate within these limits in so short a span on the scale. With the assistance, however, of the slow-motion control and cathode ray tuning indicator my first impression proved incorrect. During a long test each broadcast station was clearly heard, whilst the 20- and 40-metre amateur bands gave pleasing results, notwithstanding the great measure of interference always encountered on the latter band. On 80 metres some fine transmissions were logged.

One of the outstanding features of this set is the clear reception of regular broadcasters through the lack of background noise. Some of the stations heard were:—COCH, COCX, HJ3ABH, JZ1, VK2ME, W2XAD, W3XAL (16.87), W3XAU (49-50), W8XK (19-72), ZBW3.

Between the ordinary bands much of interest was discovered. Especially was I intrigued by trawler operations in the North Sea, conversing in their free manner with passing ships and receiving instructions from pilot boats. Other unusual calls heard were from liners and commercials preparing for international relays.

At any hour of the day or night I was able to receive a programme of interest, using the two short-wave scales only. Short-wave listening at its best!—*S.W.C.*

HAVE YOU HEARD ALL CONTINENTS?

On the Q.S.L. cards of many amateurs may be seen the letters "W.A.C.," standing for "worked all continents." Well over one thousand amateurs belong to this club, membership of which is open to those who can prove that they have been in two-way communication with all continents.

The rules of this club divide the world into six continents, Europe, Australasia, Africa, Asia, North America, and South America. Here in England, the Radio Society of Great Britain also issues a certificate to those who have worked Empire stations in these six continents, calling it the W.B.E. (worked British Empire) certificate. They also issue a certificate called the H.B.E. certificate (Heard British Empire) to those who have received Empire stations in all these continents.

How many listeners have heard stations in all continents? With the number of short-wave broadcast stations on the air it should not be difficult to pick them up. We should like to hear how many have accomplished this. Are you one of those who have heard all continents? (H.A.C.)

● H.A.C. on Different Bands

Another thing to strive for is to try and hear all continents on different bands. It should be easy to do this on the 31 and 49 metre bands, but not so easy on 16 and 13 metres. Below ten metres several American broadcast and police stations can be picked up, and the Alexandra Palace on seven metres has been heard in South Africa, so perhaps we shall soon have a claimant for H.A.C. below ten metres.

● How Many Countries?

Transmitting amateurs have found the W.A.C. certificate so easy to acquire that they measure their success by the number of countries they have worked. Many claim working up to 140 countries, but there has always been dispute over the method of counting them. Should, for example, England, Scotland, and Wales count as separate countries? Even the Isle of Man has been counted as a country by some. This is stretching things a bit, but the scheme does have the merit of flexibility.

● Zones

Another scheme coming into prominence divides the world into a number of so-called "zones." This is so arranged that although it may be possible to contact for example Vancouver, Yukon, just north of it and where there are very few stations, is rated as a separate zone. Many other areas where there are few or no stations are rated likewise, and so far nobody has succeeded in "working all zones."

Anyhow, has anybody heard all countries where there are short-wave broadcast stations?

EARTHS

Factors Concerning Their Use

THE ADDITION of an earth to a receiver operating on the medium waves in general results in an increase in the strength of reception. It is a most simple piece of apparatus to instal, a length of wire to the nearest water pipe or earth tube buried in the garden and the job is finished.

When the receiver is used on the short waves, the expected increase in strength of reception does not often materialise when the earth is added. What is the reason?

Let us consider the case of reception on medium waves first. We will assume the wave of the station we wish to receive is 400 metres. If we put up a length of wire 200 metres long, i.e., one half the wavelength, certain things happen. The signal from the station causes a voltage to develop on this aerial, and at each end of the aerial we shall have volts, while at the centre there will be no volts. Taking it a step further, suppose the earth lead is 100 metres long. In this case the earth point itself will have no volts, as it is the equivalent of the end of the aerial we have just considered. But the set end of the earth lead will be some volts above earth, as it is the equivalent of the end of the aerial. Of course the use of an earth lead of 100 metres length is ridiculous, but remember that it is one quarter wave long at 400 metres.

When we use the receiver on 16 metres, quite a different state of affairs exist. For the earth lead to be one quarter long, it only has to be four metres long (one quarter of sixteen metres), and as the length of lead must be measured from the receiver terminal to where the water-pipe disappears into the ground, an earth lead shorter than this is difficult to obtain. The result is that when we attach an earth lead of this length, the receiver is not at earth potential, but above it, and therefore it follows that the earth does not cause the receiver to become at a much lower potential than the aerial. Hence adding an earth of this nature will not improve the strength of signals.

● Hand Capacity Effects

Users of receivers with regenerative detectors (reaction) often experience bad hand capacity effects. When the hand approaches the receiver, the station being received becomes detuned, or the receiver may burst into oscillation. This is because the receiver, owing to the length of the earth lead, is not at earth potential, and this is one of the most pronounced effects of an inferior earth.

If we examine the earth system, say on sixteen metres, we shall find that one quarter wave (four metres) from the actual earth there is a voltage point. A further quarter wave along this voltage will disappear, to re-appear at still another quarter wave, and so on. A remedy for this hand capacity effect is to extend the length of the earth lead until it is so long that the point where the volts disappear is at the terminal of the receiver. Trial and error is the easiest way, extend the earth lead and in many cases the hand capacity effect will disappear.

● Mains Receivers

With a mains receiver, another factor enters into the picture. The mains themselves go underground, and are usually put through lead-covered conduit in the house wiring. The mains transformer in the receiver acts as a condenser and couples the receiver to the mains, in other words to earth, and in many cases this mains earth is better than the more usual independent earth. Adding a normal earth to them often makes no differencce and this is the reason.

However, even if the normal earth appears to make no difference it should always be attached on the score of safety. This mains earth will allow the high frequency radio current to pass through the mains transformer (acting as a condenser) but will not pass the low frequency mains current. Thus although the set may be satisfactorily earthed as regards radio frequency, it is not earthed as regards the mains. Should the receiver for any reason become above earth potential, an unpleasant mains shock would result on touching it. So the receiver, and in fact all electrical appliances, should be earthed on this score. Many household appliances are equipped with three-wire cable, two wires to carry the mains current, and the third to connect to earth.

● Counterpoises

In many transmitting stations, where the nature of the ground does not permit of a satisfactory earth being obtained, what is known as a counterpoise is often used. This consists of a length of wire, about the same as the aerial and immediately underneath it, supported and insulated from the ground, and from two to six feet above it. It is then connected as if it were a normal earth system. One end is joined to the earth terminal of the receiver, and the other is left free. In cases where it is impossible to obtain a satisfactory normal earth, it is worth experimenting with this system. If the counterpoise cannot be erected outside underneath the aerial try various lengths of wire around the skirting board, it may help reception.

Every earth is affected by the length of earth lead, and the distance of the earthing point on the pipe to where the pipe enters the ground, and so it is impossible to lay down hard and fast rules. The only way is to try by experiment. Try connecting to different pipes, hot water, radiator, etc., various lengths of earth lead. Unless the receiver is within six feet of the actual ground one cannot be sure that the earth is really efficient, and as so few of us are in this fortunate position, the only thing to do is to experiment.

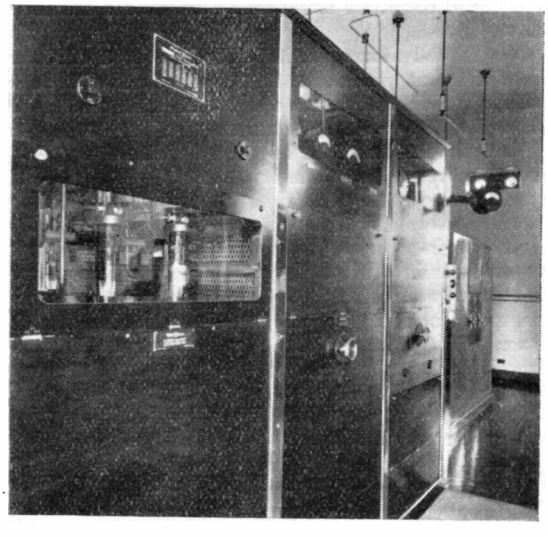
Strenuous Morning Exercises for Radio Transmitters

RADIO STATIONS, like human beings, need setting up exercises every morning For example, WABC, key transmitter of the Columbia Broadcasting System, is given an hour's strenuous warm up before it goes on the air each day.

Preparations for the next morning's schedule at WABC really begin as soon as the Columbia network "signs off" at 1.0 a.m. for the night staff of engineers at the 50 kilowatt transmitter in Wayne, N.J., spend the wee small hours checking equipment, changing worn parts and testing circuits. But when the day shift arrives things begin to hum both literally and figuratively.

● Warming up

From 6.30 to 6.45 a.m. the 14 great water-cooled valves and the ten smaller valves of WABC are warmed up by means of low voltage filament supply. This lights up the filament and burns any gases which may have been formed by the various metal elements inside the tube during the night.



● £100 Valves

Since any gas is a conductor of electricity a high voltage sent through a cold valve might cause an arc between the filament, grid and plate, thus burning it out. Because each water-cooled valve costs nearly £100, and because any burn out would cause a programme interruption, no chances are taken.

During the next half-hour the voltage is increased gradually until, by 7.15 a.m., the transmitter is operating on full power. The electrical output does not go into the ether, however, but is fed into a dummy aerial having identical resistance to the one used for broadcasting. This is done so that technicians may make final tests by means of an audio tone and also by shouting "Woof" into a microphone.

● "Woof"

"Woof" is one of the very few words which will swing a volume indicator up to a sharp peak, no matter who speaks it and therefore is universally employed by engineers in checking volume levels.

At 7.15 a.m. the transmitter is switched on to its regular aerial. For the next 15 minutes listeners who turn on their sets and listen carefully can hear a slight hum of the station's carrier wave on its regular channel.

Then, exactly at 7.30 a.m. an announcer starts the first of the day's schedule of broadcasts with a set speech beginning: "Hello, ladies and gentlemen. This is Station . . ."

5m. RECEPTION IN CROYDON

Despite the fact that the DX station heard here is G5RD near Watford, Hertfordshire, only 25 miles away, twenty-two stations have been heard during the past year. The receiver used is a super-regen. (self-quench detector and power) with a half-wave matched impedance aerial, 30 feet high, with tuned coupling. Phone: G2MV, G2AW, G2RD, G2NK (portable at Addington Hills), G2TI, G2VT, G5RD, G5BL, G5WW, G5BY, G5IB, G5OX, G5HF, G6NF, G6QB, G6UB, G8FD, G6OW. C.W.: G2HG, G55B, G6PK.—*B. R. Arnold* (2 *ANS*), *Croydon.*

RADIO CENTRE, MOSCOW

Schedule of Broadcasts In English

SUNDAY			
11 a.m.-12 noon	... ...	R.N.E.	25.00
3 p.m.-4 p.m.	... ...	R.N.E.	25.00
9 p.m.-10 p.m.	... ...	R.V.59	50.00
12 mdt.-1 a.m.	... ...	R.A.N.	31.25
MONDAY			
9 p.m.-10 p.m.	... ...	R.V.59	50.00
12 mdt.-1 a.m.	... ...	R.A.N.	31.35
TUESDAY			
12 mdt.-1 a.m.	... ...	R.A.N.	31.25
WEDNESDAY			
11 a.m.-12 noon	... ...	R.N.E.	25.00
9 p.m.-10 p.m.	... ...	R.V.59	50.00
12 mdt.-1 a.m.	... ...	R.A.N.	31.25
THURSDAY			
12 mdt.-1 a.m.	... ...	R.A.N.	31.25
FRIDAY			
9 p.m.-10 p.m.	... ...	R.V.59	50.00
12 mdt.-1 a.m.	... ...	R.A.N.	31.25
SATURDAY			
12 mdt.-1 a.m.	... ...	R.A.N.	31.25

The daily broadcast commencing at 12 midnight on 31.25 metres sometimes continues until 2.15 a.m.

All times are given in Greenwich Mean Time.

"Q.S.T. English"

THE LINGUA FRANCA OF THE SHORT WAVES

THE SHORT WAVES have their own language, abbreviations, jargon, "Q.S.T. English," or whatever you like to call it. It is perplexing at first. After listening on the broadcast bands for years, excursion into the realm of short waves seems like travelling in a foreign country. Everything is so different, language, Q.S.L. cards, distance, amateurs—all new and strange.

To learn the history of "Q.S.T. English" we must go back a few years.

Before 1924 there was no such thing as short-wave reception. Broadcasting had just started. Transmitters were using, according to present-day standards, midget power. Receivers were expensive and inefficient. There were a few continental broadcast stations, but language did not matter because, after all, people wanted to listen to music, not to speeches.

Amateur radio was stagnant. Amateurs were allowed to use 200 and 440 metres, with a power of ten watts, not as much as the average output valve of the modern receiver consumes. Some used telephony, others Morse. On these waves communication was in the main between amateurs in the same country. A few British stations had successfully been in contact with the continent, but not such an extent that language was a problem.

Suddenly, in 1924, short-waves came into prominence. By dropping from 440 and 200 metres to first 90, and then later 45 and 23 metres, amateurs found that with the low power at their disposal, and with the crude apparatus available then, it was possible to communicate with not only Europe, but also with amateurs in all parts of the world. New life was given to amateur radio, distance had been conquered, a new thrill had been born.

● Q.S.L. Cards

"Q.S.L." cards had been used before this time, but only by a few. But when someone said that he had heard Australia or New Zealand on his one-valve set, his friends said "That's what you say," and other uncomplimentary things, so the unfortunate listener tried to prove it. He would write to the station he had heard or communicated with, and ask them to send him a letter confirming it, which he would show to his friends and say: "There, I told you so." Gradually Q.S.L. cards came into general use. The call letters of the station were printed prominently on a card, with room for the report or confirmation, and these could be put in an album or pinned on the wall, for the admiration of others.

● Why the Letters Q.S.L.?

Amateur transmitter call signs began to cause confusion. English amateurs were allotted calls beginning with one of the numerals 2, 5, or 6, followed by two letters, such as 2AA, 5BB, or 6CC. Do you remember how London used to use the call "2LO"?

American amateurs had calls beginning with the numerals 1, 2, 3, 4, 5, 6, 7, 8, or 9, and so if 2AA was heard, it might be English or American, or one of a dozen countries using that numeral for amateur calls.

Commercial Morse station calls had been allotted on a different principle. They consisted of letters only, such as GLO, the old Ongar transmitter, or GBR, Rugby, or FFB, Boulogne.

Note the English calls began with the letter "G," and the French with the letter "F." It had been agreed among the countries that each should take certain letters of the alphabet, and that these calls should begin with one of these letters. When short-waves came into use among the amateurs, the same system was applied. "G" was allotted to British amateurs, and so the call 2AA became G2AA, the letter "G" indicating that the station was British. America adopted the letter "W," and so American 2AA became W2AA, and Canadian 2AA, VE2AA. Below will be seen the letters allotted to the principal countries.

● American Districts

In most instances the number in the amateur call sign does not indicate anything, but in America and Canada the number shows the locality of the station.

American calls beginning with W1, W2, W3, and W8 show that the stations are located near the Atlantic seaboard; W9 the Middle West; W4

КОДОВЫЕ ОБОЗНАЧЕНИЯ И РАДИОЛЮБИТЕЛЬСКИЙ ЖАРГОН

QRA — адрес	QRM — помехи от радиостанций	WX — погода	Gmt—время по Гринвичу (Московск. минус 2 часа)	Remarks — общ. замечания	QRH — моя волна
QSA — сила приема сигналов	QRN — атмосферн. разряды	Your — ваше	Working - работали	Input — мощность передатчика	Pse — пожалуйста
QRG — длина волны	QRB — расст. между приемн. и передающ. радиост.	Sigs hrd — сигналы слышны	Calling — вызывали	Plate — напряжение на аноде	Tnx — благодарю
T — тон передатч.		Crd rcd — квитанция получена	Circuit — схема	Aerial curr — ток в антенне	73's — сам. лучш. пожелания
QSB — затух. сигн.			Aerial — антенна		Op. — радио - оператор
QSX — колебание волны передатч.			Cpse — противовес		

Florida; W5 Texas, and W6 and W7 the Pacfiic Coast. The Canadian numbers VE1 show the locality to be near Quebec, VE2, Montreal, VE3 Toronto, VE4 Winnipeg, and VE5 Vancouver.

From being a part of the station call sign, the prefix has come into use as an abbreviation for a particular country or district, and instead of saying "I heard a Californian and an Australian this morning," listeners say "I heard a W6 and a VK this morning."

● International Language

We have seen how the call signs of stations had to change and keep pace with the progress of short waves, and how the abbreviations used to-day for countries began. In a similar manner an international language developed, based on English.

To speak a number of languages was the accomplishment of few, but where the voice failed, the Morse key conquered. It was unintentional, but effective. The rule for stations communicating with each other compelled them to send the call of the other station first, then the sign "de," followed by the call of the calling station.

VE1BB would call F8BF "F8BF de VE1BB," and would then carry on with what he wanted to say. It was common politeness to begin with "Good morning, old man," but this took some time to spell out in code, so to save time and labour this was abbreviated, and "Good Morning" became "GM," and "Old Man" "O.M." But whereas the non-English speaker couldn't remember that "Good Morning" was the equivalent of "Bonjour," for example, he could easily remember the letters "GM" and "OM." They saved time, everyone understood what they meant, and so expressions of this type came into general use.

Phonetic spelling introduced more words, as "hrd" for heard, "luk" and "buk" for look and book. Weather was abbreviated to "WX," distance to "DX."

SOME ABBREVIATIONS

AM.—Morning.
B4.—Before.
BD.—Bad.
BUK.—Book.
CL.—Call.
CONDX.—Conditions for long distance listening.
CU.—See you.
CUL.—See you later.
DR.—Dear.
DX.—Long distance.
FB.—Fine (fine business).
GE.—Good evening.
GD.—Good.
GM.—Good morning.
GN.—Good night.
GUD.—Good.
HR.—Here, hear.
HRD.—Heard.
LUK.—Look.
LX.—Local.
MI.—My.
MNI.—Many.
OC.—Old chap.
OM.—Old man.
PSE.—Please.
R.—Received correctly.
RCVG.—Receiving.
RX.—Receiver.
TKS.—Thanks.
TNX.—Thanks.
TT.—That.
U.—You.
UR.—Your.
WL.—Will.
WX.—Weather.
XMTR.—Transmitter.
YF (XYL).—Wife.
YL.—Girl.
73.—Best wishes.

● "Q.S.L."

For many years an international code had been used by ships, consisting of three letters beginning with the letter "Q" and known as the International Q Code. "QSL" followed by a question mark meant "Will you acknowledge receipt of my radiogram?", and the answer "QSL" (without a question mark) meant "I will acknowledge." Amateurs altered the meaning of QSL to indicate a card, and so "Please QSL" (abbreviated to "PSE QSL") meant "Please send me a card confirming that I have actually heard your station."

QRA	Address.	QRX	Wait.
QRK	Signal strength.	QRU	Nothing.
QRM	Interference.	QSB	Fading.
QRN	Atmospherics.	QSK	See you later.
QRO	High power.	QSL	Confirm by card.
QRP	Low power.	CQ	General call to other stations.
QRT	Stop.		

● How to Report Signals

One of the abbreviations in the Q code is QRK, standing for "Signal strength," or QRK? "How strong are my signals?" It was nice to say that signals were strong or weak, but how strong or how weak were they? The "R" code was used to show variations in strength. In this signal strength is reported from R1 to R9, according to strength, and a typical report would be "R9 QSB R5," standing for "Very strong loud-speaker signal fading at times to moderately strong signal." Here is the code used:—

R1.—Very faint signals.
R2.—Weak signals, barely readable.
R3.—Weak signals, but can be copied.
R4.—Fair signals, easily readable.
R5.—Good signals.
R6.—Strong signals.
R7.—Strong signals which over-ride atmospherics and local interference.
R8.—Very strong signals.
R9.—The strongest possible signal.

● Readability

The R code was used for many years before the need for a readability code was felt. During a storm a station might be good loud-speaker strength (R9), but if atmospherics were strong as well, not much could be understood, and a report of R9 was misleading. The code expression "Q.S.A." was adapted to mean readability, and this was followed by a number from 1 to 5, each of these indicating 20% readability.

Using the case of reception during a thunderstorm, the report would read "R9, QSA3, QRN," saving at least a dozen words and being understood by people of all nationalities.

QSA1.—20% readable.
QSA2.—40% readable.
QSA3.—60% readable.
QSA4.—80% readable.
QSA5.—100% readable.

So an international language has been built up, the language of the short waves.

INTERNATIONAL PREFIXES

CE	CHILE	**OA**	PERU
CM/CO	CUBA	**OE**	AUSTRIA
CN	MOROCCO	**OH**	FINLAND
CP	BOLIVIA	**OK**	CZECHOSLOVAKIA
CR	PORTUGUESE COLONIES	**ON**	BELGIUM
CT	PORTUGAL	**OZ**	DENMARK
CX	URUGUAY	**PA**	HOLLAND
D	GERMANY	**PK**	DUTCH COLONIES
EA	SPAIN	**PY**	BRAZIL
EI	IRISH FREE STATE	**SU**	EGYPT
ES	ESTHONIA	**SV**	GREECE
ET	ABYSINIA	**TI**	COSTA RICA
F	FRANCE	**U/UK**	U.S.S.R.
FA	ALGERIA	**VE**	CANADA
FB8	MADAGASCAR	**VK**	AUSTRALIA
G	GREAT BRITAIN	**VO**	NEWFOUNDLAND
GI	NORTHERN IRELAND	**VP**	WEST INDIES
GM	SCOTLAND	**VQ2**	NORTH RHODESIA
HA/HAF	HUNGARY	**VQ3**	TANGANYIKA
HB	SWITZERLAND	**VQ4**	KENYA
HC	ECUADOR	**VQ5**	UGANDA
HH	HAITI	**VS1, 2, 3**	MALAYA
HI	DOMINICAN REPUBLIC	**VS6**	HONG KONG
HI/HK	COLUMBIAN REPUBLIC	**VS7**	CEYLON
HP	PANAMA	**VU**	INDIA
HR	HONDURAS	**W**	U.S.A.
I	ITALY	**XE**	MEXICO
J	JAPAN	**XU**	CHINA
K4	PORTO RICO, VIRGIN ISLES	**YL**	LATVIA
K5	CANAL ZONE	**YM**	DANZIG
K6	GUAM, HAWAII, SOMOA	**YT**	YUGOSLAVIA
K7	ALASKA	**YV**	VENEZUELA
KA	PHILIPPINES	**ZB**	MALTA
LA	NORWAY	**ZL**	NEW ZEALAND
LU	ARGENTINA	**ZP**	PARAGUAY
LY	LITHUANIA	**ZS/ZT/ZU**	SOUTH AFRICA

A SOLUTION

to any problem relating to short-wave radio is offered free to our readers. All queries must be sent with the coupon cut from page 40 and addressed to "The Editor, The Short-Wave Magazine, 84-86 Tabernacle Street, London, E.C.2." Problems considered of sufficient general interest will be published. A stamped addressed envelope must accompany all correspondence.

Italy Plans New Short-Wave Centre

PLANS FOR Italy's new Imperial Short-Wave Centre, recently approved by the Italian Council of ministers, include the enlarging of the well-known short-wave station at Rome, 2RO. The power of the present two transmitters will be increased from 25 to 40 kilowatts, and three new transmitters will be built. Two of these will have a power of 100 kilowatts, while the fifth, intended for use as reserve transmitter, will have a power of 50 kilowatts. A feature of all transmitters will be high fidelity modulation.

● Four Programmes

The four transmitters for regular operation are designed to work on either of two wavelengths, provision being made for each of them to transmit a separate programme.

The reserve transmitter will be used to take the place of any of the regular transmitters, should occasion so demand, but as its design permits the use of any wave between 14 and 60 metres, it will also be used for experimental purposes.

● New Directional Aerials

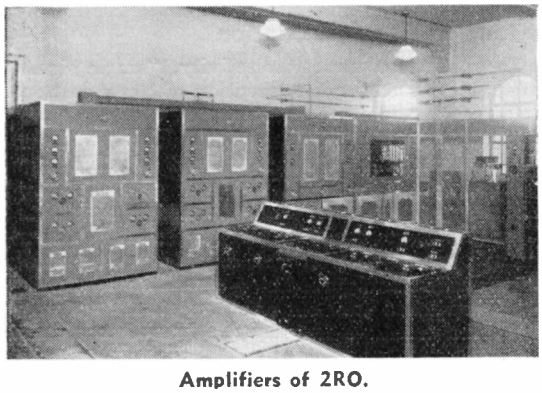
The scheme provides for the installation of a complete new aerial system. Fourteen lattice-work towers, 240 feet high, are to be erected carrying omni-directional and directional aerials. Eight different directional aerials (beams) are to be erected, the direction being:—

Beams 1 and 2.—Ethiopia.
Beam 3.—Australia.
Beam 4.—Japan.
Beam 5.—North America and Canada.
Beam 6.—North and Central America.
Beams 7 and 8.—South America.

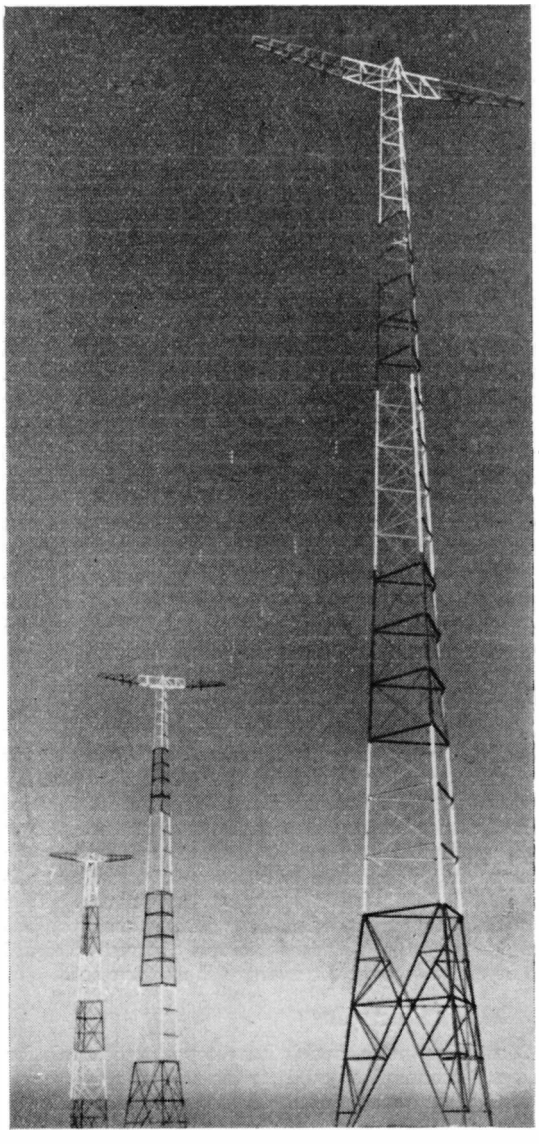
Diagrams which we have inspected indicate that these aerial arrays will be of the multiple, horizontal type.

● World Wide Coverage

These high-power transmitters, combined with the new directional aerial system, should provide a reliable programme service to listeners in all parts of the world. Reports should be sent to: Ente Italiano Audizioni Radiofoniche (E.I.A.R.), Via Arsenale, 21, Torino, Italia.



Amplifiers of 2RO.



The entire plan completes the series of tests begun with the original Prato Smeraldo short-wave transmitter in 1930. The present transmitters have been in use since the middle of 1934, while it is hoped to have the new ones in service during 1938.

Communication Receivers Compared

AN ARTICLE FOR THE NON-TECHNICAL LISTENER ON SHORT WAVES

THE SHORT-WAVE non-technical listener often wonders in what way communication receivers differ from normal commercial all-wave receivers. He will therefore find it interesting to consider and compare the different points.

Receivers of this type are usually of American origin, as unfortunately they have not been very much developed in this country, no doubt owing to the limited market. I am sure radio amateurs would welcome their wider manufacture by British makers.

These receivers, sometimes called "single signal supers," are designed expressly to provide maximum signal strength through interference. With 50,000 licensed amateur transmitters on the air, it is rare to hear one of them without experiencing interference from at least one other; more often than not there are six interfering stations causing trouble.

To hear a weak Australian station through the interference caused by half-a-dozen local Europeans requires different considerations in design than a receiver meant for broadcast reception.

● Rugged Construction

In appearance communication sets are usually totally enclosed in metal cabinets, ruggedly built to withstand hard usage, a tropical use, and to obtain complete screening, a very important point when used close to an amateur transmitter. There are usually a considerable number of controls to ensure fullest possible advantages under all conditions, flexibility, and maximum performance. To a novice they may need a little getting used to, but once mastered enable a considerably improved signal to be obtained over the average short-wave set.

● Many Controls

Most high-grade models have separate controls for radio, intermediate and audio frequency, which assists in attaining the lowest possible noise ratio to signal strength—very useful on weak signals. It is also usual to have an optional automatic or manual volume control switch, a beat frequency oscillator, tone control, jack for headphones, in addition to speaker, wide bandspread, particularly on the amateur bands (some receivers being designed for amateur bands only), and a crystal filter to counteract severe interference. All sets are of course of advanced superhet design, with at least one stage of pre-selection, and always fitted with a send-receive switch, for use when transmitting. This cuts off the high-tension voltage but leaves the filaments on, ready for quick reception.

● Changed Conditions

In the earlier days of amateur radio, enthusiasts usually preferred to make up their own receiving station, but now with the growth of the movement, and the many features embodied in a modern communication set, as a result of laboratory research, and which it is difficult for the amateur to achieve himself, the tendency is to use a set of this type, and concentrate on the actual experimental work desired which usually lies mainly in the actual transmitting, or in the case of a keen short-wave "fan" the best use of the set to obtain unusual DX reception.

It is therefore found that a communication set not only meets the requirements of the amateur transmitter, but is proving very popular with the keen short-wave listener, who appreciates the ultimate in sensitivity, selectivity, bandspread, low noise level, etc.

● Hotting Up

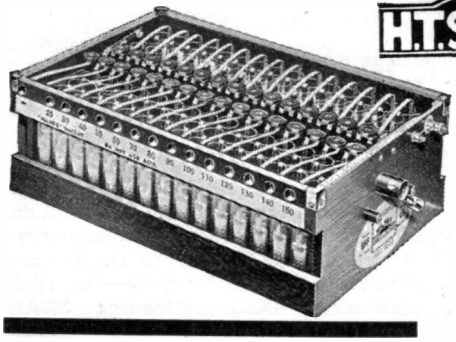
Communication receivers are usually made by specialist firms, who employ craftsmen well versed in obtaining maximum performance from sets passing through their hands. Such sets are usually very critically tested and aligned, and imported to special order by a few firms who, for their own and the maker's reputation, "hot" them up as much as possible, and laboratory test them before issue.

Amongst the best known American makes are National, Hallicrafters, R.M.E., Hammarlund, Patterson and Tobe Deutschmann, all of whom enjoy an excellent name in the States. Listeners will often hear American amateurs on the 20-metre amateur band mentioning that they use sets of these makes to contact fellow-amateurs in other Continents.

● Single Signal Reception

To obtain the utmost selectivity, "single signal" reception is used for the reception of Morse stations. In a reacting-detector receiver, Morse, or the carrier wave of a telephony station is heard when the receiver is made to oscillate. First of all a high-pitched whistle is heard, dropping gradually down the scale to zero, and rising to a high whistle the other side as the tuning is varied. In the communication type of receiver this whsitle, or beat note as it is called, is obtained by a separate valve, which can be switched in or out of action at will, operating at the intermediate frequency, so preventing radiation.

(*Continued on page* 14).



MILNES H.T. SUPPLY UNIT gives the steady, silent H.T. current essential for Short Wave work

Important extracts from users' letters :

From MR. H. J. BARLOW, 8, Harton Avenue, Gorton, Manchester.

"Having had my Unit now 9 months, I can say that it is worth every penny of its price and every short-wave listener should invest in one.
It is dead quiet in operation and I have been able to log many stations on 10 metres which I couldn't hear before owing to mains hum and noises."

From MR. JOHN H. GEAR, 8, Nottingham Terrace, N.W.1.

"I have had a 130 v. Milnes Unit in constant use for the past 9 months. It is an unqualified success. It is good for any wavelength reception but specially fine for Ultra Short Wave radio. Apart from any statics which may be about, I look upon short-wave work with it more like a glorified Crystal set, as it is so perfectly free from extraneous noises."

From MR. FRED LANAWAY, 49, Granville Avenue, N.9.

"Three years have elapsed since the day I put my 120 volt D.S.C. Unit to work during which time it has done all I have asked of it. For short-wave work, a silent, crackle-free background is essential. This is where the Milnes Unit comes to the fore. A more silent H.T. supply could not be obtained, and the voltage drop, even after a long period of use, is very little. This also is a great advantage to the DX fan, as a receiver, once calibrated, stays calibrated. My success in the International Short Wave Club's DX contest is due, in no small measure, to my Milnes Unit which I used throughout the contest."

THE MILNES H.T. SUPPLY UNIT is a battery of alkaline cells with nickel-cadmium plates. It is fitted with an ingenious trouble-free switch whereby banks of four cells can be connected in parallel for automatically regulated charging from a 6 v. L.T. accumulator. With the switch in the opposite position, all cells are connected in series, giving H.T. voltage.

Recharging takes place whenever the set is not in use, so that the Milnes Unit maintains a fully-charged condition. Running costs are negligible.

Any voltage available up to 200 volts, with or without G.B. sections.

Ask your radio dealer for details or write to—

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CHURCH ST., BINGLEY, YORKS.

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We are specialists in **Communication Receivers,** and offer a wide selection of really "hot" receivers, all guaranteed for maximum DX performance on the Short Waves. Complete specifications and data on our full range post free on request.

	£	s.	d.
Hallicrafters Sky Buddy, 5 valves, complete	9	0	0
Hallicrafters Sky Challenger, 9 valves, complete	28	0	0
National A.C.—SW3, complete with power pack ...	13	13	0
National NC100, 12 valves, complete ...	35	0	0
Patterson P.R.16C, Crystal filter, complete ...	40	0	0

We also offer a wide range of specially "hotted up" re-conditioned All-wave and Short-wave Receivers, at attractive prices, with full guarantee of performance.

Special Aerial Systems. Microphones. American Valves. Receiving and Transmitting components. All "Ham" requirements.

A.C.S. LTD. (G2NK)

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THRILLS ON THE SHORT WAVES

Miss E. G. Harris tests the "S.-W.M." Receiver described last month

BEING a person to whom variety is the "essence of life," I was very pleased to change over from the usual type of short-wave set and sit down to testing the receiver described in the March issue of THE SHORT-WAVE MAGAZINE. The results were most delightful and unexpected.

Miss Eileen G. Harris, President of the Ladies Section of the Anglo-American Radio and Television Society and a DXer of considerable experience tests the "S.-W.M." receiver.

I found the receiver excellent on all wavelengths. The 80-metre band was full of amateur stations, the most powerful being G5CU, 5TW and 2JG in London.

On the 50-metre band there were so many stations heard that I found it impossible to verify more than a few. They included COCO and COCD, Havana; YV5RMO, Maracaibo (verified by name—not call); HJ4ARL, Manizales; 8XK, Pittsburg; 3XAL, Boundbrook, and CFCX, Montreal.

Between 30 and 49 metres I received COCH, Havana; HJ1ABP, Armenia; HIN, Dominican Republic; 2XAF, Schenectady; 1XK, Millas; 3XAU, Philadelphia and the usual batch of European stations.

● Japan

My greatest surprise came when I mistook Tokio for Daventry! Volume was so great that as I leaned back and listened to a choir I imagined that it was from some church in England. Imagine then my surprise when the announcer informed me in English that I was listening to JZJ in Tokio, Japan!

Less thrilling reception was obtained from COCX, Havana; TPA3 and TPA4, Paris; DJD, Zeesen; 2RO, Rome; CT1AA, Lisbon; RNE, Moscow, and W8XK, Pittsburg.

W2XAD, 3XAL, 8XK and PLE provided excellent reception between 15 and 20 metres.

● 10 Metres

10-metre reception astonished me! I heard police stations "calling all cars," and in one instance the car replying. American amateurs and a broadcast station also provided excellent, and quite unusual, entertainment and I think I can truthfully say that this band interested me more than all the others put together. In my opinion THE SHORT-WAVE MAGAZINE set is well worth building for this band alone—certainly it has given me a real thrill!

"COMMUNICATION RECEIVERS"—(*continued from page* 12).

This beat-note oscillator is arranged off-set, that is it is arranged so that when a telephony station is tuned in and the beat note switched on, a high-pitched whistle is audible. By a suitable arrangement of the circuits only one half the carrier is heard. Thus if it is switched on when a Morse station is being received, on tuning the receiver only a high pitched whistle varying to zero will be heard, the double effect common to the reacting detector is suppressed, enabling a station to be received where previously only a whistle was to be heard, and so doubling the number of Morse stations receivable at any one time.

In the next issue we propose to describe some of the various features fitted exclusively to certain models, such as built in noise silencers, signal strength meters, provision for use of Marconi and doublet aerials, and the increasing use of metal valves, which the manufacturers claim increases short-wave efficiency, and reduces noise level.

ON TEST

• MULLARD MODEL M.A.S.5

All-wave table model superheterodyne. Ranges: 16.7-51, 200-585, 725-2,000 *metres. 5 valves (including rectifier). Types: one F.C.4, one V.P.4.B, one T.D.D.4, one Pen.A.4, one D.W.2. Price: A.C. model,* 17 *guineas. Universal model (M.U.S.5),* 18 *guineas. Makers: The Mullard Wireless Service Co., Ltd., Mullard House,* 225, *Tottenham Court Road, London, W.*1.

THE MULLARD M.A.S.5 is an excellent example of modern practice in all-wave superhets, in which all the latest refinements have been incorporated. A novel feature of the receiver is the multi-action knob, designed to dispense with the numerous knobs common to many receivers, and making for a clean apearance. This knob is mounted on a ball joint so that not only may it be turned round in the normal manner for tuning, but may also be moved vertically to control volume, and sideways to control selectivity. An ingenious slow motion device is fitted in which by turning the control round clockwise normal tuning is obtained, while by turning it in the reverse direction slow motion tuning is obtained without any trace of backlash. A separate indicator in conjunction with the selectivity control shows the actual amount of selectivity.

Under test, in a locality where car ignition noises are bad, the receiver gave a very good account of itself. Stations such as JZJ (Tokio), W2XAD, W8XK, W3XAU, USA, COCH (Cuba), XEUZ (Mexico), and others too numerous to mention were received at excellent volume. The selectivity control was found useful in cutting out interference from many other short-wave broadcast stations.

Including such refinements as cathode ray tuning indicator, and provision for external gramophone pick-up and loud-speaker, the receiver will be found capable of providing entertainment on the short waves at any time of the day or night.

• McCARTHY MODEL S.6.A.W.

All-wave superheterodyne chassis. Ranges: 16.5-50, 200-550, 800-2,000 *metres. Six valves (including rectifier).—Types: T.4, V.P.4b, T.D.D.4,* 354*v, Pen.4.V.A., 1.W.4. Price: A.C. model, or Universal model,* 7 *guineas. Makers: McCarthy Radio, Ltd,* 44*a, Westbourne Grove, London, W.*2.

THERE ARE many amateurs who prefer to build sets into cabinets of their own design rather than buy a complete receiver. For these the McCarthy chassis is expressly designed. It comprises superheterodyne chassis, complete with valves and power for a mains-energised speaker. Little technical experience is necessary, the only wiring required being the leads to the loud-speaker.

The circuit consists of a triode-hexode frequency changer, a variable-mu intermediate amplifier, double-diode detector used in conjunction with a triode for delayed A.V.C., and a pentode valve having an undistorted output of approximately 3½ watts.

The speaker field winding should be of approximately 2,500 ohms, and the input transformer a primary impedance of 6,000 ohms.

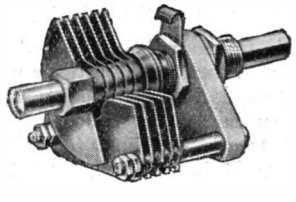
The first station picked up was an American commercial telephone station, testing in preparation for relaying a broadcast programme. The volume control had to be turned well down to keep the signal within reasonable room limits. Among the many short-wave broadcast stations received were W3XAL, W8XK, W1XAL, W2XAD, W2XAF, W2XE, VP3MR, COCH, and COCQ, all of whom provided a signal of full programme value.

On the amateur bands the receiver was found to be extraordinary good, it being possible to separate stations from all but the worst interference—a hard test for any receiver.

The A.V.C. was particularly effective, while the tuning ratio enabled even the weakest station to be tuned in with ease.

"APEX" ECONOMY CONDENSERS

We have from Webb's Radio, 14, Soho Street, W.1., samples of a new range of short-wave condensers. The construction is of brass with ceramic insulation. This insulation is kept at a minimum, with a single bearing at the panel end. Provision is made for coupling several of them together, while it is an easy matter to double space them for low-power transmitter use.



The prices are:

15 mmfd. 1s. 6d.

40 mmfd. 1s. 9d.

100 mmfd. 2s. 0d.

Books for the Radio Amateur

TELEVISION RECEPTION

By Manfred von Ardenne, translated from the German by O. S. Puckle, A.M.I.E.E., research department, Messrs. A. C. Cossor, Ltd. Publishers: Chapman and Hall. 121 *pp.*, 10*s.* 6*d.*

THE NAME of Manfred von Ardenne is a familiar one to all who have studied the development of television and his work in cathode ray valve research needs no introduction to our readers.

The book begins with a discussion of the technical problems of the transmission and reception of television. An account is given of the transmitter and the results obtained at Berlin, together with details of the Baird and E.M.I. transmitting systems at the Alexandra Palace.

Having dealt with this aspect, the author introduces the reader to the cathode ray tube, the operation and design of which is discussed in a particularly lucid manner. Practical circuit diagrame of the power supply and scanning circuits, including such details as the value of resistances and condensers, are given.

The great advance made in television during the past few years is shown by the numerous photographs of results obtained.

The short-wave enthusiast will find much to interest him in the section dealing with the design and construction of ultra-short-wave superhets.

"Television Reception" should prove of interest not only to the engineer, but also to the amateur television receiver constructor.

THE INTERNATIONAL BROADCAST AND SOUND ENGINEER YEAR BOOK, 1937

Edited by A. L. J. Bernaert, Assoc.I.R.E. Publisher: I. Davey, 30, *Davis Street, E.*13. 225 *pp.*, 6*s. post paid.*

TO KEEP abreast of every development in broadcast and sound engineering requires a perusal of journals published in many different languages. In this year book the editor summarises all this information and places it before the reader as a review of progress during the year. References to the journals in which the original papers appeared make it possible for the reader to study details of papers in which he may be particularly interested.

Apart from this review of progress, the book contains a number of articles written by international authorities. Of particular interest to the short-wave experimenter are the articles on "Power Requirements of the Final Stage of a Transmitter with Class B Modulation," "Ultra-Short Wave Transmission at High Power," and the descriptions of various commercial short-wave transmitters. The advanced amateur and the engineer will find this a valuable reference book, covering fields untouched by other publications.—*B.W.*

Trade Announcements

PYE ALL-WAVE RECEIVERS

From Pye Radio we have received the following details of their new all-wave receivers:—

Model QTRF. Three valve battery receiver (1-V-I). Ranges: 16.5-51, 200-550, 1,000-1,900 metres. Price (including batteries and accumulator), £8 5s.

Model QAC3. Five valve, table model superheterodyne. Ranges: 15.5-52-3, 200-556, 900-1,945 metres. A.C. model, 100/250 volts, 25/100 cycles. Price: 13 guineas.

Model QAC5. Six valve, table model superheterodyne. Ranges: 5.8-12.5, 11-28.6, 24-66.7, 200-565, 880-2,000 metres. A.C. model, 100/250 volts, 25/100 cycles. Price: 18 guineas.

McCARTHY SUPERHET

Particulars of the McCarthy Radio new all-wave superheterodyne receiver are given in a recently issued leaflet. All-wave table model superheterodyne, 3 wavebands, 16.5-2,000 metres. A.C. model, price 8 guineas.

KOLSTER-BRANDES BATTERY RECEIVER

Kolster-Brandes announce the following particulars of their new all-wave battery receiver, the K.B. 620:—

Model K.B.620. Three valve battery receiver (1-V-1). Ranges: 18.5-52, 200-500, 900-2,000 metres. Price (including batteries and accumulator) 8 guineas.

PARTRIDGE P.A. MANUAL

A P.A. manual (trade publication) from N. Partridge makes interesting and useful reading. Descriptions are given of his 12- and 30-watt public address amplifiers, single and two-stage pre-amplifiers, together with much useful information on microphone technique and inter-stage amplifier lines. A trade price list is included.

The manual may be obtained by service men from N. PARTRIDGE, B.Sc., Kings Buildings, Dean Stanley Street, London, S.W.1, price 1s.

ED WYNN

Broadcasts during April at 11.0 p.m. each Saturday from W3XAL (49.18 metres)

Turned from stage to N.B.C. microphone two years ago, became a sensation with his many listeners as the fooling Fire Chief

Ed Wynn was born in Philadelphia circa 1886. While attending grammar school in that city he became fascinated by the theatre, and pleading medical attention for a mysterious ailment deserted the school each Monday afternoon that he might attend vaudeville. Detected in this malingering by his father he was barred from all theatres for three months and was sentenced to stand in the corner for ten minutes each Monday afternoon.

High School Education

Later he attended the Central High School in Philadelphia along with a bright youngster who later acquired fame in New York as critic, actor, shouter and murmurer, Alexander Woollcott. Leaving high school he was pointed by his father towards the University of Pennsylvania, and a cheque was sent to the bursar covering his freshman tuition and dormitory fees. He enrolled, but immediately decamped and was found by a vigilance committee organized by his worried parent, acting in the Thurber-Nasher Repertoire Company in Norwich, Conn.

Wynn was then 16, and in his first role in his first play, "American Grit," played a minister of 70. He received £2 10s. a week, and the company stranded in Bangor, Maine, after a guinea matinee. Wynn used to pass out handbills on the streets before the performance. This was in 1902.

Was Millinery Salesman

His father was, and is, the head of one of the largest wholesale millinery establishments in America, with headquarters in Philadelphia. It was while amusing himself by trying on the women's hats in his father's stores that he became aware of the comic possibilities of hilarious headgear, an important item in all his antics to this day. After working as a salesman—millinery—for his father, he resumed his theatrical adventures in 1904 with one Jack Lewis, in a vaudeville act, billed as "The Rah Rah Boys."

Wynn continued in vaudeville with one partner or another until 1914. Then while getting a vaudeville salary of £150 a week, agreed to take £45 for a chance in the Ziegfeld Follies of 1914, a revue that had for its comics Bert Williams, W. C. Fields, William West and Leon Erroll, to say nothing of Ina Claire. It was in this show that he gained his first recognition as a comic in New York.

Ed Wynn—Hilda Keenan

It was while with the Follies that Wynn married Hilda Keenan, daughter of the famous legitimate actor, Frank Keenan. She had just finished playing Aggie Lach in "Within the Law" with Margaret Illington. With the Follies for two seasons and then with "The Passing Show of 1916" at the Winter Garden. His only son, Keenan, was born while Wynn was playing at the Winter Garden.

When the Actors' strike broke in 1919, Wynn was playing in the "Shubert Gaieties." His activities on behalf of the actors so incensed the managers that he was outlawed, and when peace was made Wynn found that no manager would engage him. In this extremity he retired to his Long Island home and in six weeks wrote the book, lyrics and music for "Ed Wynn's Carnival." He opened this under his own management and it ran in New York and on tour for 117 weeks. Thus in combating the managers he found that he must become a manager himself to obtain employment.

Noted for Clean Shows

Successively thereafter Wynn wrote, directed and produced "The Perfect Fool" and "The Grab Bag," both of which enjoyed opulent runs in New York and profitable tours. Next he appeared in a starring engagement under the management of George White in "Manhattan Mary"—salary £1,500 a week—and then as the star of Ziegfeld's "Simple Simon." Last season he returned to his own management with "The Laugh Parade."

Wynn's own shows have all been distinguished for their lack of smut and double entendre. It is his boast that an objectionable line has never appeared in one of his own revues.

BROADCAST PROGRAMMES FOR APRIL

With the knowledge that a number of the countries broadcasting via the short-waves are beaming their transmissions in the direction of this country, we publish the following time-table of regular weekly features. Arrangements for the inclusion of other systems are maturing, and as and when these transmissions become regular items of listening value, they will be included. Programmes from Rome and Radio-Colonial (Paris) are included this month.

(a) W2XE ... ... 21,520 kc, 13.9 m.
(b) ,, ... 17,760 kc, 16.8 m.
(c) ,, ... 15,270 kc, 19.6 m.
(d) W3XAU ... 9,590 kc, 31.2 m.
(e) W3XAL ... 17,780 kc, 16.8 m.
(f) ,, ... 6,100 kc, 49.2 m.
(g) 2RO ... ... 11,810 kc, 25.40 m.
(h) ,, ... 9,635 kc, 31.13 m.
(i) Radio-Colonial (Paris) TPA2 ... ... 15,243 kc, 19.68 m.
(j) TPA3 ... ... 11,885 kc, 25.27 m.
(k) TPA4 ... ... 11,720 kc, 25.60 m.

SUNDAY

a.m.
9.00 Gramophone Records (*daily*) (j)
9.15 News in French, English and Italian (*daily*) (j)
11.00 Concert—relayed (*daily*) (i)
11.43 Various programmes from Italian stations (*daily feature*) (g)

p.m.
12.00 News in English (*daily*) (i)
1.00 On the Air To-day (*daily*) (a)
1.05 Organ Reveille (12.30 *on other days*) (a)
1.20 Mediterranean Hour (*daily*), Light concert (g)
1.30 Lyric Serenade (a)
1.45 Radio Spotlight. The week in preview and News of the Stars (a)
2.00 Children's Sunday Programme (a)
2.00 Children—Milton Cross (e)
2.30 Concert—relay (i)
2.55 Press Radio News (a)

Joe Penner, captivated by the swing rendition by Gertrude Niesen of a popular song joins in. Joe is heard every Sunday over the Columbia network.

3.00 Church of the Air (a)
3.30 Children's Hour (a)
4.00 Press Radio News (e)
4.20 Varied programme for Italian East Africa (*daily*) (g)
4.30 MAJOR BOWES' CAPITOL FAMILY; Dalton Brothers; Helen Alexander. Coloratura Soprano; Nicholas Cosentino, Opera Tenor; Edward Matthews, Baritone; Charles Magnante, Accordionist; Sam Herman, Xylophonist; and Waldo Mayo's Orchestra (a)
5.30 Salt Lake City Tabernacle Choir and Organ (from Utah) (b and d)
5.30 RADIO CITY MUSIC HALL (e)
7.00 MAGIC KEY OF RCA, Symphony Orchestra; director: Frank Black.
7.00 Music of the Theatre. Howard Barlow with Concert Orchestra and Guest Stars (c)
8.00 NEW YORK PHILHARMONIC-SYMPHONY ORCHESTRA (c)
8.10 News in English and Italian (j)
10.30 GUY LOMBARDO and His Orchestra (c and d)
10.30 Col. Stoopnagel and Budd (f)
11.15 Concert—relay from Radio-Paris (*daily*) (k)

a.m.
12.00 JOE PENNER, Comedian; Gene Austin, Radio and Screen Recording Artist, and Coco and Malt, Harmony Team, with Jimmy Grier's Orchestra (from Hollywood) (d)
12.30 Robert L. Ripley; Nelson Orchestra (f)
12.30 Phil Baker and Orchestra (d)
1.30 EDDIE CANTOR, with Bobby Breen, Deanna Durbin, Jimmy Wallington, and Jacques Renard's Orchestra (d and 49.5 m)

MONDAY

a.m.
11.00 Concert—relayed from Montpellier (i)

p.m.
12.15 Concert—relayed from Radio-Paris (*daily except Sundays*) (i)
1.05 The Oleanders, male quartette (a)
1.25 City Consumer's Guide (a)
1.30 Lyric Serenade (a)
1.45 Montana Slim, the yodelling cowboy (a)
2.00 News in English (*daily except Sundays*) (g)
2.00 Metropolitan Parade (a)
2.15 Jack and Loretta, songs and patter (a)
2.15 Symphonic Concert, Augusteo or EIAR Orchestra (g)
2.30 Concert of Light Music (i)
2.30 Richard Maxwell, Songs of Comfort and Cheer (a)
2.40 Press-Radio News (a)
2.45 " Bachelor's Children " (a)
3.00 " Betty and Bob," dramatic sketch (a)
3.00 News (e)
3.15 " Modern Cinderella," dramatic sketch (a)
3.30 Betty Crocker, cooking expert (a)
3.36 Hymns of All Churches (a)
3.48 News. John K. Watkins (a)

4.00 "Magazine of the Air," Talk, Orchestra and Sketch (a)
4.30 " Big Sister," dramatic sketch (a)
4.45 DR. ALLAN ROY DAFOE (a)
5.00 "The Gumps," sketch (b and d)
5.15 Ted Malone (b and d)
5.25 News Reporter (e)
5.30 National Farm and Home Hour (e)
5.30 " The Romance of Helen Trent," dramatic sketch (b and d)
5.45 "Rich Man's Darling," dramatic sketch (b and d)
6.00 FIVE STAR REVUE, Variety Programme; Morton Bowe, Tenor; Mari Bell, Popular Songstress; Ray Sinatra's Orchestra and Bill Johnstone, Hollywood Reporter (c and d)
6.21 News in English and "English Letter Box" (h)
7.00 U.S. Navy Band (e)
7.00 "News Though a Woman's Eyes" (c and d)
7.15 American School of the Air (c and d)

Helen Hayes may be heard on Mondays as she portrays her N.B.C. role of " Bambi." The dramatic series is relayed to Europe through Bound Brook on 49.18 metres.

7.45 "Myrt and Marge," sketch (c and d)
8.00 Colonel Jack Major's Variety Show (c and d)
8.00 Rochester Civic Orchestra (e)
9.30 Chicago Variety Hour (c)
11.00 American Hour.—News, concert, talk and Opera (one Act) from Scala Theatre in Milan (h)
11.00 News (f)
11.05 U.S. Army Band (f)
11.30 News (f)
11.45 LOWELL THOMAS—News (f)
a.m.
12.00 " Poetic Melodies," Jack Fulton with Orchestra (d)

TUESDAY

a.m.
11.00 Concert—relayed from Rennes (i)
p.m.
1.05 The Bluebirds, Girls' Vocal Trio (a)
1.30 Salon Musicale from New York (a)
2.00 " Dear Columbia." Fan Mail Dramatization (a)
2.15 Jack and Loretta, songs and patter (a)
2.30 Richard Maxwell. Songs of Comfort and Cheer (a)
2.40 Press Radio News (a)
2.45 Bachelor's Children (a)
3.00 " Gold Medal Feature Time " (a)
3.00 News (e)
4.15 "Quality Twins." Ed East and Ralph Dumke (a)
4.30 " Big Sister " (a)
4.45 Eleanor Howe's Homemakers' Exchange (a)
5.00 "The Gumps," dramatic sketch (b and d)
5.15 Ted Malone (b and d)
5.25 News (e)
5.30 "Romance of Helen Trent," sketch (b and d)
5.30 National Farm and Home Hour (e)
5.45 " Rich Man's Darling," dramatic sketch (b and d)
6.21 News in English (*daily except Sundays*) (h)
6.30 George Hall and His Orchestra (c and d)
7.15 American School of the Air (c and d)
8.00 Tuesday Jamboree Variety (c and d)
8.00 U.S. Marine Band (e)
10.30 ST. LOUIS SYNCOPATERS (c and d)
10.45 " Wilderness Road," dramatic sketch (c)
11.00 News for North American Listeners (*daily except Sundays* (h)
11.30 Opera from Scala Theatre, Milan (one Act) (h)
11.45 News. LOWELL THOMAS (f)
a.m.
12.00 " Poetic Melodies," (d)
12.30 Alexander Woollcott, "Town Crier " (d)
1.30 AL JOLSON SHOW, with Martha Raye. Sid Silvers and Victor Young's Orchestra (d and 49.5 m)
2.30 " JACK OAKIE'S COLLEGE." with BENNY GOODMAN'S BAND (d and 49.5 m)

WEDNESDAY

a.m.
11.00 Concert—relayed from Limoges (i)
p.m.
1.30 Salon Musicale from N.Y. (a)
2.15 Jack and Loretta, songs and patter (a)
2.25 News (e)
2.00 Music in the Air (a)
2.30 Symphony Concert (i)
2.45 Bachelor's Children (a)
3.00 Gold Medal Feature Time (a)
3.00 News (e)
3.48 News. John K. Watkins (a)
4.00 Magazine of the Air (a)
4.30 "Big Sister." Sketch (a)
4.45 DR. DAFOE (a)
5.00 "The Gumps." Dramatic Sketch (a and d)
5.15 Ted Malone (b and d)
5.25 News (a)

PROGRAMMES—continued.

5.30 "Romance of Helen Trent." Sketch (b and d)
5.30 National Farm and Home (e)
5.45 "Rich Man's Darling," sketch (b and d)
6.00 News in German, English and French (h)
6.00 Five Star Revue. Variety programme (c and d)
7.00 News Through a Woman's Eyes (c and d)
7.15 American School of the Air (c and d)
7.45 "Myrt and Marge" (c and d)
8.00 Manhattan Matinee (c)
8.30 Current Questions Before the House (Washington) (c)
8.45 Jimmy Brierly with Leon Goldman's Orchestra (c)
9.00 Curtis Institute of Music (c)
10.30 Singing Lady—Children's Skit (f)
10.30 Blue Flames, Mixed Quartet (c and d)
11.00 American Hour.—News in English. Opera (one Act) from Royal Opera House (h)

Bert Gordon—Number one pest on Eddie Cantor's popular programmes. Tune to W3XAU for this CBS feature.

11.00 News (f)
11.45 LOWELL THOMAS. News (f)
a.m.
12.00 Poetic Melodies (d)
12.45 Boake Carter (d)
1.30 ETHEL BARRYMORE (f)
1.30 BURNS AND ALLEN; Henry King's Orchestra; Tony Martin, vocalist (d and 49.5 m)

THURSDAY

a.m.
11.00 Concert—relayed from Grenoble (i)
p.m.
1.30 Salon Musicale from New York (a)
2.00 Greenfield Village Chapel (from Detroit) (a)
2.15 Jack and Loretta, songs and patter (a)
2.30 As You Like It. Variety Programme (a)
2.30 Concert of Chamber Music (i)
2.40 Press Radio News (a)
2.45 Bachelor's Children (a)
3.00 Gold Medal Feature Time (a)
3.00 News (e)
3.48 John K. Watkins. News (a)
4.15 Quality Twins, Ed East and Ralph Dumke (a)
4.30 Big Sister (a)
4.45 Eleanor Howe's Homemakers' Exchange (a)
5.00 "The Gumps." Dramatic sketch (b and d)
5.15 Ted Malone (b and d)
5.25 News (e)
5.30 National Farm and Home (e)
5.30 Romance of Helen Trent (b and d)
7.15 American School of the Air (c and d)
8.00 Thursday Matinee Variety Programme (c and d)
8.00 Jorge Megrete, Ramon Armengo, songs (e)
8.30 Do You Remember? Old Favourite Memories (c and d)
8.45 Light Opera Company—Harold Sandford (e)
9.30 U.S. Army Band (c)
9.30 Metropolitan Opera Guild—Informal discussion of the Metropolitan Opera Saturday Matinee Production (e)
10.00 Current Questions Before the Senate (c and d)
10.45 "Wilderness Road." Dramatic sketch (c)
11.00 News in English (h)
11.00 Patti Chopin. Songs (d)
11.00 News (f)
11.20 Latin America Programme. News in Spanish and Portuguese (h)
11.30 News (f)
11.35 George Hall and His Orchestra (d)
11.45 LOWELL THOMAS—News (f)
a.m.
12.45 Boake Carter (d)
2.00 MAJOR BOWES' AMATEUR HOUR (d and 49.5 m)

FRIDAY

a.m.
11.00 Concert—relayed from Bordeaux (i)
p.m.
1.45 Montana Slim (a)
2.00 Metropolitan Parade (a)
2.15 Jack and Loretta, songs and patter (a)
2.25 News (a)
2.30 Richard Maxwell (a)
2.45 Bachelor's Children (a)
3.00 News (e)
3.00 Gold Medal Feature Time (a)
4.00 Magazine of the Air (a)
4.30 "Big Sister." Sketch (a)
4.45 DR. DAFOE (a)
5.00 "The Gumps," dramatic sketch (b and d)
5.15 Ted Malone (b and d)
5.25 News (e)
5.30 "Romance of Helen Trent," sketch (b and d)
5.30 National Farm and Home (e)
6.00 Five Star Review (c and d)
7.00 News through a Woman's Eyes (c and d)
8.00 Columbia Concert Hall (c and d)
10.15 Singing Lady—Musical Plays (e)

11.00 American Hour.—Concert of Request Numbers (h)
11.45 LOWELL THOMAS—News (f)
a.m.
12.30 HAL KEMP'S DANCE BAND (c and d)
1.00 Broadway Varieties (d and 49.5 m)
2.00 Hollywood Hotel (d and 49.5 m)

SATURDAY

a.m.
11.00 Concert—relayed from Toulouse (i)
p.m.
1.30 Light Music (g)
1.45 The Oleanders—Male Quartet (a)
2.00 Fred Feibel at the Organ (a)
2.30 Orchestral Concert (i)
2.30 Mellow Moments (a)
2.55 Press Radio News (a)
3.00 Your Home and Mine. Bryan Rash, commentator (a)
3.15 Richard Maxwell—Songs of Comfort and Cheer (a)

Helen Traubel, popular lyric soprano is a St. Louis, Missouri local girl who made good. Her songs are broadcast to Europe via W3XAL each Sunday at 12 p.m.

3.45 Tours in Tone (c and d)
4.30 Opera (one Act) from Royal Opera House, Rome; or Scala Theatre, Milan (g)
4.30 Magic of Speech—Vida Sutton (e)
5.25 News (e)
5.30 National Farm and Home (e)
5.30 George Hall and his Orchestra (b and d)
5.50 News in Turkish, German, English and French (h)
7.05 METROPOLITAN OPERA (e)
8.00 Down by Herman's (from Milwaukee) (c and d)
10.30 Let's Pretend. Children's Programme (a)
10.30 Drama of the Skies (c)
11.00 Ben Feld and His Orchestra (d)
11.00 News (f)
11.35 Home Symphony—Ernest La Prade (f)
a.m.
12.00 Saturday Night Swing Club. Bunny Berigan and Guest Stars (d)
1.00 ED WYNN, Graham McNameee, comedy (f)

MALAY STATES

Our Malayan correspondent advises us of the activities of the following stations:—

PMA—Bandoeng (Java). 15.5 metres.
Commercial phone Java-Holland, occasionally used for broadcast.

HS8PJ—Bangkok (Siam). 15.79 metres.
Broadcast Monday, 14-16 G.M.T.

PLE—Bandoeng. 15.93 metres
As PMA.

PLE—Bandoeng. 15.93 metres.
Experimental, relays N.I.R.O.M. programmes.

F3CID—Saigon (French Indo-China). 25.58 metres.
Irregular, Monday afternoons, Asiatic music.

PLT—Bandoeng. 27.25 metres.
Relays N.I.R.O.M. programme.

HS8PJ—27.35 metres.
Monday, 14-16 G.M.T.

PMN—Bandoeng. 29.24 metres.
Relays N.I.R.O.M. daily (best station in Malaya).

PKYDB—Sourabaya (Java). 31.10 metres.

ZBW3—Hong Kong. 31.49 metres.
Broadcasts daily.

PLV—Bandoeng. 31.86 metres.
Broadcasts Tuesday, Thursday, 16-16.30.

HS8PJ—Bangkok. 32.09 metres.
Thursday, 13.30-16. European and Siamese music. News in English.

PMH—Bandoeng. 44.64 metres.
New 3 kw. station. Relays N.I.R.O.M. native programmes.

ZGE—Kuala Lumpur. 48.93 metres.
Broadcasts Sunday, Tuesday, Friday.

VUC—Calcutta. 49.1 metres.
Broadcasts daily, 14-16 G.M.T.

ZHJ—Penang—49.34 metres.
Broadcasts daily except Sundays.

VPB—Colombo (Ceylon). 49.6 metres.
Broadcasts daily 15.30-18.30 G.M.T.

Akash Vani (Mysore, India). 49.7 metres.
Daily, afternoon broadcast.

ZGE—Kuala Lumpur. 110 metres.
Relays ZGE, 48-93 metres.

YDA—Batavia. 98.68 metres.
10 kw. used for relay N.I.R.O.M. programme. Afternoons.

Full Constructional Details of the

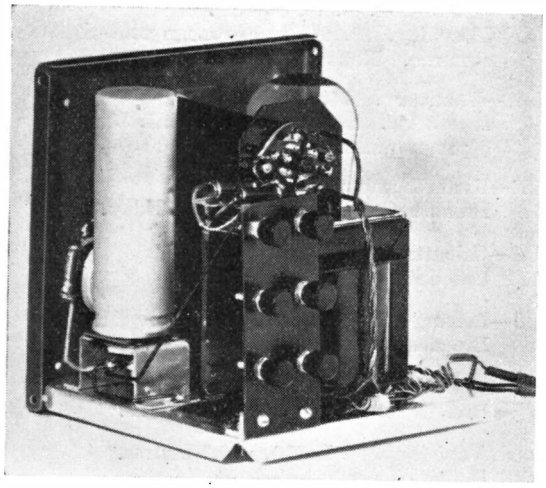
CATHODE RAY OSCILLOSCOPE

By S. J. LOBB

THE CATHODE RAY tube is similar to the receiving valve with the addition of four extra elements, called deflecting plates. It has a cathode, a grid, and two anodes. Electrons are emitted by the cathode, the anodes have positive H.T. connected to them and so attract the electrons from the cathode. On their way they pass through the grid, which is used to control their flow. Up to now it seems to be the same as a triode, but here is the difference: The two anodes do not collect the electrons, but have a hole in them, through which the electrons pass until they are stopped by the glass end of the tube. This glass end is coated internally with a fluorescent material (the screen), which glows when the electrons hit it. The two anodes are designed so that the electrons are concentrated into a pin-point ray, appearing as a tiny point of light on the screen.

● The Deflecting Plates

After the electrons have been concentrated into a ray by the anodes, they pass between the four deflecting plates. First they pass between two arranged



on either side, east and west, and then through the other two, arranged north and south. If a potential is applied to any of these plates, it will deflect the ray. If A.C. is applied to one of these pairs, the deflectors will become alternately positive and negative, the ray will be pulled first by one and then by the other, so that it will travel to and fro across the screen appearing as a straight line. If the A.C. volts are the mains, then the ray will travel across the screen fifty times per second.

Now if an A.C. voltage of 100 cycles is applied to the other pair of plates, the ray will travel between them at the same time as it travels between the first two. Now the ray will be moving east/west fifty times per second, and north/south 100 times a second, and the result will appear on the screen as a stationary picture of two waves (the 100 cycle A.C.), enabling the user to study the wave form. The lower frequency is called the time base, or sweep circuit, and the number of waves appearing on the screen depends on the frequency of this divided into the frequency of the A.C. to be studied. Thus if the time base is 50 cycles, and the other voltage is 500 cycles, 10 waves will appear on the screen.

● Construction

Using components as specified no difficulty will be experienced in the assembly of the components on the chassis and panel.

To simplify matters the positive H.T. is connected to the chassis, so that there will be no need to insulate the tube from the box. Care must be taken, however, to insulate the potentiometers from the panel by means of bushes.

● Wiring the Potentiometers

No difficulty will be found in wiring the potentiometers provided the following is observed. The 50,000 ohm resistance connected to anode 1 is wired to the potentiometer so that clockwise rotation brings the slider towards 150,000 ohms, thereby increasing the voltage.

The 25,000 ohm potentiometer connected to the grid is wired so that clockwise rotation brings the slider towards the junction of the 50,000 and 25,000 ohm potentiometers, thereby decreasing the bias on the tube.

The few resistances required are supported by the use of stiff wiring material, such as Glazite.

The iron box is a standard product of Messrs. Burne-Jones, Ltd., the dimensions being approximately a 7-inch cube. Full chassis diagrams are given so that exact copies may be made if required.

● Operation

The operation of the unit is very simple. To test it, one pair of deflector plates should be shorted,

and the other pair left open. The power should then be applied, and the tube tested to determine whether the spot goes in and out of focus. The focus is the right hand control (50,000 ohm potentiometer) and this should be adjusted until the spot is as fine as possible. The brightness of the spot is then controlled by the brilliancy control (25,000 ohm potentiometer).

As the spot during this test remains stationary, the brilliance control should be reduced, otherwise the spot will burn away the screen.

● 50 Cycle Time Base

The spot having been adjusted, the time base should be applied. In this unit a fixed base of 50 cycles, taken from the transformer, is used. This extra winding of the transformer should be connected to one pair of plates via the 500,000 ohm resistance as shown in the theoretical diagram. It should be connected to the pair which result in a horizontal line, and can only be determined by experiment. It is improbable that the line will be dead horizontal at the first attempt, but provision is made in the tube holder support so that the tube may be moved round a few degrees to enable a horizontal line to be obtained.

The other pair of deflecting plates should be brought out to the top two terminals of the terminal strip. It will be noticed that there are six terminals on this strip but four of them are left blank, for use with a variable time base unit to be described in our next issue.

Although it has been mentioned that the controls on the panel are brilliance and focus, it will be found that they are interlocking, that is if the brilliance is altered, the focus will have to be re-adjusted. A few minutes' practice at the controls will soon make the use of them easy. The ideal is to have the line as thin as possible and yet have adequate brilliance. With too wide a beam scan, detail will be lacking, especially when the vertical scan (A.C. voltage to be measured) is small.

When using the unit in a bright light, it will be found useful to fit a tube or screen round it.

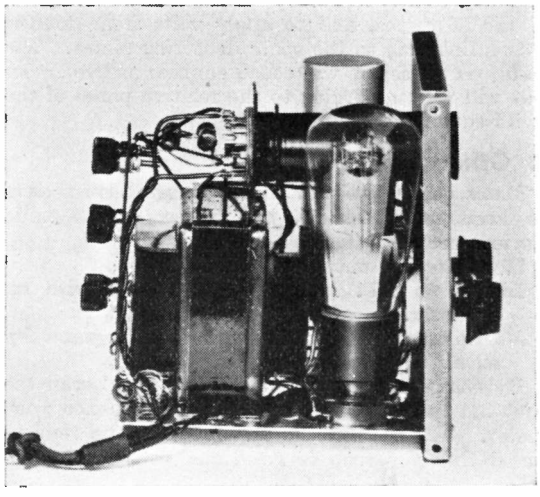
● Using the Oscilloscope

With only the 50 cycle base the tube may be used in a variety of ways. The voltage to be examined should be connected to the two terminals on the strip at the back.

The simplest use is to connect it to the output of a receiver. This can be done by means of choke capacity coupling, or via a transformer. The base will only operate on multiples of fifty cycles, but any residual hum in the receiver will immediately become apparent. On tuning in to a station, the straight horizontal line will be broken up vertically, in sympathy with the music. Local man-made static will appear as hairs and a thickening of the line. It is interesting to watch the width of the vertical scan vary as the signal fades, and if a single note is transmitted, the fading may be measured.

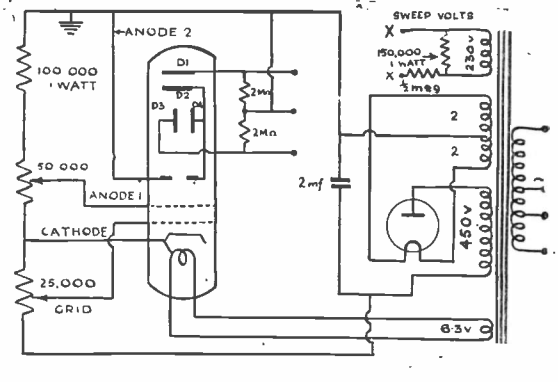
● Checking Transmitter Modulation

The easiest way of getting accustomed to the tube for checking transmitter modulation is to experiment first with a crystal oscillator. Under test, a crystal oscillator was set up on 7 mc., the power supply being from a full-wave rectifier. A single turn loop was coupled to the tank coil, and this was connected to the two spare deflecting plates by means of twin flex. As the time base is 50 cycles, the number of



waves appearing vertically will be 7,000,000 over 50, i.e., 140,000. This number will be too many for the eye to separate one, and the result will therefore appear as a rectangle on the screen.

If the filter is now disconnected from the power supply of the transmitter, the transmitter will be modulated at 100 cycles (full-wave rectifier), and as the time base is 50 cycles, two modulated waves will appear on the screen in the form of triangles, or trapezoids, apex to apex. If the modulation is 100%, the two triangles will exactly meet. If modulation is above 100%, there will be a connecting line between the triangles, while if it is less than 100%, the triangles will not have a sharp apex, but a broad, flat one, and the ratio between this and the base will give the percentage of modulation. Careful examination of the screen will show that not only



is there 100 cycle modulation from the power supply, but also a trace of 50 cycle, the two frequencies being clearly visible.

The percentage of modulation may be varied by adding a small condenser to the output of the rectifier.

● Experiments with Doublers

An interesting experiment to try is to use the crystal oscillator frequency for the time base in place of the 50 cycles, and to apply volts from doubler (via a link coil) to the spare deflecting plates. The result on the screen will usually appear as two circles but will vary according to the relative phase of the two frequencies.

● Other Uses

Many other uses will readily suggest themselves to keen experimenters, but a few of the more obvious are:—

Measuring the output of B.F.O.'s.

Lining up I.F. stages in conjunction with an oscillator.

Measuring the audio response of radiograms by means of frequency records.

By comparing the height of the vertical scan the unit may also be used as a high impedance voltmeter. When measuring A.C. it must be remembered that the scan is 2.8 times as great as the equivalent value of D.C.

LIST OF PARTS

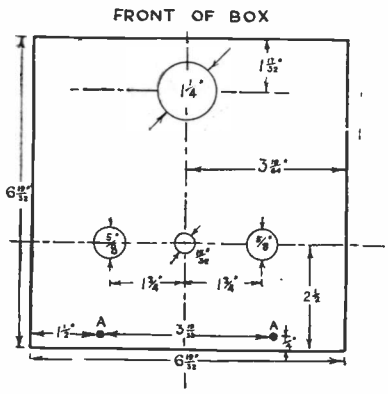
1 Mains transformer (Partridge).
Primary: 200/250 volts., 50 cycles.
Secondary:
450 volts at 10 milliamps.
230 volts at 5 milliamps.
6.3 volts at 1 amp.
2-0-2 volts at 2.5 amps.
1 R.C.A. type 913 cathode ray tube.
1 Mullard D.W.4 rectifier valve.

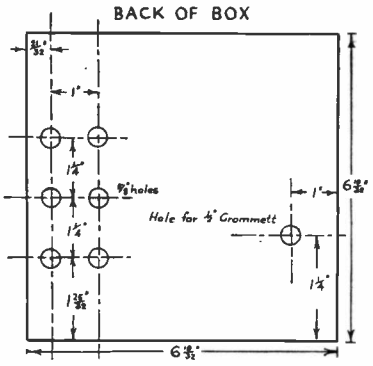
FIXED RESISTANCES (Erie):—
1 150,000 ohm., 1 watt.
1 100,000 ohm, 1 watt.
1 ½ megohm, 1 watt.
2 2 megohm, ½ watt.

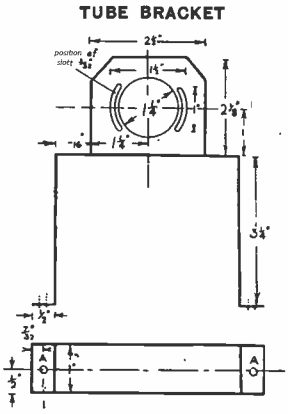
CONDENSER:—
1 650 volt, 2 mfd., type LEG (Dubilier).

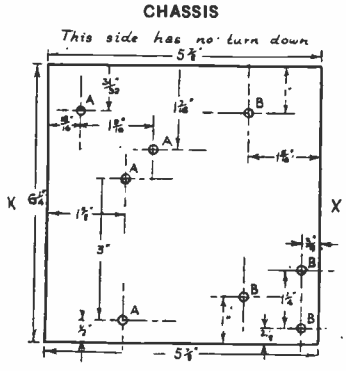
POTENTIOMETERS (Bulgin):—
1 50,000 ohm.
1 25,000 ohm.
1 Iron screening box (Burne-Jones).
1 Octal base for 913 tube.
1 5-pin baseboard holder for D.W.4.
6 Terminals (Belling-Lee).
Ebonite insulating bushes ⅜ hole, with ⅝ shoulder.

(*Continued at foot of next page*).







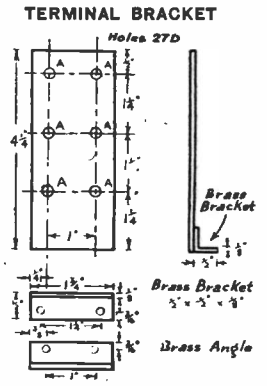


Tube Bracket and Chassis, 16 S.W.G. Aluminium.

Sizes of Holes—A, 33 drill; B, 27 drill.

Chassis—½-inch turn-down at X.

Terminal Bracket—Paxolin with brass angle.



USEFUL HINTS

SCREENING A PENTODE

Many amateurs using R.F. transmitting pentodes have experienced difficulty, especially on 14 mc. with self-oscillation, and have had to neutralise them to obtain stability.

During the construction of a new transmitter employing an R.K.20, this trouble occurred, and was finally traced to the screening.

A normal type of screen, from the chassis up to the level of the screen-grid was tried, but still oscillation occurred unless the valve was biased excessively negative. On inserting a screen, from the chassis to the top of the valve, the trouble disappeared.

R.F. IN THE EARTH LEAD

All C.W. signals on a single-signal super suddenly became modulated, although no hum was apparent during the reception of fone stations. Examination showed that five of the valves had gone, evidently due to R.F. from the transmitter.

Duplex fone had been used with separate transmitting and receiving aerials, and it was concluded that the receiving aerial had picked up the R.F., causing the valves to go.

A few weeks later, the same thing happened, although after the first occasion the receiving aerial had been disconnected from the receiver while the transmitter was in operation.

After trying nearly everything, a thermo-couple ammeter was inserted in the earth lead to the receiver, and on switching on the transmitter, a current of half an ampere was read.

New valves were inserted, and since removing the earth lead, no further trouble has been experienced.

A MAKE-SHIFT MODULATOR

A useful tip when testing a suppressor modulated transmitter on an artificial aerial is to use a broadcast receiver for modulation. Couple it by a step-up transformer attached to the external speaker sockets, and either insert a mike in the pick-up circuit, or use the broadcast programme for modulation. This latter saves the bother of shouting into a mike while modulation measurements are being made.

A receiver having an output of two watts will be satisfactory for most pentodes.

(*continued from previous page*)

When measuring 50 cycle A.C., it will be found that if the time base 50 cycle A.C. and the external 50 cycle volts are in phase, the result will be a straight line, which will be at an angle of 45 degrees to the horizontal. If, on the other hand, the two frequencies are out of phase, the result will be an elipse, which will resolve into a circle when they are 90 degrees out of phase.

As the time base is only 50 cycles, frequencies lower than this cannot be measured, because it would be impossible to trace a complete sine wave.

Next month a variable time base unit will be described, with which it will be possible to lock the frequency to be measured in a stationary position.

READERS' QUERIES

I have a commercial all-wave radiogram. Is it possible to have variable selectivity fitted to the instrument?

It is possible to have variable selectivity fitted, but would be rather expensive. It would necessitate fitting new intermediate frequency transformers, in which the distance between the two coils is varied by means of a control fitted to the outside of the receiver. This control is attached to a rod which either by a screw action, or by a push-pull action varies the coil distance. In receivers incorporating variable selectivity the intermediate transformers are arranged in a line so that one rod can be used to vary the coil coupling of each transformer simultaneously. The difficulty would be the fitting of this rod, which might mean rearranging the component positions. The simplest way would be to have one variable intermediate transformer installed.

I am a very keen listener but know nothing of technicalities. Can I join a listeners' club?

There are several clubs catering for the listener. See the reports and addresses on other pages appearing from time to time.

My loudspeaker keeps the household awake at nights. Can I fit headphones to my mains receiver?

Connect them via a transformer to the external speaker sockets of your receiver. The transformer primary terminals connect to the receiver, and the headphones to the secondary terminals. The transformer ratio will depend on the output impedance of the receiver, and this is usually stated in the instruction book. If the external impedance is Z1, and the headphones impedance Z2, the formula for determining the correct ratio is:—

$$\text{Ratio} = \sqrt{\frac{Z1}{Z2}}$$

What does the expression "signal to noise ratio" mean?

All receivers generate internal noise. This is due to a certain amount of residual hum from the mains, and to the fact that valves do not emit electrons in an even flow, but in a series of jerks. This noise is not often noticeable, but the more valves there are in the instrument, the greater is the chance of this noise becoming prominent. In addition "man-made static" (noises caused by passing cars, electric signs, etc.) affect some receivers more than others. The strength of the station received over the strength of these noises is called the "signal to noise ratio."

MODULATION—Simply Explained

SOME TIME ago I designed a small transmitter consisting of a class B valve, one half of which was used as crystal oscillator, and the other half as Heising modulator. From the considerable amount of correspondence that resulted, it was apparent that many amateurs are not familiar with the requirements of this system of modulation, and in these notes it is hoped that many of the queries raised will be explained.

Modulation systems are of two kinds: frequency modulation and amplitude modulation.

● Frequency Modulation

Frequency modulation, as its name suggests, consists of varying the frequency of the transmitted wave in sympathy with the speech or music it is desired to transmit. At one time it was a popular system with low power transmitters, the microphone being connected across a loop of wire, which

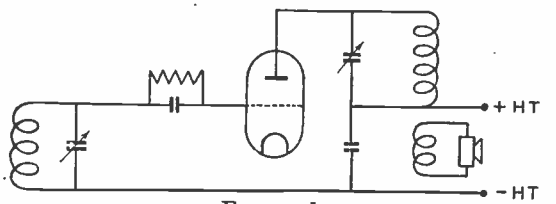


FIGURE 1.

was in turn coupled to the output circuit of the transmitter (*Fig.* 1). With a self-excited oscillator this system gave good results with low power, but since crystal control has become general it is of course impossible to frequency modulate transmitters of this type There is one exception to this, the Armstrong system, used at the Empire State television transmitter in New York, but this is accomplished by phase shift.

● Amplitude Modulation

In amplitude modulation, the frequency of the wave is kept constant, but the aerial power varies in sympathy with the modulation.

Now if we have an unmodulated aerial power of, for example, ten watts, this can be modulated in two ways. We can reduce the aerial power during modulation (efficiency modulation), or we can increase the aerial power during modulation (power modulation).

● Efficiency Modulation

To understand efficiency modulation it is only necessary to consider the operation of an L.F. amplifier. The power output of an L.F. amplifier can be controlled by varying the grid bias, the amount of power taken from the grid bias battery being extremely small. In the case of an amplifier of two watts output rating; the power may be reduced by altering the grid bias, but no juggling with the bias will give an increase of power output above the two watts.

This is exactly what happens with efficiency modulation. This system includes such types as grid bias, suppressor, and linear amplifier modulators. In comparison with the power of the valve only a small amount of modulator power is required for complete modulation, but as this is accomplished by varying the efficiency, the average output efficiency of these systems is about 25%. Thus although it looks easy to modulate in this way, for every ten watts put into the valve, only two and a half appear in the aerial.

● Power Modulation

In power modulation, the aerial power is increased during modulation, and this increased power must be supplied by the modulator. This is the type generally known as "Heising" modulation.

Heising modulation can only be used with a class C oscillator or amplifier. To operate a valve under class C conditions the bias applied must be at least double the volts necessary to prevent the valve taking power with normal anode and grid volts applied, without any drive from preceding stages. To do this, apply power to the amplifier alone, increase the bias until no power is taken, and if this requires 100 volts then 200 volts will be needed to cause the valve to operate class C.

The valve must operate class C because in this class of operation if double the anode volts are applied, then the valve will draw double the current. Thus, if the valve takes 10 milliamps at 500 volts, if the anode volts are increased to 1,000 volts the anode current will increase to 20 milliamps. For successful use of Heising modulation the valve must operate in this condition.

Now suppose that instead of doubling the anode volts by adding another 500 volts D.C. we add to them 500 volts A.C. At one part of the cycle these extra 500 volts A.C. are positive, at another part negative. So we have in the one case our original 500 volts plus the extra positive 500 volts, totalling 1,000 volts, and at the other part of the cycle the original 500 volts minus the extra negative 500 volts, totalling zero volts. Thus this 500 volts A.C. has the effect of varying the anode volts between 0 and 1,000, and the power between zero and four times normal input.

From this it can be seen that if the frequency of this 500 volts A.C. is fifty cycles, then the valve will be 100% modulated at fifty cycles, and going a step further, if instead of using a frequency of fifty cycles, we use speech frequencies, then the valve will be 100% modulated at speech frequencies.

This is exactly what the Heising system does—the anode volts are varied by the speech or music, and as the volts vary, so must the current vary, and thus the power. During part of the cycle the power increases, and this power has to be supplied by the modulator, but the average effiiency is 75%, that is if the normal input is ten watts, then seven

and a half watts appear in the aerial, roughly three times as much power as for the same input with efficiency modulation.

● Circuits

The basic circuit of the Heising system is shown in *Fig.* 2, in which V1 is the class C valve, and V2 is the modulator. The anode supply to both is fed

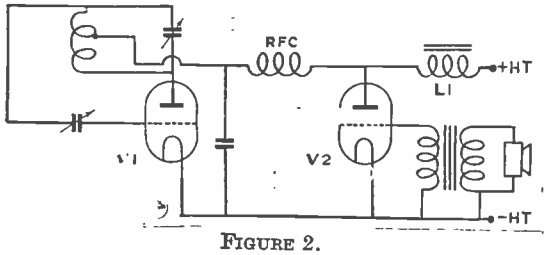


FIGURE 2.

through the L.F. choke, L1, which is for the purpose of limiting the current. Now if no speech is applied to the modulator, the anode power, through L1 is divided between the two valves, V1 and V2. When speech is applied to the grid of the modulator, V2, A.C. volts appear in its anode circuit, which add to the volts on V1. Directly the volts on V1 increase its anode current increases, but the total anode current of the two valves is limited by L1, so the current to V2 decreases. In other words V1 borrows power from V2, and so modulation takes place.

This cycle of operations once understood, it can be realised why the amplifier valve must operate in a class C condition, and why the modulator must develop nearly as much audio power as the amplifier does radio frequency.

Referring back to the transmitter mentioned in the first paragraph, one of the questions raised was inability to modulate fully. It was possible to use an input of ten watts to the oscillator section, and many amateurs tried to modulate this with the other section, but as the modulator section could only produce about two watts maximum audio output, it is obvious that complete modulation could not take place, and so the power of the oscillator section was deliberately adjusted to three watts, enabling 100% modulation to take place.

Lack of space prevents a discussion of modulator design, but the usual audio amplifier considerations must be studied. The class C amplifier must be so operated that the output impedance of the modulator matches to obtain maximum power, and this will vary according to the design of the modulator.

Summarising the above, the Heising modulator requirements are:—

(*a*).—The valve to be modulated must be operated class C.

(*b*).—The modulator must develop sufficient audio power into the correct load.

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DEFERRED TERMS IF DESIRED

BELOW FIVE METRES

PRACTICAL TRANSMITTERS FOR 112 AND 224 MC.

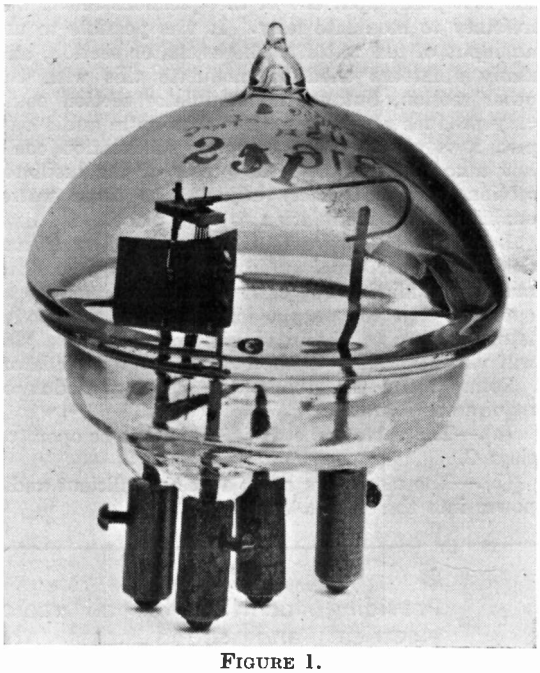


FIGURE 1.

THE HISTORY of radio has been one of difficulties encountered and overcome. When short-wave work first became prominent it was suggested that valves would not oscillate below 100 metres; transmitters were designed for 20-metre operation and had to be suspended from the ceiling so that vibration would not cause instability. Gradually technique has advanced until now we can use crystal-controlled transmitters on frequencies up to 56 mc. But the great field above 56 mc. has been sadly neglected, and it is here that the ardent experimenter may pioneer.

● Valve Failure

Experimental work on these frequencies can be expensive or inexpensive, according to the manner in which it is approached. Apparatus must be suitable for the frequency, otherwise there is every chance of it being destroyed. Valves are the main source of trouble; seals must be capable of handling the power and frequency, filaments must not resonate, and the structure of the valve must be such that no gas is released during operation. This last factor is most important, and many amateurs have had the misfortune of having valves "go soft" through attempts to get them to work at ultra-high frequencies.

This month THE SHORT-WAVE MAGAZINE presents in this article on ultra-short waves two transmitters for 224 mc. (1¼-metre) work, one employing a special valve, and the other using a receiving valve modified for this work.

● The New Acorn Transmitting Valve

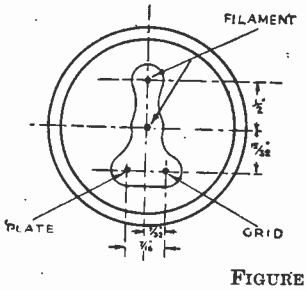
The first transmitter to be described incorporates the new acorn transmitting valve, type 4316A manufactured by Standard Telephones and Cables. This is a larger edition of the receiving acorn, already well-known to amateurs in this country. It has electrodes and spacing far smaller than any standard receiving valve, but it has a dissipation of 30 watts, and can be used up to 750 mc. (*Photo opposite*).

The characteristics are:
- Filament volts: 2.0 volts.
- Filament amps.: 3.65 amps.
- Total emission: 0.40 amps.
- Amplification factor: 6.5.
- Mutual conductance: 2.4 m.a./volt.
- Impedance: 2,700 ohms.
- Maximum plate volts: 450 volts.
- Maximum plate current: 120 mils.
- Dissipation: 30 watts.
- Maximum D.C. grid current: 10 mils.

Inter-Electrode Capacities:—
- Grid to plate: 1.6 mmf.
- Grid to filament: 1.2 mmf.
- Plate to filament: 0.80 mmf.

Operation at 500 mc.:

1. Unmodulated:—
   - Maximum plate volts: 400 volts.
   - Maximum plate current: 80 mils.
   - Output: 6.5 watts.
2. Plate Modulated:—
   - Maximum plate volts: 375 volts.
   - Maximum plate current: 80 mils.
   - Output: 6 watts.

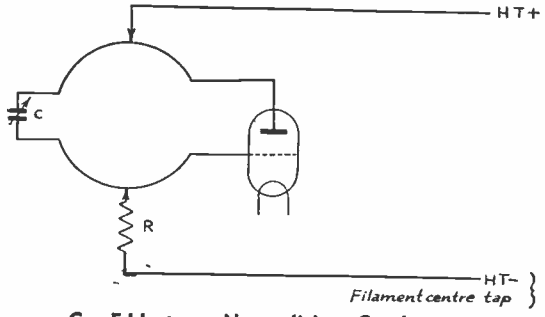


No base is provided for the 4316-A Valve. The grid, plate and filament leads are 0.06-inch diameter tungsten rods, ⅜-inch long, projecting from a flat face of the bulb.

FIGURE 2.

● Circuits

The simplest circuit for use with this valve on 112 and 224 mc. is shewn in *Fig.* 3, and the complete transmitter in *Fig.* 4. It will be seen that the valve has no base, wires protruding from the bulb and special collars with grub screws sliding on them. To provide a sprung support the two filament bypass condensers are bolted direct to the brass baseboard, the tags being bent at right angles, and the collars mounted on them. The baseboard used is of 16 S.W.G. brass, the size being nine by seven inches. The tuning condenser was chosen to keep the leads "in the air," and to simplify the wiring, and is one of the new Eddystone neutralising type.



C—Eddystone Neutralising Condenser.
R—100,000 ohms, 1 watt.

FIGURE 3.

The remainder of the wiring consists of the H.T. tap (from the pillar insulator) and the grid tapping via the grid resistance. This resistance should be adjusted for best output with minimum input. With 300 volts H.T. on 224 mc. a value of 100,000 ohms will be found suitable.

● Adjustment

The adjustment of this transmitter is simplicity itself. The grid and H.T. taps are set approximately at the middle of each half-turn inductance, and the frequency checked up by means of Lecher wires (*see the note on these later in this article*). Finally, after the frequency has been adjusted, by varying the length of the inductances, and the grid excitation by means of the variable neutralising condenser, the grid and H.T. tap positions are varied until highest output is obtained. The average input to this valve at 224 mc. was found to be (unloaded) 30 milliamperes at 350 volts.

The size of the inductances will depend upon the stray capacity in the circuit, i.e., the actual layout, and is therefore best determined by experiment.

For frequencies above 300 mc. the makers recommend that the filament supply of the 4316A be fed through ¼-wave lines. To do this detach the filament supply cable from the condensers, attach two parallel lengths of about 14 S.W.G. copper wire to them (a spacing of two inches will be satisfactory) and then tap the filament cable on to them until output is highest.

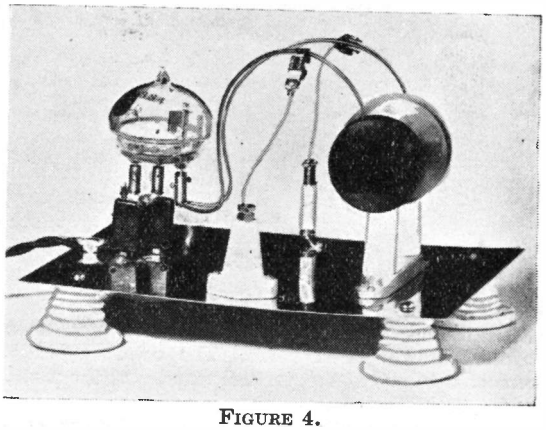


FIGURE 4.

● Don'ts

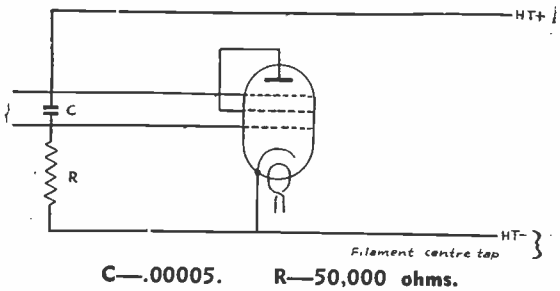
Don't place any strain on the valve connections.
Don't attempt to solder direct to the valve connections.
Don't run the filament under 2 volts, preferably raise the volts to 5% more than the 2 volt rating.
Don't allow the plate current to rise too high during tuning up; at these frequencies excess dissipation ruins a valve far quicker than on lower ones.

● The Tungsram APP4C and APP4G Valves

The second ultra-short transmitter employs the Tungsram APP4C valve. This is a triple grid power valve, i.e., a pentode with all the grids brought out separately.

The characteristics of this valve are:—
Heater volts: 4.0 volts.
Heater current: 1.95 amps.
Maximum plate volts: 250 volts.
Maximum screen volts: 250 volts.
Mutual conductancce: 10.0 m.a./volt.

The APP4C is a standard production for low frequency power work, but so successful has it been found for ultra-short-wave work that a modified version, the APP4G has been produced. In this the electrodes and seals are strengthened for U.H.F. use, and the control grid brought out to a connection at the top of the valve. The APP4C is used in this transmitter as it simplifies the wiring.



C—.00005. R—50,000 ohms.

FIGURE 5.

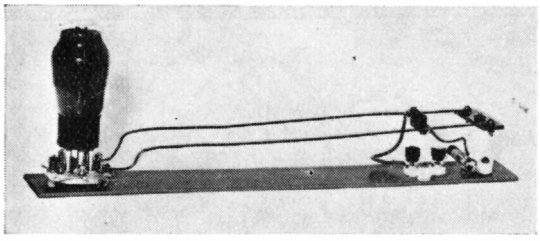


FIGURE 6.

● Construction

The transmitter (*Fig.* 5 *and* 6) is mounted on a strip of brass, ⅛-inch thick. The control grid is connected to one of the parallel wires, and the plate, screen and suppressor grids joined together and connected to the other wire. A .00005 mica condenser is arranged so that it can slide along between the two wires, the H.T. being connected to one side, and the grid resistance to the other. Again the value of the resistance must be adjusted by trial and error, too high a value causing a "squegger" effect (parasitic oscillation), too low a value resulting in high anode current.

● Adjustment

The frequency of the circuit is adjusted by sliding the condenser "bridge" along the parallel wires. A refinement would be to replace the fixed .00005 mfd. condenser with a two-plate variable air condenser, and adjusting this for maximum output.

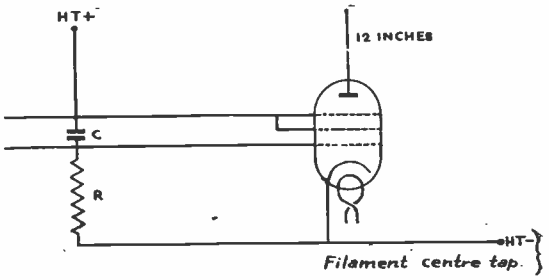
Under test, at 224 mc. the plate current was 45 milliamperes at 350 volts—in excess of the maker's rating of 250 volts, but no ill effects or heating were encountered. The H.T. supply was of a normal filtered type, and the note from the transmitter was pure enough for telephony. As the suppressor grid is brought out separately, modulation may be tried by this method, but some difficulty will probably be experienced with R.F. trying to get back via the modulator circuit. At the time of writing this method has been found rather erratic, but experiments are still going on and it is hoped that a satisfactory solution will be found. However, it is a further subject for those who are experimentally inclined.

● Aerials

Difficulty often arises with the aerial at these frequencies. Usually it can be traced to the length being incorrect. An inch or so either way can make all the difference. For the first experiments at these frequencies it is advisable to try a half-wave aerial, coupled by means of a small condenser (wrapping the aerial lead round the "inductance" wire), and then to prune the length on the aerial as on lower frequencies. Both end fed, and single-wire fed aerials have been found easy to use, and once it is certain that the transmitter will deliver power under load more complex systems of aerial and feeder may be tried.

● New UHF Circuit

A new circuit developed by the Tungsram Company is shewn in *Fig.* 6. It will be noticed that the anode carries no H.T., and that a suppressor and screen grids appear to act as anode. A length of wire, about 12 inches long is connected to the anode. The makers state that with 750 to 850 volts at 15 milliamperes, an output of 5 watts should be obtained on 224 mc.—a very good efficiency at this frequency. Again the grid resistance is most critical, and unless everything is adjusted correctly the valve will take very high current on the screen and suppressor, which will reach white heat in the space of a few seconds. We shall be interested to hear from readers trying this circuit.

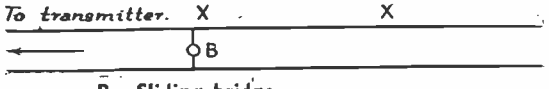


C—.0001 R—20,000 ohms

FIGURE 7.

● Lecher Wires

The easiest way of measuring wavelength at these high frequencies is by means of Lecher wires. These are simply two parallel wires, about two inches apart, and about a wavelength long. To start with both ends are open, and one end has to be coupled to the transmitter. This can be done by shorting one end into a loop and coupling this loop to the transmitter, or else the end can be left open and the wires connected to the transmitter via small condensers. A flashlamp bulb is then connected across the two wires in the form of a bridge, so that it may be slid along their length.



B—Sliding bridge.
X—Points of maximum brilliance.
Distance between X = ½ wave.

FIGURE 8.

On moving the bridge along the wires away from the transmitter, the bulb will be found to light. As it is moved further away it will increase in brilliancy until a maximum is reached and further movement causes the brilliancy to decrease. Note this point of maximum brilliance. Then move the bridge further away from the transmitter. The bulb will go out and then a second position of maximum brilliance will be found. These two positions are respectively ¼- and ¾-waves, so that the distance between them will be ½-wave. Measure this carefully, multiply by two, and you will have the wavelength.

NOTE.—These transmitters may be seen at Webb's Radio, Soho Street, Soho Square, W.1.

CORRESPONDENCE

Address all correspondence to the Editor, SHORT-WAVE MAGAZINE, *84-86, Tabernacle Street, London, E.C.2. Letters for publication should be brief and must bear the sender's full name and address, but a non de plume may be used.*

CONGRATULATIONS

From L. F. S. Parker (G5LP), honorary secretary Wellingborough and District Radio and Television Society:

"Congratulations on your first issue of THE SHORT-WAVE MAGAZINE. It will certainly fill a large gap in short-wave literature, and I am looking forward eagerly to future issues. An announcement regarding the magazine was made at our last meeting and several members have already obtained their copies and will become regular readers. I wish your publication every success and hope that the high standard set by the first number will be maintained."

From Arthur E. Bear, European and Colonial representative International Short-Wave Club:

"Congratulations on your first number. I understand that the article on Malayan views of Empire broadcasting was appreciated. The news on the various radio societies is something which readers find of interest. Wishing your publication every success."

From Arthur H. Bird (G6AQ), The World Friendship Society of Radio Amateurs (U.S.A.) (British Section):

"I wish to congratulate you on the new magazine, and hope it will gain the popularity it deserves. It should prove a useful addition to our radio literature. West best wishes for its success."

"Having bought a copy of THE SHORT-WAVE MAGAZINE, I am now writing to congratulate you upon your publication. I think it is most interesting, and in view of the number of people now buying all-wave sets I am sure it will be a great success. Although I am not an experimenter, I am a very keen short-wave listener and there must be thousands of others who will appreciate your magazine. Wishing you every success."

R. WALKER.

"Glengarth," Heaton Road,
Newcastle-on-Tyne, 6.

THANKS

"Just a line to thank you for assistance you gave me in introducing me to the manufacturers of transmitting components during my visit to your country. Wishing your magazine every success."

F. J. DEVENISH (VE3ADV).

Simcoe, Ontario.

SUGGESTIONS

"Allow me to congratulate you on producing the entirely short-wave magazine. There are several Radio Magazines with a so-called short-wave section, but this is the first magazine of its kind—and may I add, a long-felt want. The popularity of the short-wave bands amongst the average intelligent person is very great to-day, thanks to the all-wave receivers on the market at reasonable prices. In wishing you every success, may I voice the opinion of many by asking you to start a short-wave club *at once*, with the necessary club badges, stationery, etc., at a modest fee to regular readers."

B. J.

Halifax.

"I am writing this letter to let you know how I appreciate your SHORT-WAVE MAGAZINE. It is fine, and an important addition to our meagre 'selection' of radio books. I am sure you will get support from short-wave fans.

"As you mention in your opening pages, you would like suggestions—well, I submit mine. Some may not meet with your approval, but I am trying only to assist.

1. The binding, paper and type of print are excellent; don't change it for 'something as good!'
2. Establish a branch at which readers' reports on stations can be handled.
3. Form a club.
4. Advertise your magazine in a daily paper.
5. Publish each month a few stations not issuing Q.S.L. cards.
6. Full wavelength charts (in monthly sections).
7. Addresses of transmitters (as monthly instalments).
8. Logs of fellow-readers.
9. Alteration in wavelength or time schedule of stations.
10. All activities of radio societies in one section of the magazine, not jotted all over the place.
11. Improvements to short-wave sets.
12. Views on certain subjects by readers.
13. 'Highlights' of the short-wave programmes.
14. Gradually enlarge as membership increases.
15. Issue certificates to readers who produce verification cards from all countries.
16. Publish fortnightly—a month is a long time to wait.

"Wishing your new magazine all the success it deserves."

R. PEARCE.

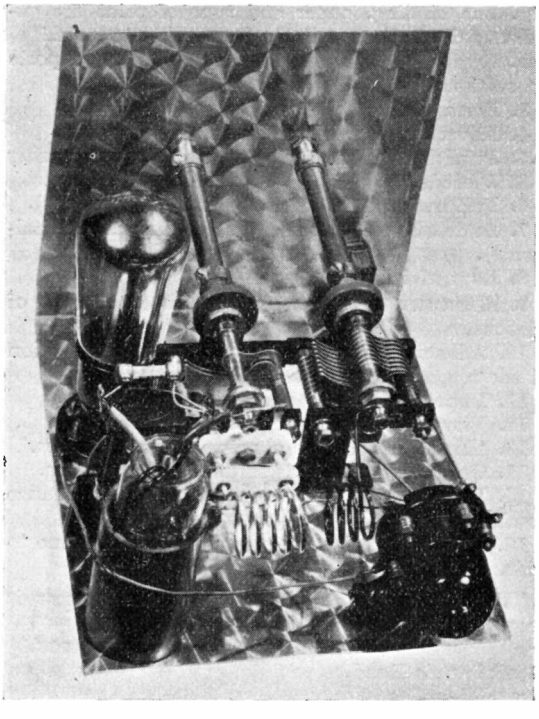
11, Britannia Road,
Westcliff-on-Sea, Essex.

AN ULTRA-SHORT-WAVE RECEIVER

For Television Sound, Five Metre Amateur Reception, And Experimental Work on 2½ metres.

By "The Short-Wave Magazine" Constructional Staff

The receiver described has been designed for coverage from 2½ to 7 metres; within these limits much experimental work is being conducted. The simple circuit and layout allow of latitude in the use of components, and circuit modifications may be tried later; the main design, however, makes a satisfactory foundation for testing various ultra-short-wave receiver theories.



MANY USES will present themselves to the constructor of this receiver: it may take the form of a portable, for H.T. requirements are small; the amateur will find a use for local work; and the ordinary listener will be enabled to hear television sound if within reasonable distance of a transmitter—not forgetting the possibility of long distance reception, reports of which are constantly being made.

Experiments have shown that super-regenerative receivers generally require at least an R5 signal to overcome or stop the quench. The reasons for this have been traced to the following: (1) The use of a low value of resistance for biasing the self-quench detector; (2) inefficient aerial coupling.

To overcome the first disadvantage the ultra-audion circuit has been modified, thus permitting the use of a high resistance grid leak of 3 megohms. Under these conditions the valve quench is reduced to a minimum by weak signals.

The method of aerial coupling to a receiver of this type is of primary importance. The usual methods employed, such as via a small capacity, although fairly efficient, do not provide sufficient coupling over the whole band. So tuned aerial coupling is employed.

● The Circuit

A special detector valve designed by The 362 Radio Valve Co., Ltd., for super-regenerative working is used. This valve "SR2" is a low impedance triode with a high slope on the positive side. It has a large surplus emission, so that it is possible to allow the maximum amplitude to build up to a much larger value than would be possible inside the limits of the maximum mean anode current; this large output can be produced while leaving the greater part of the quench period available for quenching and regeneration.

The valve inter-electrode capacity has been reduced to a minimum, and in taking full advantage of this fact the tuning condenser in the receiver is

only of sufficient capacity to cover the required band, thus creating a high L/C ratio. No base is supplied with the SR2.

The detector is transformer coupled to an LP2 valve in the usual manner. The condenser C4 is essential in a super-regenerative circuit, for without its use the detector will not quench. Should any trouble arise with threshold howl the fitting of resistance R2 (.25 megohm) will provide a solution. With the components used originally no difficulty was experienced in this direction.

Besides giving maximum coupling over the whole band the tuned aerial coil will absorb unwanted quench.

It will be seen that the high frequency choke is connected to the grid end of the coil. This method of H.T. feed allows a permanent contact to be made, thus obviating the use of a clip to a tapping on the coil; therefore coil changing presents no difficulty and losses usually associated with the use of clips are avoided.

Biasing is obtained through a 3 megohm resistance from an H.T. + potential. This was found to provide smoother operation than when using the more orthodox method.

● Construction

The chassis consists of an aluminium sheet measuring 6½ by 15 inches, bent at a right angle 6 inches from one end. The shorter flange forms the panel, on which are mounted the toggle switch and phone jack (this latter component must be well insulated by the use of ebonite washers and a bush). Centres for the condenser controls are 3½ inches from the bend and 2⅛ inches from each side.

Photographs show clearly the positions of the components. As the SR2 valve has no base it was mounted in a paxolin tube 1⅜ inches inside diameter and 2¾ inches long. A disc of ebonite was tightly fixed to the base of the cylinder and formed a fixture to the chassis. Other methods of valve mounting will suggest themselves to the constructor, depending upon the materials he has at his disposal.

The coil base is bolted direct to the grid/plate tuning condenser, for which purpose the countersunk screw is removed and a longer bolt used. Wiring at the coil socket ends will retain the base in a horizontal position.

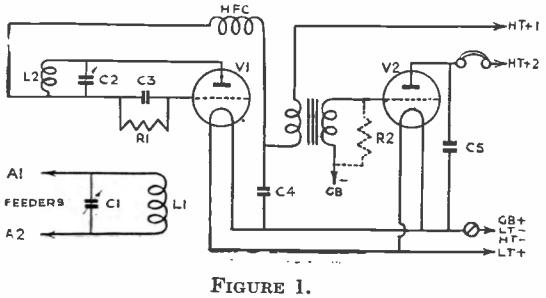
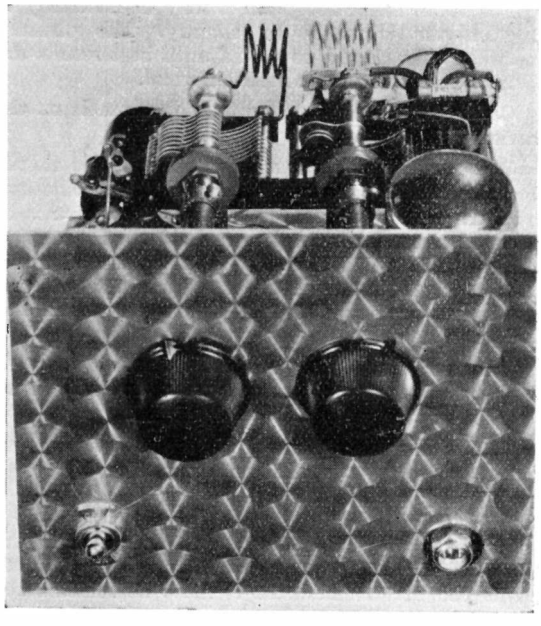


FIGURE 1.



Coils for five metre reception are as follow:—L1, four turns of 16 S.W.G. enamelled copper wire wound on a ¾-inch former, the ends being used for support from the aerial condenser. This coil is home-constructed, for a commercial coil with a base cannot be adjusted to the correct coupling. L2 is a commercial 5-turn coil; or, for those desiring to make their own, 5 turns of 16 gauge wire.

For reception of television sound use the same aerial coil and a 6-turn for L2.

The high frequency choke can be made by winding 50 turns of 28 S.W.G. (enamelled or silk-covered) on a ¼-inch former. A small glass tube makes an excellent former, or a pencil with lead removed.

A horizontal five-pin valve holder is used instead of terminals. Connection is made to this in the following order: H.T. + to plate position; H.T. + 1 to grid; G.B.— to centre point; H.T.—, L.T.— and G.B. + to a filament socket; L.T. + to the remaining filament point. This system of battery changeover is to be recommended for general practice.

Components are bolted to the chassis by 6 B.A. countersunk bolts. All leads are connected direct and the chassis is not used for the various earth points shown in the circuit. The one necessary connection of the chassis is made at the point below C4.

● Operation

Less than 30 volts H.T. are required to cause the SR2 to quench, but it is advisable to try different voltages under varying conditions until the best results are obtained.

The aerial coupling coil should be placed sufficiently close to the grid/plate coil so that when tuned the quench is absorbed.

For seven metre reception it may be necessary to tighten the turns of L2 slightly. The distance between coils should be varied until best results are obtained; about ⅛ of an inch is normal.

Connect the aerial feeders to the terminals on the aerial tuning condenser.

When searching for stations both controls should be operated so that the detector is just oscillating, and when a signal is heard the aerial should be retuned until the highest ratio between modulation and quench is obtained. When it is desired to receive straight C.W. this re-tuning will not be found necessary, as the valve must be out of quench and only oscillating.

For maximum signal strength of phone it has been observed that the aerial coupling coil should be tuned to the low frequency side of the signal.

Although no slow motion dials are used tuning was not found to be over critical for phone or C.W.

● Aerials

Experiments with various types of aerials have shown that a half-wave matched impedance (*Fig.* 2) gives the best results, but it must be remembered that it is a strictly one-band aerial.

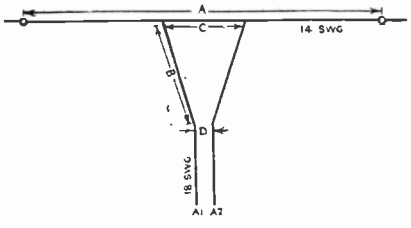


FIGURE 2.

The dimensions for five metre reception are:—A 92 inches; B 10 inches; C 9 inches and D 5 inches. The seven metre aerial measurements are:—A 132 inches; B 19 inches; C 13 inches and D 5 inches.

Feeder spacers can be constructed from ½-inch insulating material cut to 5-inch lengths. If the aerial is intended for indoor use wood spacers will suffice.

Another form of suitable aerial is the half wave end-fed type. One end of this may be connected to either side of L1. The length for television sound required is 132 inches, and for five metre work 92 inches. It is advisable to experiment with both horizontal and vertical systems.

PARTS REQUIRED

1 Aluminium Chassis, 6½ x 15 inches, Ready Drilled (E. Paroussi).
2 Variable Condensers (Jackson Bros.), 15 mmf. L2 (2,140), .0001 L1 (1,054).
U.-S.-W. Coils, 5- and 6-turn (Eddystone—1,050).
1 Coil Base (Eddystone—1,051).
2 Extension Control Outfits (Eddystone—1,008).
2 Adjustable Brackets (Eddystone—1,007).
3 Type "M" Condensers, .0001, .002, .001 (T.C.C.).
1 U.-S.-W. Choke.
1 3 megohm Resistance (Bulgin, ½-watt).
1 Phone Jack (Bulgin—J2).
1 L.F. Transformer (Bulgin—L.F. 33).
1 5-pin Cable Plug (Bulgin—P.3).
1 Toggle Switch (Bulgin—S.80.T).
2 Valve Holders, 4-pin and Horizontal 5-pin.
2 Valves, SR2, LP2 (362 Co.).

Quantity of 6 B.A. bolts, Glazite wire, and 16 S.W.G. enamelled wire for coils.

BROADCAST RADIO INSTRUCTION

Late listeners who are students of radio technique will find interest in the April schedule of W1XAL (49.6 m.). During this month a Modern Radio Course will be given by C. Davis Belcher each Tuesday at 12.30 a.m. as follow:—

6th.—Tuned Radio Frequency Receiver.

13th.—Superheterodyne Receiver.

20th.—Super-regenerative Receiver.

27th.—Fading and Static.

At 1.30, for half an hour, International Morse code practice will be given, followed by a radio forum.

(*Continued from previous page*).

grids. Further stages of the transmitter will also be keyed at the same time providing their bias is taken from the same source. An example of this is a transmitter in which the buffer is an R.K.20, followed by an H.K.354 final. When the key is up, the control and suppressor of the R.K.20, and the control grid of the H.K.354 are isolated, ensuring that no spacer wave is radiated.

The simple keying filter in *Fig.* 2 prevents any trace of interference with local broadcast receivers. Under test it was found possible to place a broadcast set within two feet of the transmitter without hearing any trace of it. The values of the components in the filter are not critical, the chokes can be of between 5 and 20 henries, the resistance about 100 ohms, and the condenser 1 or 2 mfds.

HOW TO KEY A DIRECTLY HEATED PENTODE

THE SUPPRESSOR grid in the pentode provides an easy means of keying. The usual method (*Fig.* 1) is to make the suppressor negative when the key is up, and to reverse this bias to positive when the key is down. The resistance R, of about 50,000 ohms, is inserted to prevent the bias battery being shorted, but is an additional drain on the battery. Great care has to be taken to prevent key clicks.

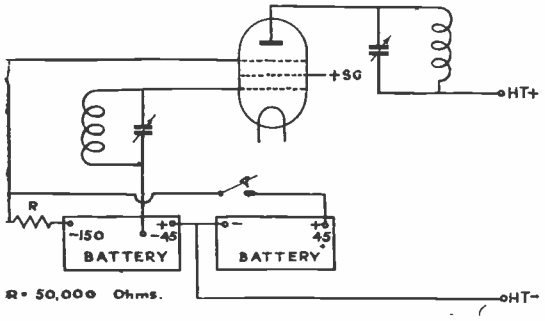


FIGURE 1.

A new method of keying is shown in *Fig.* 2. In this the control and suppressor grids are keyed simultaneously, without any additional resistances to waste the bias supply.

The normal small transmitting pentode (RFP 15, RK20), requires a negative control grid bias of about 60 volts, and a positive suppressor voltage of 60 volts. If a 120 volt battery is taken and the centre point (60 volts) earthed, then with respect to earth, the two ends will be plus 60 volts and minus 60

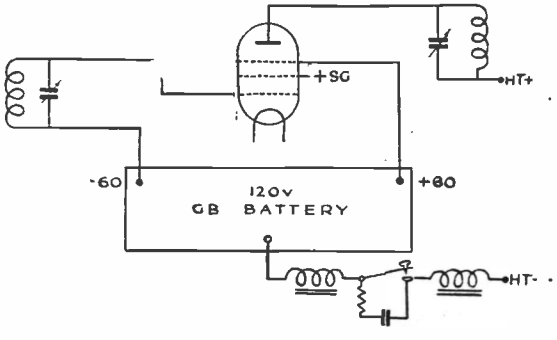


FIGURE 2.

volts, the exact voltages required by the suppressor and control grids respectively.

By inserting a key in the lead between earth and the centre of the battery, when the key is up it breaks the bias to both the suppressor and control

(*Continued on previous page*).

WORLD FRIENDSHIP SOCIETY

SPONSORS TEST

Second Birthday Celebration

The World Friendship Society of Radio Amateurs celebrates its second birthday on April 22, and to mark the occasion a birthday party on the air has been arranged.

Beginning at 00.01 G.M.T. and finishing at 24.00 G.M.T., every transmitting member is asked to work as many other members as possible. To confirm contacts each station will transmit numbers consisting of the date of his membership certificate, e.g., if the certificate is dated April 17, 1936, the numbers 17.4.36 will be sent.

The method of scoring allows two points to be claimed for every contact completed, and one point for every station heard.

Logs should be sent either to W9DQD, 730, N. Sixth Street, Grand Junction, Colorado, U.S.A., before June 30th, or to Arthur H. Bird, G6AQ, 35, Bellwood Road, Waverley Park, Nunhead, London, S.E.15, before June 1. The time in GMT, calls of the stations heard or worked, numbers sent and received, together with the number of points claimed, should be given.

It is hoped that some of the British members will contact W9DQD, located in Colorado, one of the most difficult states to work.

SUMMER PLANS

SOUTHALL

Although the regular weekly meetings of the Southall Radio Society ended on March 30 until the autumn, a number of interesting events are planned for the summer. These include field days, direction finding contests, and visits to well-known commercial radio stations. Full details of the Society's activities can be obtained from Mr. H. F. REEVE, hon. secretary, 26, Green Drive, Southall.

BLACKPOOL AND FYLDE

The Blackpool and Fylde Short-Wave Radio Society is planning intensive 56 mc. indoor and outdoor work during the summer. They also hope to arrange demonstrations of commercial gear, but more members are needed—so, short-wave listeners and others in Blackpool and the Fylde, what about it? Technicians, DX fiends and QSL hunters, all are welcomed, as is anyone with an interest in radio reception and transmission.

G6MI and 2CJP have got CMI's 56 mc. MO-PA working and want skeds with any station on 56 mc. fone.

Other members active: G5MS, G6VQ, G6YV, G8AK, G8GG, 2ARL, 2BCF, 2BSF, 2CJP and 2CKD. The secretary is Mr. H. FENTON, 25, Abbey Road, Blackpool.

On the Amateur Bands

"Ham" News by G5GQ

MY REMARKS on the subject of low power D.X. work seem to have aroused the Q.R.P. crowd, many of whom have written in for more dope on VK3PG'S transmitter. Sorry I havn't full details, only his card, which says that he uses a 201A valve, 180 volt H.T. battery with a maximum input of four watts to an eight wave aerial. He is W.A.C. and has worked 59 countries. Very nice to have the room to put up an eight wave aerial, but it isn't the only way to work D.X. with low power. Do any of you remember the records put up by G5SI? He got across to the States with under one-tenth of a watt, and often worked VK and ZL with well under a watt input, and he certainly never used anything out of the way in aerials. By the way, does anyone know what has happened to him? He seems to have vanished from the air.

I havn't had the opportunity to try for low power record work recently, my best effort in the last few months being R8 on 14 mc., and R6 on 7 mc. from U.S.A. with under five watts input, but surely someone has W.A.C. on this power, so let's hear from you.

● American Receivers

Comment continues to reach me regarding the use by British amateurs of American communication receivers. Why does not some enterprising firm turn out a British equivalent of the Hammarlund Super-Pro, or the National H.R.O., or the R.M.E.69? It does seem a pity that we have to go across the water for our receivers, and for the Government to have to purchase them from abroad. The price cannot be the trouble, because some of them can hardly be called cheap.

● Remote Control

Visiting U.S.A. last November, I was impressed with the way many W hams used remote control. Of course their winter is more severe than ours, and as so many of them have a liking for installing the transmitter in the garage or in an outhouse, remote control is necessary for the cold winter mornings. W2CVJ, with whom I stayed, had a very neat system. He had two transmitters installed in a cupboard in a bedroom, one for 14 and the other for 7 mc. On the operating table in the lounge were two switches, and with these it was possible to work the transmitters and use either at will. In the bedroom the gear was completely concealed, and the first thing I knew about it was when I slept there. The first morning I was awakened by a peculiar clicking noise, which on investigation proved to be the keying relay!

Until I went over there I was under the impression that their transmitters were not so efficient as ours. Well, I went round to W2DTB, and there he had a pair of Eimac 150T's in push pull. I said I would like to take a photograph, but didn't think the light was good enough for cine work. W2DTB said that he would soon fix that, turned on his transmitter and coupled one of those large 1,000 watt floodlight bulbs to it. Did it light? I thought it was going to burn out!

● Television across the Atlantic

W2CVJ gave me an interesting account of how he received television across the Atlantic from England way back in 1928. At that time G2KZ, at Coulsdon, Surrey, was experimenting with the old Baird mechanical system. I remember standing by to assist W2CVJ and G2KZ with their tests so took the opportunity of asking him how he got on. He told me that he had often worked G2KZ on phone and one day received a cable from him asking if he would participate in some special television tests.

These tests were fixed up and finally proved successful, perfect reception being demonstrated before press representatives at his home in Scarsdale, New York. Most of the gear was installed in a cellar, including 2,000 volts of dry batteries to provide power for a pair of Mullard 0/150's in the output stage of the receiver. Visiting the office of the NEW YORK TIMES a few days later, we were told that they could show cuttings of anything appearing in that paper during the last fifty years, within a minute's notice, so we challenged them to show us the cutting about this reception, which sure enough they did.

I wonder how long it will be before the Alexandra Palace transmissions are seen over there.

● Four Tons

While over there I was a frequent visitor at W2FEQ. He was in the middle of rebuilding his entire station, and had built an extension to the house for it. He was doing all the work himself, and had by then used over four tons of material in the construction of the radio room. All the power was concealed in the walls, and he promised to let me have photos when he had completed the station. They arrived last mail. See next page.

● Q.R.M.

On 14 mc. there was a sudden lull in activities, all the Yanks were getting ready for the A.R.R.L. contest, and sure enough, zero hour on the first day

found them all back again. Even with a single-signal super it is next to impossible to separate them, so heaven knows what it must be like on an o-v-1. 50,000 amateurs licensed over there and they all seemed to be on at once. They always claim that Q.R.M. is worse over there, but personally I think we know more about it. C.W. Q.R.M. is bad on 7 mc., but one can copy through it with a decent

This and photograph below show W2FEQ's new shack.

receiver. They have none of our continental phone friends occupying 50 kc. or so with self-excited phone to contend with, and I have yet to come across a receiver capable of cutting these merchants out. 14 mc. is about the same as here, with their own stations an R point louder. G stations do not seem to get across very well, G6NJ being the most consistent.

● Visitors

VE3ADV looked in the office during his visit here in March. Many of you will remember him—Fred Devenish; used to work under the call G5UP when he lived here before he went to Canada in 1929. He has been working on low power since he went, but is now putting in a couple of RK2O's in push-pull, suppressor modulated, so no doubt we shall be hearing more of him. He and I got across the pond for the first time on the same night. My contact that night was W1UE, E. L. Battey, now assistant communication manager for A.R.R.L.

Latest 1937 All-wave radio!

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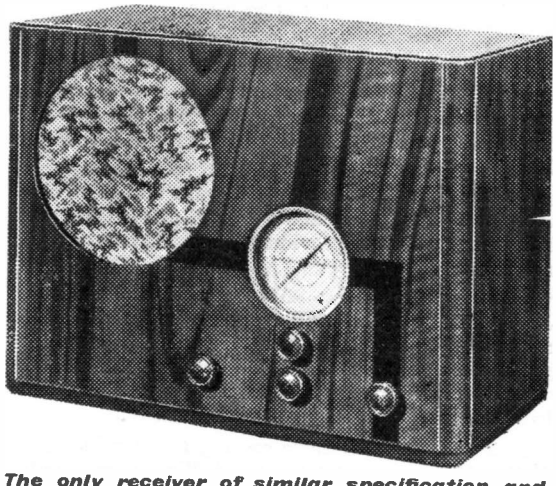

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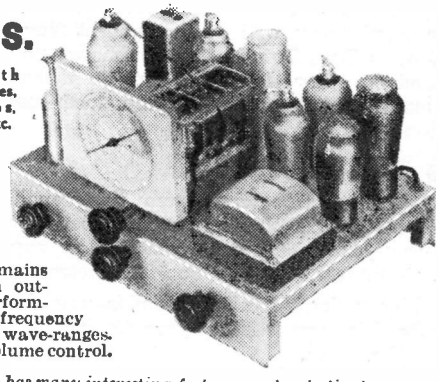

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STOP PRESS

Flashes from Around The Globe

Conducted by Leslie W. Orton

HAVE YOU ever taken a short-wave receiver for a car ride? The other day I took my set to Wales via Portsmouth, Salisbury, Bath and Bristol and found reception better in South Wales than in England.

On the coast road between Cardiff and Porthcawl reception was particularly good, American and European stations providing good signals in the moving car.

The scene changes. At home I am receiving JZJ, Tokio at good loud-speaker strength on 25.42 metres. JZI on 31.46 metres, transmitting the same programme, has been heard at lesser volume quite often. According to the station announcer these two stations operate from 7 p.m. nightly.

Other Japanese stations coming in irregularly are JVP a 50 kw station situated in Nazaki, and JVK, Kemikawa-Cho, an experimental commercial station which 'phones California in the early mornings.

● PK-YDB, Batavia

I expect most of you have received PLE on 15.93 and PMN on 29.24 metres but I wonder how many of you have tuned in PMH on 44.64 metres? I heard a musical programme at, I must admit, indifferent strength, from this station the other day.

And what about PK-YDB, Sourabaya? He is a decent catch, being heard occasionally on 31.11 metres between 9.30 and 2.30 p.m.

South and Central American stations are coming in particularly well at the present time and HIN, Trujillo City, Dominican Republic is one of the best received. Try for him on 48 metres. English announcements and a lady announcer make verification fairly easy.

● TIPG on 30 Metres

Other good catches from this republic include HI-1A and HI-1J. I have heard both these stations recently, the former operating on approximately 48.5 metres, the latter on 51.15 metres.

If you don't receive Colombia nowadays you can take if for granted that your receiver is not delivering the goods.

HJ-1ABB, Barranquilla on 46.52 and HJ-4ABB on 49.15 metres are two of the best heard of these stations at the present time.

I have also heard HJ1ABB; and 2ABC at decent strength on the 30 metre band after midnight.

The other evening I heard a San Juan station, presumably T1PG, operating on approximately 30 metres. This station's usual wavelength is 46.8 metres and I am wondering whether any other listener heard him on the lower band. Station announcements interspersed with strokes from a gong were heard.

Cuban stations are being heard particularly well and during the month I have tuned in CMCX, COCQ, COCE, COCQ and COCH more or less regularly—and at good volume.

● Overseas Reports

Our New South Wales listening post operator reports hearing stations in the Dutch East Indies, Fiji, Japan and India at excellent strength. VK2ME, Sydney, as might be expected, is the most powerful signal. He has been receiving the Empire transmissions on 19 and 25 metres, Rome, Zeesen, Warsaw, etc. more or less regularly. W8XAL, 2XAF and 4XB are included in the American stations heard.

West Indian and Central American stations are providing excellent signals in the central and eastern states of America and, to a lesser extent in the western states. HH3W, Port au Prince; HIN, HI1A, COCQ, COCH, COCD, TIPG and scores of other stations are heard well.

From Africa we hear that the Empire transmissions; Zeesen; Rome; Warsaw; Prague; Budapest; Lisbon; 2XAF; 8XK; 3XAL, etc., are coming in well.

Our operator also reports reception of Australian amateurs on the 20-metre band.

● Alexandra Palace

He also says that the ultra short-wave transmissions from Alexandra Palace have been heard by African listeners of late—decidedly out of the service area!

DX concerts are always, I think, fascinating. Here are details of three.

TI4NRH at Heredia, Costa Rica, has commenced the regular broadcast of DX conccerts dedicated to the Universal Radio DX Club of California. 4NRH operates on 31.02 metres with a power of about 120 watts.

A Curaçao station PJ1J broadcast a concert dedicated to the World Friendship Society of Radio Amateurs on March the 20th. If you picked up this transmission Mr. Arthur Bird of 35, Bellwood Road, Waverley Park, Nunhead, S.E.15 will be pleased to hear from you.

On March 28 from 11 p.m. to midnight, COCD at Havana broadcast a concert commemorating the first anniversary of the British Short Wave League on 48.92 metres.

● Italian Africa

And now for a little short-wave "dope" from Italian Africa.

IAC at Coltanas, Italy, has been heard testing with IUG in Addis Ababa. The latter station has been heard broadcasting musical programmes on 15.45 metres. IUC, also in Addis Ababa is heard more or less regularly upon approximately 25 metres.

Have you heard ITK on 18 metres? This station is located at Asmara, Eritrea and is again on the air after a long absence.

RV15 at Kharbarovsk, Siberia, is not heard very often in this country but latest news from America to the effect that he is now operating on approximately 52 metres may alter all this. He is reported to operate on that wavelength from 10 a.m. to mid-day.

If you are lucky you may hear CED, Antofagasta, Chile between midnight and 12.15 a.m. on weekdays when he re-transmits news bulletins from CEC. CED also operates as a commercial 'phone but is then fairly hard to identify. Search for him on 29.3 metres.

I shall be pleased to hear of any interesting or out-of-the-way reception and cordially invite readers to send me any informative schedules or details that they may have.

● Short-wave Flashes

If you wish to hear China—and I imagine you *do* —here are some stations to search for. XGV, Shanghai has been heard calling San Francisco on approximately 41 metres around 4 p.m. XTV at Hankow is being picked up phoning on 31.7 metres from 7 a.m. and lastly, but not least, XTC, Shanghai is reported as being heard on 33 metres from 7 a.m.

There are plenty of interesting Latin-American stations to search for and the following details may be of help: OAX4J is relaying OAX4I (a medium wave station) on 31.33 metres.

Santiago, Chili, using the call Radio Service, operates daily on 23 metres from 4 to 6 p.m. and from 9 to 1 a.m. Search for him around 11 p.m.

Have you heard the heterodyne on W1XAL, Boston? The culprit is a station worth searching for—OAX5B, Radio Universal de Ica, Peru.

A new radio-telephone station WCU has commenced operation at San Juan, Porto Rico. He has been heard irregularly on 29.5 metres.

Two new Japanese stations are on the air daily from 9 a.m. on the 70-metre band. "Scrambled" speech and normal speech are employed. I hope to have further details shortly.

● Reception

And now for a few more details of reception to end up with.

I have heard W3XES at Baltimore relaying WCAO on the 10-metre band lately. The best time to search for this station is in the afternoon. I have also heard W6XKG on 24-hour schedule and 1XKB Boston.

SM5SX was heard on 20 metres broadcasting a musical programme interspersed with station calling at 8 a.m. the other morning. The official wavelength of this station is 25.63 metres.

I have heard dance programmes originating from VQ7LO, Nairobi on several occasions recently. Try for him around 7 p.m.

W9XF at Chicago has staged a come-back on the 40-metre band. To hear him at his best you should search for him around 5 to 6 a.m. Try for W8XAL, Cincinnati; XUZ, Mexico, also.

I have also heard VK2ME and VK3LR between 6 and 7 a.m. but have had difficulty in picking up VK3ME. Melbourne.

By the way, the Czechoslovakian stations OLR2A (49.92m.); OLR3A (31.58) and OLR4A (25.3 metres) are all coming in well and requesting reception reports.

Now here is a news item just to hand. TI4NRH, Heredia, Costa Rica is broadcasting a DX concert dedicated to the Newark News Radio Club from 7 to 8 a.m. on April 4th, and again on May 2nd at the same times. Wavelength is not given but I imagine it will be on approximately 30 metres.

And so, friends, until next month I leave you—all the best and I'll be pleased to hear of any unusual DX catches.

"ON THE AMATEUR BANDS"—*continued from page* 37.

● Handbooks

On my trip over, I wandered into the radio room of the *"Aquitania,"* and there lying on a table was a copy of the A.R.R.L. handbook. One of the operators was busy shifting the waveband of the S.W. transmitter, and stopped to give vent to his opinions on the evils of neutralising. The rig was not high power, as commercials go, a pair of 212D's in push-pull. Coming back, on the *"Empress of Britain,"* I again found a copy of the handbook in the radio room. Chief operator was busy perusing dope on the Lamb noise silencer. He told me that they logged dozens of hams on their trips.

● Controlled Carrier

Been playing with a version of controlled carrier recently. Idea is that the rig turns itself off when you're not talking and on again when you start, reducing Q.R.M. during duplex work. The control is done with a Westector, but it isn't quite tamed yet. However, more anon.

TEN METRES—CLUB TRANSMITTER G.P.O. DEMONSTRATION ELECTRICITY AND AGRICULTURE

WELLINGBORO' AND DISTRICT

At a recent meeting of Wellingborough and District Radio and Television Society on March 10, at the Midland Hotel, Wellingborough, a lecture was given by the hon. treasurer, Mr. W. Bigley, BSWL122 entitled "Experiments and Experiences on Ten Metres."

For the past few months, said Mr. Bigley, he had been carrying out a series of experiments on ten metres as a result of which he had arrived at certain definite conclusions, which he proposed to explain in detail to the members present. One of the surprising things in connection with ten metre reception was the huge number of American amateur telephony stations that were to be heard at excellent strength during daylight on a simple three-valve receiver. He advised members to take more interest in this band of frequencies, which was rapidly becoming one of the most popular. Mr. Bigley described in detail the circuit that he had found the most suitable for ten metre operation—a three-valve receiver built for headphone use and powered by batteries. Various other receiver circuits that Mr. Bigley had experimented with were shown on the screen and described.

A good aerial was a great help for DX work, he said, and the best types were often quite simple to erect and did not cost a lot of money. Some of the aerials described were highly directional and this was borne out in actual practice by one that would receive South American stations galore but was useless for receiving stations in Africa. Mr. Bigley described an aerial system that he was experimenting with that should prove to have advantages over all the other systems that he had tried in that provision would be made to rotate the aerial so that it could be pointed in the direction that signals were most required.

Questions were asked and answered by Mr. Bigley. The hon. sec., Mr. L. F. PARKER, took the chair in the absence of the president, Mr. A. E. Fletcher, who was ill. A supper and junk sale has been arranged for a date in April as a winding-up night for the present session.

THORNTON HEATH

Short-Wave Radio and Television Society of Thornton Heath was founded in 1923. Previously known as the Thornton Heath Radio Society it was realised. some two years ago, that the short-wave sphere held the bulk of the radio amateurs' interest, hence the change of title, although other branches of radio are not neglected. Special features of the Society are the transmitter, designed and built by the members (call—G8GY) and a bi-monthly bulletin, CARRIER WAVE, which will be sent to any interested readers. Weekly meetings are held throughout the year and during the warmer months field days are arranged. Readers living in the Thornton Heath district are cordially invited to join and the hon. sec., Mr. J. T. WEBBER, 368, Brigstock Road, will be pleased to supply further details.

PORTSMOUTH AND DISTRICT

At a meeting of Portsmouth and District Wireless and Television Society, Mr. Newsome gave a lantern lecture and demonstration on "Electrical Interference." He traced the part played by G.P.O. engineers in eliminating interference by the fixing of suppressor devices. Various types of suppressors were described and an actual demonstration of curing interference by an electric fan and flashing sign was given. The Society caters for all interested in wireless and television, meetings being held every fortnight on Wednesdays, and the alternate Wednesday for practical work. Morse class every Monday. Vice-Chairman: Mr. HAROLD LEIGH (2BBG), 20, King Street, Southsea.

EXETER

At the last meeting of the Exeter and District Wireless Society there was a good attendance of members who thoroughly enjoyed a most interesting lecture given by L. W. Cornish, of the Exeter City Electricity Undertaking, the subject being "Electricity as applied to Agriculture." With the help of over one hundred lantern slides the speaker demonstrated the ways in which electricity could be used by the modern farmer and horticulturist. The heat treatment of the soil for the propagation of seedlings; the drying of grass as storage food for cattle through winter months; plant irradiation; these were all colourfully dealt with in their turn, and at the end of the lecture question time proved not only very helpful but many members took the opportunity of ascertaining the cost of the various systems.

The meetings will be resumed on Monday, April 5th, when a lecture will be given by Mr. Bateman of the G.P.O. Telephones. These meetings are held at No. 3, Dix's Field, Exeter, and those who desire to become members should apply to the hon. secretary, W. J. CHING, of 9, Sivell Place, Heavitree, Exeter.

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S.-W.M. 4/37.

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3,000 BRAND New Wearite 110 k.c. Pre-tune I.F. Transformers, type O.T.1, O.T.2 and O.T.2F; 1/6 each, or offer for quantity.

40 MFD. + 24 mfd. 200 Volts Peak Electrolytic Condensers; 3/-.

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ASSORTED 1-gross Parcels of 1-watt and ½-watt Resistances by N.S.F.; 12/-.

MARCONI Model 25 Pick-ups; 25/-.

CONVERSION Units for Converting D.C. Receivers to A.C. Mains, operation up to 110 watts, improved full-wave type; £2/10.

WESTINGHOUSE Rectifiers, L.T.4 or L.T.5, with mains transformer and variable resistance, 22/6; Varley D.P.4 output transformers, 1-1 and 25-1, 9/-.

MAINS Transformers, 350-0-350v. 60 m.a., 4v. 3 amps., 4v. 25 amps., 12/-; 425-0-425v. 120 m.a., 4v. 1 amp., 4v. 1 amp., 4v. 7 amp., 4v. 25 amp., for "W.W." Quality Amplifier, 26/-; L.T. transformers, with two 4v. 3a. C.T. windings or 2.5v. 8a. 5v. 2.5a. 8/6.

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WE Stock All Parts for "Wireless World" Quality Amplifier, Quality Amplifier Receiver, Imperial Short-wave Six, 1936 Monodial Q.A. Super, All-wave Super Seven, etc.

We can supply correct equivalents for any British type of valve, including side-contact Universals, H.F. pentodes, double diode triodes, 3.5 watt output pentodes, 500v. indirectly heated rectifiers, octodes, double diodes, single diode tetrodes, etc., at an appreciably lower price.

Carriage Paid, cash with order or C.O.D.; send for list.

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BROADCAST STATIONS

The list of short-wave broadcast stations given below will be added to and brought up to date each month. New stations of programme value, alterations in wavelength and frequency to be shown in heavy type, thus making the feature as complete as possible month by month.

Station	*Call*	*Wave*	*Freq.*
PITTSBURG	W8XK	13.93	21.54
DAVENTRY	GSJ	13.93	21.53
WAYNE	W2XE	13.94	21.52
DAVENTRY	GSH	13.97	21.47
BANDOENG	PLE	15.93	18.83
DAVENTRY	GSG	16.86	17.79
BOUNDBROOK	W3XAL	16.87	17.78
ZEESEN	DJE	16.89	17.76
WAYNE	W2XE	16.89	17.76
BUDAPEST	HAS3	19.52	15.37
SCHENECTADY	W2XAD	19.57	15.33
DAVENTRY	GSP	19.60	15.31
BUENOS AIRES	LRU	19.62	15.29
ZEESEN	DJQ	19.63	15.28
WAYNE	W2XE	19.65	15.27
DAVENTRY	GSI	19.66	15.26
RADIO COLONIAL (Paris)	TPA2	19.68	15.24
PODEBRADY	OLR	19.69	15.23
EINDHOVEN	PCJ	19.71	15.22
PITTSBURG	W8XK	19.72	15.21
ZEESEN	DJB	19.74	15.20
DAVENTRY	GSL	19.76	15.18
DAVENTRY	GSF	19.82	15.14
VATICAN CITY	HVJ	19.84	15.12
ZEESEN	DJL	19.85	15.11
WARSAW	SPW	22.00	13.63
REYKJAVIK	TFJ	24.52	12.23
MOSCOW	RNE	25.00	12.00
RADIO COLONIAL (Paris)	TPA3	25.23	11.88
PITTSBURG	W8XK	25.27	11.87
DAVENTRY	GSE	25.29	11.86
WAYNE	W2XE	25.36	11.83
LISBON	CT1AA	25.36	11.83
DAVENTRY	GSN	25.38	11.82
ROME	2RO	25.40	11.81
BOSTON	W1XAL	25.45	11.79
ZEESEN	DJD	25.49	11.77
PODEBRADY	OLR	25.51	11.76
DAVENTRY	GSD	25.53	11.75
WINNIPEG	CJRX	25.60	11.72
RADIO COLONIAL (Paris)	TPA4	25.60	11.72
HAVANA (CUBA) ...	COCX	26.24	11.43
BUENOS AIRES	LSX	28.99	10.35
RUYSSELEDE	ORK	29.04	10.33
MADRID	EAQ	30.43	9.86
HAVANA (CUBA) ...	COCQ	30.75	9.75
LISBON	CT1AA	31.09	9.65
ROME	2RO	31.13	9.63
MOSCOW	RAN	31.25	9.60
BOGOTA	HJ1ABP	31.25	9.60
RADIO NATIONS	HBL	31.27	9.59
PHILADELPHIA	W3XAU	31.28	9.59
SYDNEY	VK2ME	31.28	9.59

Station	*Call*	*Wave*	*Freq.*
EINDHOVEN	PCJ	31.28	9.59
DAVENTRY	GSC	31.32	9.58
LYNDHURST	VK3LR	31.32	9.58
MILLIS	W1XK	31.35	9.57
BOMBAY	VUB	31.36	9.56
ZEESEN	DJA	31.38	9.56
ZEESEN	DJN	31.45	9.54
TOKIO	JZJ	31.47	9.63
JELOY	LKJ1	31.48	9.53
TOKIO	JZI	31.48	9.53
SCHENECTADY	W2XAF	31.48	9.35
MELBOURNE	VK3ME	31.55	9.51
DAVENTRY	GSB	31.55	9.51
BOGOTA	HJ1ABE	31.58	9.50
RIO DE JANEIRO ...	PRF5	31.58	9.50
HAVANA (CUBA) ...	COCH	31.82	9.42
BUDAPEST	HAT4	32.88	9.12
RADIO NATIONS	HBP	38.48	7.78
MOSCOW	RV96	38.89	7.52
TOKIO	JVP	39.95	7.51
SAN DOMINGO	HIT	45.25	6.63
MARACAIBO	YV5RP	47.81	6.27
HAVANA (CUBA) ...	COKG	48.78	6.15
MARACAIBO	YV3RC	48.78	6.15
WINNIPEG	CJRO	48.78	6.15
PITTSBURG	W8XK	48.86	6.14
HAVANA (CUBA) ...	COCD	48.94	6.13
BOGOTA	HJ3ABX	48.96	6.12
MEXICO CITY	XEUZ	49.02	6.12
WAYNE	W2XE	49.02	6.12
DAVENTRY	GSL	49.10	6.11
CHICAGO	W9XF	49.18	6.10
BOUNDBROOK	W3XAL	49.18	6.10
JOHANNESBURG	ZTJ	49.20	6.10
HONG KONG	ZBW2	49.26	6.09
CHICAGO	W9XAA	49.34	6.08
MARACAIBO	YV7RMO	49.42	6.07
PHILADELPHIA	W3XAU	49.50	6.06
CINCINNATI	W8XAL	49.50	6.06
BOGOTA	HJ3ABD	49.59	6.05
DAVENTRY	GSA	49.59	6.05
MIAMI	W4XB	49.67	6.04
BOSTON	W1XAL	49.67	6.04
ZEESEN	DJC	49.83	6.02
BOGOTA	HJ3ABH	49.85	6.01
HAVANA (CUBA) ...	COCO	49.92	6.01
PODEBRADY	OLR	49.92	6.01
GEORGETOWN	VP3MR	49.92	6.01
MONTREAL	CFCX	49.96	6.00
MEXICO CITY	XEBT	50.00	6.00
MOSCOW	RW59	50.00	6.00
VATICAN CITY	HVJ	50.26	5.97
MARACAIBO	YV5RMO	51.28	5.85
CARACAS	YV2RC	51.72	5.80
KHARBAROVSK	RV15	70.20	4.27

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