

MARCONI'S AMAZING LIFE-STORY ( APPEARING EXCLUSIVELY IN THIS JOURNAL )

# Popular & Wireless & TELEVISION TIMES

THOSE "ADDERS"  
By K. D. ROGERS

EVERY  
WEDNESDAY  
PRICE

# 3<sup>D</sup>

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## SECOND LONG INSTALMENT THIS WEEK

of our great "scoop," the authorised life-story of Marconi—ace pioneer of Radio. You see him in the above photo with Mr. Kemp, who assisted him in his historic trans-ocean experiments.

*(Photograph reproduced by courtesy of Marconi's Wireless Telegraph Co., Ltd.)*

# A Duel Between Master-Minds



A Major Event in Detective Writing!  
This Book-length Thriller Features  
two of Fiction's greatest characters  
in stern opposition . . . .

## RAFFLES v SEXTON BLAKE

Raffles, with his inseparable companion, Bunny Manders, rent a house near the Somersetshire estate of the Earl of Welland, who possesses a famous bracelet known as the Fetter of Buddha. The famous gentleman-cracksman intends to acquire that valuable property by his usual carefully planned methods, little realising that Sexton Blake is a guest of the Earl. Raffles learns that a Home Office order has been issued for the exhumation of the body of a local resident who has mysteriously died. Knowing the attention of the police to be concentrated on the re-opening of the grave, Raffles takes the opportunity of making his bid while this is in progress. But he finds himself in a terrible jam, with the famous Baker Street investigator as his opponent.



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Editor: G. V. Dowding

Asst. Editors: A. Johnson-Randall, A. S. Clark

INDIA'S STATIONS  
POLAR RADIO  
U.S.A. RECEPTION

## RADIO NOTES & NEWS

O.K., N.P.L.  
INTERLUDE  
30,000 INTRUDERS

### European Background in India

NEWS of the proposed new stations for India is now coming in almost every mail, and before the end of the year that great country will have achieved the nucleus of a healthy radio service.

You would hardly expect it to be so, but the wavelengths for the new Indian stations have had to be chosen with one ear on Europe's, because in mid-winter the European transmissions are quite strong enough to be heard in India.

The latest proposals for stations are as follows: Trichinopoly, 396 m.; Delhi, 339 m.; Lucknow, 294 m.; Lahore, 276 m.; Dacca, 257 m.; Bombay, 244 m.; Calcutta, 235 m.; Madras, 211 m.; and Peshawar, 200 m.

### Television Tit-Bits

THE R.C.A.'s transmitter on the top of the Empire State Building, New York, has recently gone over to 441-line system, and will be working experimentally all spring and summer. Seventy-five selected receivers have been located round it, to test its performance in the New York television reception area.

\* \* \*

Television pictures of about nine inches by nine at the receiving end are planned for the new Italian service, which will centre on Rome, with supplementary stations at Milan and Turin. High-definition (about 441 lines) will be employed, and it is hoped to have the service going strong shortly.

### Russia Hangs Aerial on North Pole

HAVING kept you fellows well posted on the subject of Soviet enterprise in Polar regions I shall not surprise you greatly by this news of the North Pole wireless station. On May 21st some intrepid Russian scientists established their camp—where they intend to live for a year if the ice doesn't move too fast—only a few miles from the North Pole. They have tents, a portable rubber-covered hut, and a radio transmitter, which had the honour of transmitting "North Pole Calling."

The operator, Mr. or Comrade E. Krenkel, hopes to contact short-wavers all over the world on 20 to 40 metres, as soon as his phone equipment can be carried up on the planes that keep the camp supplied.

I take off my hat to these Soviet boys, for they've surely got what it takes. Good luck to them, and may the polar bear and chilblains pass them by!

### Excelsior!

IT'S a bit late in the day to talk of Coronation records, but there was one with a curious wireless flavour that will interest you; so here's the low-down.

It happened at the Rugby radio station, which you will remember has the highest

### MY WORD

### By THE EDITOR

## CLOSING DOWN

SO Television is to have a holiday. For three weeks the several thousand people who have paid upwards of one hundred pounds, and even over that, for television receivers will have to cover their expensive instruments with dust-sheets.

Well, as our Television Correspondent has said, the B.B.C. television engineers find it necessary to overhaul the gear at Alexandra Palace, and the "over-worked staff" will be able to take their holidays.

But when all has been said the fact remains that as a Service, and it's supposed to be that, you know, B.B.C. television is to fail for a solid three weeks.

Somehow we don't think this would have happened if the B.B.C. weren't a semi-Government monopoly. A "miracle" might be necessary to avoid it. Unsheltered organisations whose very existence depends upon giving Service with a capital "S" appear to make a habit of performing such "miracles."

But the B.B.C. is in the fortunate position of being independent of such arduous necessities. And viewers must therefore await the Corporation's pleasure with as good grace as they can muster.

masts-in the country. Some genius, gazing cloudwards, realised that as the station-was blessed with eight 820-ft. masts it would be a crying sin and shame not to use one of them as a flag-pole.

A Union Jack was soon requisitioned, and a 35-ft. pole was hoisted to the masthead; but when all was ready it was found that the electrical charges round the mast had burned through the rope. Somebody got a ladder and somebody else got some *insu-*

lated rope (whatever that is), and finally the flag was flown, 850 feet above daisy level.

### Broadcasting House a Swell Place

BROADCASTING HOUSE started to swell almost before the B.B.C. moved in, if the various annexes, offices and so forth are to be considered; but now this extension job is to be done properly. The whole row of houses in Portland Place up to the corner of Duchess Street, northwards of Broadcasting House, is to be engulfed by the B.B.C. headquarters building. The houses numbered from 10 to 22, some of which are now being occupied by the B.B.C., will be absorbed within the next twelve months.

Externally the new building will harmonise with, if not duplicate, the present building; but internally it will be like nothing on earth. Above street-level will be all offices, so presumably that forecast I gave you about the studios being underground is O.K.

What *will* our programmes be like if all the programmes come from below the level of the city's cellars?

### Best Time for the Transatlantics

WHEN I was telling you last week about the way in which my Worksop friend "Medium Wave," ropes in the transatlantics, I forgot to say that in his opinion the 1936-7 season has not been as good for long-distance reception as the 1935-6 season; and that, in turn, was not so good as the 1934-5 session. His first transatlantic medium-waver in 1934 was on July 24th, but the following year he bagged one on July 22nd.

He warns aspirants to these tricky honours that for such Summer Time reception you must be prepared to get up early or go to bed late, for 3 a.m., or later, is the only time when there's a hope on medium wavelengths.

### Daylight Long-Distance Reception

ANOTHER bit of tricky reception work in which "Medium Wave" delights to indulge is daylight reception of the Continentals. Since Christiansand joined Trondelag on 476.9 metres, he has

(Please turn to page 336.)

.....  
NEXT WEEK: RADIO AS A CAREER ( SPECIAL ARTICLES )  
BY EXPERTS  
.....



Courtesy Marconi's Wireless Telegraph Co., Ltd.  
The great inventor as he was in 1899 at the age of 25. It was in this year that he increased the range of his wireless apparatus from 18 to 72 miles. It is interesting to note that it was in 1899 that Sir Thomas Lipton took his first "Shamrock" to America.

THE trump cards of a new science had been put into Guglielmo Marconi's hands. He played them with the intuition of a genius. The prize he won was wireless.

It was in the '90's. Science challenged. Destiny dealt the cards. Opposite the unknown Italian, Marconi, at this electric gaming table was the Englishman, Sir William Preece, at his right another distinguished Briton, Sir Oliver Lodge, and at the left Professor Augusto Righi of Italy. All were intent. The game was near the final trick.

All were experts taught by Maxwell and Hertz to know that every coveted scientific honour on earth, fame and fortune lurked in the cards they held. No four men ever played for such a stake. Edison, Lord Kelvin, Popoff, Tesla, Branly, Fessenden, Crookes and Fleming stood by watching every move. They, too, were skilled at this electro-magnetic game. For years these rival men of science had devoted their time to pursuing mysterious clues that in the air was hidden an invisible opportunity—a rich scientific prize.

But they had had their chances. Marconi in his 'teens had studied their errors in the game; he profited by the way they had flipped their cards without success. Fate stacked the cards for him. Lady Luck directed his every move. As if inspired by a vision the invincible Marconi confidently laid down every card with the persistence and foresight of a victor about to be crowned champion. The prize was his. It was engraved "Marconi Wireless."

With scientific cunning Marconi had played the cards that ingeniously assembled the scattered parts of wireless. He offered the world a finished product to be accepted or rejected. It was accepted universally, for it was as universal as the air breathed by every race on the face of the earth.

Marconi assumed nothing. Modestly he presented civilisation with a revolutionary system of quick communication. No

# MARCONI—

## CHAPTER II: SECRETS OF MARCONI'S SUCCESS

How Destiny dealt the cards of wireless—Scientists a youth outwitted—The importance of timeliness—How Loomis pointed to wireless—Edison's remarkable discovery and conception of wireless—An important patent Marconi bought—Faraday had flirted with an "impulsive rush"—Sir Oliver Lodge and Sir William Preece—Tesla's early work with electromagnetic waves—Fate gave Marconi victory over many runners-up—His early engineering associates—Forces that favoured Marconi.

statesman ever waded such power; no dictator ever waved such a wand over the public domain. With invisible threads of electricity he proceeded to establish his empire in the sky to endure as long as the earthly sphere spins on its axis. Although heralded as "the King of Space"—that vast expanse of unfathomed "ether" reaching out to the planets and beyond—he was no hereditary monarch.

Timeliness is one of the sharpest tools with which Destiny carves a man's career. Fame and fortune often are missed by a mere whim—by a twist of Fate. Guglielmo Marconi did not miss. He did the right thing at the right time. He stepped upon the dais of Time when Fate held out the diadems of opportunity to make his name immortal.

Too soon is as ill-fated as too late whether the scene be in scientific research, exploration or in politics. That truth runs through history. There is Leif Ericson, believed to have visited the shores of Greenland between the fifth and ninth centuries. Nevertheless, Columbus is heralded as the discoverer of the New World. Wireless also has its "Vikings," and it would be amiss to leave them out of the story.

Dr. Mahlon Loomis, an American, in 1865, showed how to set up what he called "disturbances in the atmosphere" that would cause electric waves to travel through the air and ground, thereby establishing wireless communication between two distant points. He described and drew pictures of a so-called "aura" around the globe. He named it "the static sea." Later, others found the term, "the ether," more convenient.

Loomis knew what he was talking about. The United States Patent No. 129971 dated July 30th, 1872, proves it. In 1866 he sent signals from Cohocton Mountain, Va., to Beorse Deer Mountain, Va., fourteen miles apart, and later for two miles between ships on Chesapeake Bay. The patent covered "aerial telegraphy, employing an 'aerial' used to radiate or to receive the pulsations caused by producing a disturbance in the electrical equilibrium of the atmosphere."

"The Loomis Aerial Telegraph Bill" requesting an appropriation of \$50,000 was presented to the American Congress on May 21st, 1872. The principle of operation was described as:

... causing electrical vibrations or waves to pass around the world, as upon the surface of some quiet lake one wave circle

follows another from the point of the disturbance to the remotest shores, so that from any other mountain top upon the globe another conductor, which shall pierce this plane and receive the impressed vibration, may be connected to an indicator, which will mark the length and duration of each vibration; and indicate by any agreed system of notation, convertible into human language, the message of the operator at the point of the first disturbance.

What better conception could one have of wireless?

Loomis conducted experiments with "kites covered with fine light gauze of wire or copper, held with a very fine string or tether of the same material, the lower end of which formed a good connection with the ground by laying a coil in a pool of water."

This all happened prior to the birth of Marconi.

And when Marconi was but a year old, Thomas Alva Edison, in November, 1875, while experimenting in his Newark laboratory, observed new manifestations of electricity through mysterious sparks. The true import and practical applicability of these phenomena, however, did not occur to him, despite enthusiastic investigations. Nevertheless, he deduced correct conclusions that the impulses were of an oscillatory nature.

It was while experimenting with a vibrator magnet consisting of a bar of Stubb's steel fastened at one end and made to vibrate by means of a magnet, that Edison noticed sparks coming from the cores of the magnet. He had observed a similar effect while working with other devices but always passed it, believing induction to be the cause. But the action seemed so strong on the vibrator of the magnet that he wondered if he was witnessing some "true unknown force." Curiosity led him to connect the end of the vibrator to a gas-pipe, and when he drew sparks from the pipes in any part of the room he considered it good proof of a new force, the sparks of which were tell-tale clues.

Edison then built what was popularly known as his famous "black box," inside of which two carbon points formed a micrometer gap, across which the mysterious sparks could be seen through a "window." It remained for Hertz, however, a more profound student of mathematics than Edison, to prove the existence of electric waves in space.

\*Washington Chronicle, November 1, 1872.

# —THE MAN AND HIS WIRELESS

A youth with an idea and tremendous confidence in its possibilities. That, in the fewest possible words, describes Marconi as we find him at the beginning of Chapter Two of this greatest of radio dramas.

No other man in the whole history of the world has ever lived to see an idea of his own devising develop to such an astonishing extent as this modest creator of twentieth century communication and entertainment.

Wireless at Sea, Aero-Radio, Transocean Phones linking ninety per cent. of the world's telephone subscribers, Police Radio, Broadcasting and Television! There is not one inhabitant of this globe who has not had his life affected in one way or another by Marconi's tremendous contribution to practical science.

No other contemporary life-story can at the same time constitute such a saga of human advancement. And it is our privilege to publish it as an exclusive presentation in serial form.

Edison, having noticed the tendency of the strange force to diffuse or broadcast itself in all directions through the air, and through various objects, named it "Etherec." The idea was quite widely ridiculed. Nevertheless, he had discovered an unknown phenomenon—that under certain conditions electricity would pass through space and through matter entirely unconnected with the point of origin. He was on the threshold of wireless. Its history might have been different had Edison realised what he had discovered; had he injected more power into the waves and applied a coherer to detect them. But he didn't. Marconi did.

Laboratory notes dated December 3, 1875, captioned "Etherec Force," record how "Charley Edison hung to a gas pipe with feet above the floor and with a knife got a spark from the pipe he was hanging on." The notebooks reveal Edison tried all sorts of stunts with frogs' legs and various instruments in an effort to unravel the mystery of the sparks.

Dr. George M. Beard, noted physicist, devoted considerable study to Edison's "find," and in a discussion of priority claims by others said that "thousands of persons, probably, had seen this spark before it was discovered by Mr. Edison," but they failed to suspect its meaning, and thus missed an important discovery. To which Dr. Beard added, "The honour of a scientific discovery belongs, not to him who first sees a thing, but to him who first sees it with expert eyes; not to him even who drops an original suggestion, but to him who first makes that suggestion fruitful of results."

Marconi did just that.

Dr. Beard pointed out: "If to see with the eyes a phenomenon is to discover the law of which that phenomenon is a part, then every schoolboy who, before the time of Newton, ever saw an apple fall, was a discoverer of the law of gravitation. . . ."

Edison took out only one patent on long-distance telegraphy without wires. It involved the principle of induction, and while not exactly wireless in the sense that Marconi developed it, nevertheless it was a step toward progress. The application was filed May 23, 1885, but the patent, No. 465971, was not issued until December 29, 1891.

"I have discovered," said Edison in the specifications of his patent application, "that if sufficient elevation be obtained

to overcome the curvature of the earth's surface and to reduce to the minimum the earth's absorption; electric telegraphing or signalling between distant points can be carried on by induction without the use of wires connecting such distant points.

" . . . At sea from an elevation of 100 feet I can communicate electrically a great distance, and since this elevation or one sufficiently high can be had by utilising the masts of ships, signals can be sent and received between ships separated a considerable distance, and by repeating the signals from ship to ship communication can be established between points at any distance apart or across the largest seas or even oceans."

Edison further claimed: "Collision of ships in fogs can be prevented by this



★  
**NIKOLA TESLA**

Born in 1857 and educated in Europe, Tesla went to America where he became assistant to Edison and invented numerous electrical appliances.

★

method of signalling, by the use of which also the safety of a ship in approaching a dangerous coast in foggy weather can be assured. In communicating between points on land, poles of great height can be used or captive balloons. At these elevated points, whether on masts of ships, upon poles or balloons, condensing surfaces of metal or other conductors of electricity are located. Each condensing surface is connected with the earth by an electrical conducting wire." He called the receiving instrument an "electromotograph."

Drawings accompanying the Edison patent showed his conception of high-pole aeriels, on either side of a stream, connected to the signalling apparatus, which included a telephone receiver, telegraph key and batteries; his drawings also illustrated how boats might be equipped. Edison is



H.M. The Queen—then Duchess of York—with Sir Oliver Lodge, famous physicist and radio pioneer, at the time of the Lady Margaret Hall Jubilee at Oxford.

said to have referred to his device as "grasshopper" telegraphy.

Convinced by the first transatlantic wireless signal that Marconi was the logical man to wear the wireless crown, and to pursue the research, Edison sold his "radio" patent to the Marconi Wireless Telegraph Company for what was described as "a small amount of cash and quite a little stock."

Standing back of Marconi "four-square," Edison associates recalled the friendship of the two inventors, and said when Edison sold his patent to Marconi in 1903 he did so for "a song." It seems other interests tried to acquire the patent but Edison, because of his faith in Marconi and his belief in the fundamental nature of his experiments, flatly refused. Edison, engaged in other lines of research, side-tracked his investigations of "etheric force." The patent became a bulwark in Marconi's defence in the courts, in fact, early associates of Edison have remarked that this patent on more than one occasion in litigation helped to "save Marconi."

Edison's discovery of "etheric force" stirred scientific comment on both sides of the Atlantic. The later experiments of Hertz caused a spotlight to be put on Edison's early work and many wondered why such an important observation had been so generally overlooked.

At a meeting of the Institution of Electrical Engineers on May 16, 1889, in London, there was a wide discussion on the celebrated Paper of Professor (Sir) Oliver Lodge on "Lightning Conductors," and the chairman, Sir William Thomson (Lord Kelvin), made the following remarks:

"We all know how Faraday made himself a cage six feet in diameter, hung it up in mid-air in the theatre of the Royal Institution, went into it and, as he said, lived in it and made experiments. It was a cage with tin-foil hanging all around it; it was not a complete metallic enclosing shell. Faraday had a powerful machine working in the neighbourhood, giving all varieties of gradual working-up of the dis-

(Continued overleaf.)

## MARCONI—THE MAN AND HIS WIRELESS—Continued

charges by 'impulsive rush'; and whether it was a sudden discharge of ordinary insulated conductors, or of Leyden jars in the neighbourhood outside the cage itself, he saw no effects on his most delicate gold-leaf electroscopes in the interior.

"His attention was not directed to look for Hertz sparks, or probably he might have found them in the interior. Edison seems to have noticed something of the kind in what he called the etheric force. His name 'etheric' may, thirteen years ago, have seemed to many people absurd. But now we are beginning to call these inductive phenomena 'etheric.'"

Britain wondered, and rightly, why Sir William Preece or Sir Oliver Lodge was not crowned sovereign of wireless.

Preece for a long time had been at work upon the problem of telegraphing through the air where wires were not available. When the cable broke between the mainland and the island of Mull in 1896, by laying lines of wire on the two shores he telegraphed by induction over the water and through the air, the distance being four and a half miles. He sent and received 156 messages in Morse code. But Preece conceded in a lecture at Toynbee Hall that the Marconi system was superior. Furthermore, the Preece idea was not applicable on board ships.

Lodge, too, contributed to wireless. He verified the Hertz experiments, and in 1894 demonstrated the Branly coherer as a detector of signals up to 150 yards. His work was confined chiefly to the lecture halls. He took out a patent, however, that showed how undesired waves could be tuned out by adjustments of devices at the transmitter and receiver. (This patent was later acquired by the Marconi Company.)

Marconi's own appreciation of Sir Oliver Lodge and his work in wireless is found in the remarks he once made at Central Hall, Westminster, at a meeting in honour of the noted English scientist:

"Sir Oliver Lodge is, as we all know, one of our greatest physicists and thinkers, but it is particularly in regard to his pioneering in wireless, which should never be forgotten, that we are all here to welcome him to-night. In the very early days, after the experimental confirmation of the correctness of Clerk Maxwell's theory as to the existence of electric waves and their propagation through space, it was given to only very few persons to possess clear insight in regard to what was considered to be one of the most important hidden mysteries of Nature. Sir Oliver Lodge possessed this insight in a far greater degree than perhaps any of his contemporaries."

Sir Oliver explained why he had not pursued wireless in the '90's:

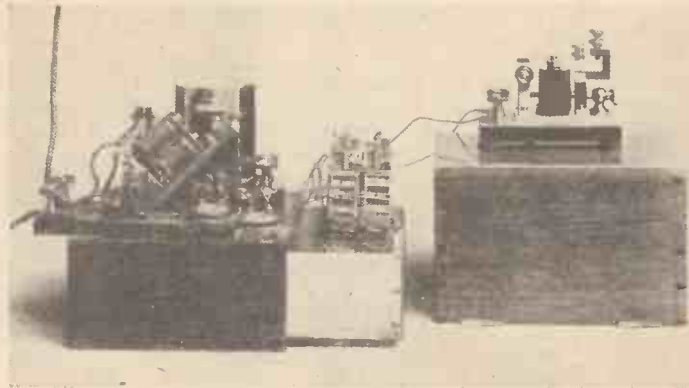
"I was too busy with teaching work to take up telegraphic or any other development, nor had I the foresight to perceive what has turned out to be its extraordinary importance to the Navy, the Merchant Service, and indeed, land and war services too."

<sup>2</sup>Wireless Weekly, September 26, 1923.

Similar stories ran through the story of invention. There is always one, so it seems, whose conception surpasses all others, although to the layman in later years the differences may appear slight. For instance, Professor Samuel Pierpont Langley of the Smithsonian Institution, Washington, D.C., introduced a machine to fly in 1897. But it was not until 1909 that the aeroplane was developed for human locomotion. Wright brothers did the trick. Again the early pioneer did not win the inventive crown.

At the turn of the century it was remarked that it was difficult to invent anything basically new in radio, and still more difficult to invent anything which did not have some bearing on or had not been preceded by an invention of Nikola Tesla. In 1891, at Columbia University, Tesla demonstrated the principle of tuning. He obtained patents on tuned circuits and claimed more than 100 tuning inventions. Nevertheless, it is called Marconi wireless; not Tesla wireless.

### EARLY RECEIVING APPARATUS



Courtesy Marconi's Wireless Telegraph Co., Ltd.  
A Marconi coherer and Morse tapper used in the early days of wireless.

Why was Marconi selected as the one to be immortalised?

He admits there were pioneers who blazed the trail. Yet Marconi became a synonym for wireless. Eventually, the others are likely to vanish in the mist of the past, forgotten or recorded as "a probable historic personage." They may have lacked business acumen or the subtle art of showmanship.

Marconi was treated kindly by Fate and those uncanny forces that sweep men in and out of the arenas of politics and science to crown a few, and brush others aside although they seem to be so near the crown.

Those inventors who are uncrowned lack some almost mystic element. Glory calls for more than invention. Timeliness is a vital ingredient. So is money. So is courage, perseverance and the will to win. Drama is paramount!

Marconi had money. Back of his modest and retiring manner was a flair for the dramatic. To some extent he frowned upon publicity, but its fruits would not be denied, they fell upon him bountifully.

Marconi could get things done and reach a commercial conclusion. There is where many inventors fail. Furthermore, he wisely realised from the beginning that wireless was no one-man job. He surrounded

himself with expert electricians; such specialists as Dr. Erskine Murray, W. W. Bradfield, Dr. W. H. Eccles, Dr. Ambrose Fleming, Andrew Gray, C. E. Rickard and C. S. Franklin of short-wave and beam fame. With an inflexible will, when headed for a goal, Marconi drove everything and everybody associated with him towards it. No one thought of failure.

All were spurred by an intense interest in wireless; a tireless energy and love for long hours of work. Tested by adversity, and disappointments they never lost confidence in the elusive signals. Marconi never gave up. Sceptics could not dent the armour of his faith. Always he plodded ahead under the slogan: "Occorre progredire!"—"We must progress!" He was endowed with a plastic power; he mastered circumstances.

"Marconi's success may be summed up in patience and infinite persistence plus a great deal of natural ability," said one of his early associates. "I have seen him work thirty hours at a stretch. He hates routine business, and while he has a business sense he lacks administrative and organising ability. He is no mixer; out of seven hundred on the Marconi staff probably not more than half a dozen knew him well enough to speak to him. He never cared for sports.

"I knew his brother Alfonso. He had none of Guglielmo's characteristics. He was a pleasant, amiable chap; a good-natured man, but you would never suspect they were brothers physically or mentally. Alfonso, however, was for years a director of all the principal companies of the Marconi organisation. He was distinctly Italian; and so was Guglielmo, who possessed, moreover, a sharp inborn knowledge of the world.

"It was natural that an inventor of Marconi's personality and ability should attract the cream of the engineering crop. He had a fine collection of experts. George S. Kemp, an ex-navy man, was his first assistant and remained with him until his death in 1933. Andrew Gray was Marconi's first chief engineer. R. N. Vyvyan, also on the engineering staff, was a society man with wide acquaintances in government circles. He jollied the officials when documents were delayed. We called him the red-tape breaker."

Marconi himself was credited with "opening new doors in the electric wing of the temple of truth." Dr. Jagadis Chunder Bose, the Hindu Professor of Physics in the Presidency College at Calcutta, and distinguished student of electrical radiation, foresaw "all the special sciences marching abreast along the old Roman road of science which leads no one knows whither." And he espied an obstacle—a great high wall blocking the way in all directions. Upon the wall, as upon the wall in the palace of Babylon, he perceived "a strange and as yet unintelligible inscription—the mysterious word 'ether.'"

<sup>3</sup>McClure's Magazine, March, 1897.

(Please turn to page 334.)

# TELEVISION TOPICS—Collected by A. S. Clark

## "TELEFRAMES"

Items of general interest

### "BETTER THAN REAL"

IT is estimated that on the television sound transmitter more sound frequencies can be sent out than can be heard in the average music hall because of acoustic considerations. Thus the listener is able to hear music to better advantage than those actually present at the performance.

This is always supposing the sound side of the television receiver with its loud-speaker is capable of reproducing the wide range sent out in its true proportions.

### A TELEVISION EFFECT

It is probable that the "coming shortly" adoption of all-colour for films has been accelerated by television. With films all in colour, and television receivers still dealing in black and white, the question of competition is very largely relegated to the background.

Incidentally it is also likely to hold back the coming of regular large-size television shows in cinemas. The difference—while great in any case—would become too much for cinema television to attain great popularity.

But a boomerang effect may easily take place by the presence of all-colour films, egging on the development of all-colour television.

### SEND SOME SETS ABROAD!

It is not uncommon for the sound reception from Alexandra Palace to be getting quite weak on the outskirts of the service area when pick-up of the vision signals is still good and pictures excellent.

This leads to the assumption that it might be possible to get pictures in far-off parts such as New York, Cherbourg, and South Africa, where the Alexandra Palace has been heard.

It will be a scoop for the first manufacturer who sends a set abroad and succeeds in producing pictures in another country. And it's bound to happen sometime.

### "LINOLEUM"

Floor shows have been so successful in television that Reggie Smith has called his next show "Linoleum," getting down to brass tacks with a chorus of charladies armed with pails and mops. The linoleum motif will also be reflected in the dresses which, if not actually made of this durable material, will reveal some striking floor patterns.

The Six Metaxa Girls are taking part in this unique broom-and-brush ballet, and viewers will also see Rhodes and Stevens in their charlady act, already well known to Empire listeners.

### A NEW KIT RECEIVER

Messrs. Peto-Scott Co., Ltd. have just put into production a kit of parts for building a complete television receiver. We hope very shortly to give further details

of this, and also to describe our experiences in seeing the apparatus working.

### TELEVISION RELAY SERVICE

Without a doubt relay services will supply television just as at present they give an ordinary broadcasting service. One leading relay company are stated to have devised a suitable cable for distributing one television programme and three sound programmes at the same time.

### INGENIOUS BUT SIMPLE

Since a cathode-ray tube if broken, due to the high pressure on it because of the vacuum inside, implodes—namely collapses inwards—there is little danger from flying glass. But such a breakage may produce high-voltage shorts, or expose electrodes carrying high voltages.

To guard against dangers from these causes, a G.E.C. patent covers the use of a switch whose contacts are held closed by the glass of the tube. As soon as a breakage occurs, the contacts are opened.



Miss Joan Stevenson at the piano with Miss Lorna Tarbat. They have appeared in television programmes from Alexandra Palace.

## SOME RASTER POINTS

**R**ASTER is the term given to the "grid-iron" of lines formed on the end of a cathode-ray tube by a television type double time-base. When correct for television it is so fine that the individual lines do not stand out clearly unless one is fairly close to the tube. The following are other terms connected with the television raster.

**Frame** describes the complete covering of the picture area with lines, and is said to occur so many times a second. Sometimes the number of frames is the same as the number of—

**Pictures per second.** A picture is said to be completed when all the scanning lines have been carried out. In simple scanning where lines are produced in consecutive order, the number of frames and pictures is bound to be the same. But in—

**Interlaced Scanning** in which first all the odd and then all the even numbered lines are scanned, there will be double the number of frames as there are pictures per second. This is the type of scanning used in the Marconi-E.M.I. system employed at the Alexandra Palace. Interlaced scanning sometimes goes by the description of inter-leaved scanning, or even intermeshed.

**Fly-back Line** is the bright line cutting across the straight lines of a raster, and marks the path of the spot as it travels back from the end of one complete frame

to commence another. The spot also, of course, has to fly-back from the end of one line to the beginning of the next, but in this case it is travelling so fast that practically no light is produced on the screen and consequently these fly-back lines are normally not visible.

**Black-out** describes the way in which the bright fly-back line is removed and prevented from appearing across a picture. During the time allowed for the fly-back, the transmission is so arranged that the spot will be cut off, or, in other words, made equal to a black part of the picture.

### Effects of A.C. Ripple

**Hum Distortion** is noticed on a raster in two ways according to the particular components through which A.C. ripple from the mains is being applied to the tube. If it is getting on to the grid and causing a modulation of the electron stream, two wide, darkish lines will appear horizontally across the picture.

But if the A.C. is getting on to the deflectors it will cause a wavy effect at the sides of the picture, more or less in the form of a sine-wave. In bad cases both forms of hum distortion can be present at one and the same time.

## ARE YOU THINKING OF TAKING UP Radio as a Career?

If so, you should make a special point of getting next week's "P.W." in which you will find articles by experts on this very subject.

THE DIAL REVOLVES

BY LESLIE W. ORTON

# BROADCASTING STATIONS AT THE NORTH POLE?

10-METRE NEWS :: ON THE AMATEUR BAND :: TRANS-ATLANTIC RECEPTION

**H**ISTORY will be made if the sensational prediction of Harry Richman that "there will be radio broadcasting stations at the North Pole in a few years time" becomes reality. Mr. Richman plans to fly non-stop from London to Australia via the top of the world. His plane will be equipped with the latest receiving and transmitting apparatus, and so there is a chance of DX-ers hearing him.

By the way, did you know that a North Pole station exists? Using the call Radio Upol, it is situated in a Russian polar camp. I understand that there is no truth in the statement that the North Pole is being utilised as an aerial mast!

## Pennies From Heaven

I don't know why it is, but I've been literally snowed under with 10-metre dope of late, and being a kind-hearted fellow (*sic*) I'm only too thankful to pass some of it on to you fellows.

To set the ball rolling, here are details of a station that I haven't heard of before, W1XEQ at New Bedford, Mass. This broadcaster operates from 8 p.m. to 2 a.m. daily on the overworked wavelength of 9.494 metres.

With a touch of humour an American correspondent sends me details of some American police stations along with a copy of Bing Crosby's song hit "Pennies From Heaven"! Certainly the 10-metre band does seem to rain "coppers" at times!

Looking over his list I find some worthwhile catches. To start with, a real teaser W6XKW at Alameda, California. Other stations in his list are W9XFH, Evansville, Indiana; W4XU, Raleigh, N.C.; W8XC Y, Royal Oak (sounds more like a "pub" than a town!), Michigan; W4XAC, Salisbury, N.C., and W2XEM, Newark—a regularly heard station.

To end his list my correspondent gives a challenge. Giving details of W7XB I, mobile station of the Spokane, Washington, police, he says: "Get him if you can!" I can't, but maybe some of you hardened DX-ers will be more fortunate—don't forget our reputation is at stake!

## Ghosts?

Since the reported closing down of ZHI, Singapore, reports of reception have continued to flow in—curious, isn't it? VUB, Bombay, is similarly afflicted. As I write I have before me reports of reception of this station (supposed to have closed down) from no fewer than three reliable sources. What can it mean? Are the ghosts of past stations taking a stroll? Or have the station managers taken pity on us DX-ers and decided to remain open a little longer? Can any reader help unravel this sinister business?

## Amateur Radio

That never-ending source of entertainment the 20-metre amateur band continues

to be packed full of thrills. Like homing pigeons W's have flocked to my aerial, and for the sake of variety I have been compelled to tune to the higher end of the band where CO2JJ, CE3DW, HK1JD, LU7ET, and many other knights of the ether, have given me more entertainment than a variety show!

One particularly cheerful fellow is CO7CX in Central Florida, Cuba, whom I have heard testing with other stations on several occasions. This fellow has the gift of the gab, and he uses it most effectively!

Among the most powerfully received W's have been W3MD, W1HAT, W2GAK, W2BA, W3EO, W4AH, W6BAY, and W9HG. During the week I received from all districts, and I should imagine that any DX-er could have accomplished that last week—conditions were marvellous!

## The Cat Thanks W3XL!

Reception of short-wave broadcasters has once again been excellent, and I've quite an imposing list of stations to my credit—reminds me of the London telephone directory!

An old friend, W3XL, at Bound Brook gave me a pleasant surprise the other morning when I tuned him in at breakfast-time. Forsaking my breakfast for the dials I thoroughly enjoyed myself as, unfortunately, did one of my cats who found my bacon unguarded! W3XL tests



Some Mexican stations to search for.

irregularly on 46.73 metres, and is generally a very powerful signal.

Another welcome friend was W2XBJ, at Rocky Point, whom I heard testing on 31.7 metres.

Of the more familiar stations W2XAD and W2XAF at Schenectady have been the "stars," although W3XAL, Bound Brook, on 16.87 metres has run them close.

The 49-metre band is in something of a muddle, and a certain amount of skill is required to get the best out of it at the present time. Among the stations which I have heard at decent strength have been W3XAL, Bound Brook; W8XK, Pittsburg; W1XAL, Boston; YV5RF, Caracas; COCO, Havana, and HIX, Trujillo City—not bad considering that summer has arrived.

## Realistic Reception

You would have laughed if you had seen me the other night! In this hot and bothered world—and gee, isn't it hot?—I've found solace in my radio. The other night I tuned in COCD, Havana, and with sweat pouring down my face I felt as though I were actually in Cuba. A thunderstorm that suddenly broke overhead added to the illusion most effectively. "Gosh, another revolution!" I exclaimed to myself as I hurriedly switched off for the night.

## S.W. STATION IDENTIFICATION

By F. A. BEANE

# THROUGH CENTRAL AMERICA

**C**ONTINUING our tour of investigation we travel into Panama, where, according to HP5B "the land was divided so that the world could be united." The Canal Zone, under the jurisdiction of the U.S.A., though not possessing a broadcaster, is familiar to listeners through the medium of the amateur NY2AE of the Coco Solo Submarine Base.

Panama, where "palm trees blow and two oceans flow," is well represented by several stations, of which, perhaps, HP5B is the best known. This station, or "Estacion Miramar," operates on 49.75 metres, and is situated in Panama City. Announcements are frequently given in English, and the programmes interspersed with advertisements, while the time is given "by the Westinghouse clock."

The chief characteristics of other HP stations are as follows:

**HP5J** (31.23 m.) Panama City, announces and advertises in English frequently; slogan, "La Vos de Panama." The march "The Black Horse Troop" marks the beginning and close of their daily 00.30-01.20 news bulletin in English.

**HP5A** (49.75 m.) Panama City, announces in English at times and relays HP5C. Slogan "La Vos de Ismo."

**HP5F** (49.38 m.) Colon, announces in English occasionally. Slogan "La Voz de Colon."

**HP5K** (49.96 m.) Colon, announces as "La Voz de la Victor" and relays HP5O.

## Lima's Verification Cards

It is quite possible that additional Panama stations are now broadcasting, but so far I have failed to hear them. An HP5L is said to be operating on 25.53 m., and a HP5I in the same band, and although HP5A is officially said to operate on 49 m., it has been reported on 49.75 m. Incidentally, "fellow travellers" may be interested to learn that HIN has recently been heard on 24.2 m., and that CAX4J (32.12 m.) of Lima, Peru, sends a particularly fine verification card of folder type.

Next week we will proceed to the neighbouring Republic of Costa Rica where much of interest is to be found.



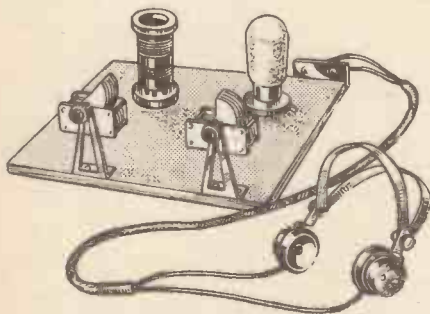
# ON THE SHORT WAVES



THE £.S.D. OF SHORT-WAVE RECEPTION  
By W. L. S.

IT doesn't seem so long ago that the short-wave receiver was regarded as a gadgety affair that involved a lot of trouble and the spending of a lot of money. A typical short-wave receiver was a broadcast receiver *plus* a lot of fairly expensive extra components.

Some of my new readers can't have had any experience of those trying times, and they possibly don't realise how well off they are to-day. But they are intensely interested in the financial side of short waves, and I



(a) The simplest form of short-waver, which can be made up entirely of spare parts on hand.

have had a crop of letters asking how much it will cost to make such-and-such a set, or to buy a good short-waver.

Well, half the strange fascination of short waves is that you can get thrilling results from the very simplest apparatus imaginable. A single-valver which would be a decidedly boring affair to handle on the ordinary broadcast waves will pull in the world on the short waves. And beggars can't be choosers, so many of my readers have to start off with the very cheapest and simplest set they can devise.

### Absolute Simplicity

Look at the sketch labelled "a"—just about the plainest of all single-valvers shown in symbolic form. Here's its balance-sheet—assuming that you already have had one or two shots at home construction, and have a few spare parts around you:

Two valve holders (in hand) ..	0 0 0
Two variable condensers (cut down from old ones in hand, as per recent article on subject) ..	0 0 0
Some ebonite formers (shaving soap tubes) ..	0 0 0
Wooden baseboard (in hand) ..	0 0 0
Grid leak and condenser (in hand) ..	0 0 0
H.F. choke, home-wound on test-tube or discarded ebonite tube ..	0 0 0

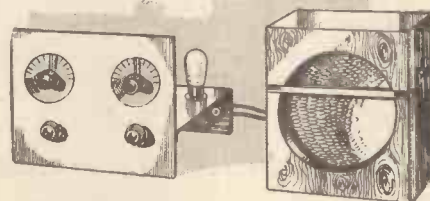
Terminal strip (odds and ends)	0 0 0
Batteries (in hand) ..	0 0 0
Valve (in hand) ..	0 0 0
Headphones (on hand) ..	0 0 0
<b>Total ..</b>	<b>£0 0 0</b>

Wonderful! Almost like Maskelyne and Devant. But there's no deception, unless you think I'm cheating when I assume that you have had some shots at home construction before, and therefore have cdds and ends left over.

But if you had never taken any practical interest in radio, I can't imagine that you would set about building a short-waver, anyway. And if you start from nothing, the only serious outlay is for the headphones and the batteries, which you would need, anyhow, for whatever kind of set you thought of as a start.

The set itself I would undertake to build for less than 5s. any day.

Now, suppose you have grown up a bit and are now a nice, quiet, respectable



(b) A neat two- or three-valver can be built quite inexpensively, especially if the coils are home-wound. Such a set will work a loudspeaker.

short-wave listener who never pesters well-known stations with demands for wallpaper, and wants to get a set which will "reach out" a little more. What do you aim at? See sketch "b"—again very symbolic and all that.

Nice little two- or three-valver on a chassis, coupled to smart little moving-coil speaker. Two good slow-motion dials for tuning, otherwise the "innards" of the set very plain and cheap. Coils—either a commercial set thereof, or a home-made set wound on shaving soap tubes or old valve bases.

Cost? Nothing prohibitive, I can assure you. I should say £2 for a two-valver and £3 for a three-valver, if you use the *very best components*. If the whole thing is home-brewed, it won't work out at anything like that; £1 will probably cover the set without the speaker.

One of the beauties of home construction, you see, is that you can start off with the kitchen table and a pair of pliers, and make a set from odd bits of wood and metal.

You get results. Very well—you want better results. Well, you can improve that set by substituting really good components for your crude home-built ones.

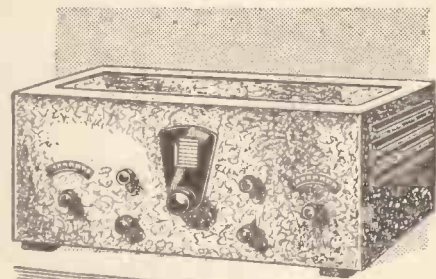
You can scrap your ancient double-spaced condenser and substitute a nice slow-motion short-wave condenser for it. You can turn out your home-wound coils and plug proper commercial ones into the same sockets. You can remove your unsightly brackets and erect a nice front panel with, possibly, a couple of slow-motion dials on it. But you never need be without a set that works.

### Single-Signal Supers

Up to now I have rather been considering those of you who don't want to spend money on short wavers. Perhaps I may be allowed a little space for those who *can*.

Sketch "c" is a rough representation of one of those nice single-signal superhets that makes the owner grow two inches taller and sing in his bath. Every modern convenience is there—including H. and C. (otherwise known as a variable selectivity control). Cost—shhh!—about £28 at least. The Hammarlund Comet Pro, one of the well-known ones, sells at about this figure.

You can go up to something in the sixties for a set like the National HRO. On the other hand, a British single-signal set, the Evrizon, sells for £20, but that does not include a power pack.



(c) Of course, if you want a de-luxe single-signal super you must be prepared to spend quite a lot of money—£28 or even more.

These Rolls-Royces of the short-wave world are intended, of course, chiefly for use by amateur transmitters, who take their work very seriously and insist on having a receiver that will bring in the other man through the most diverse of conditions. I am almost inclined to think that they are too good for the ordinary short-wave receiving enthusiast. After all, you get a thrill out of hearing America on a home-made one-valver.

ON THE SHORT WAVES—Page 2.

## POINTS from the POST-BAG

### W.L.S. Replies to Correspondents

S. A. K. (Dorking), who has been absent from these Notes for some little time, tells me that he has been so busy playing with short-wave receivers that he just hasn't had time to write. A pretty good reason, too. He now has a rig that is rather like the "Simplex" Three; and he approves of keeping the two controls separate and not trying to gang them. He thinks it ensures better reception of "the weak 'uns."

S. A. K. backs me up with my remarks on the QSL business and says that he knows some fellows who send reports, not to the weak and struggling hams, but to stations a few miles away who rock the speaker. And don't they moan when they don't get a reply!

#### Like a Siren

What's happening round about 31 metres? S. A. K. says he hears a sort of wailing noise, like a siren, that rises and falls regularly. He suggests that it may be the German authorities trying to jam out the "pirate" station that broadcasts anti-German propaganda round about that wavelength.

A useful hint here, from A. D. (Newcastle), which is worth passing on: "Re your attempts to throw a rope over the roof. Where there is an attic window of the dormer type the job of slinging an aerial over the ridge of the roof can be done by crumpling a sheet of paper into a ball and winding 30 to 40 feet of twine on it. Then fit a pointed steel wire at the end of a fishing-rod, impale the ball of string on it, attaching the free end of the string to the fishing-rod.

"The rod and ball can then be swung out of the attic window so that the ball is just over the ridge of the roof; jerk the rod towards you and the ball will be released and roll down the slope of the roof and so into the yard or garden below. The large size of the paper ball should prevent it from lodging in the gutter. The string can now be used to haul up the aerial and its insulators."

Pretty useful, that, and it should suggest an idea or so to readers who are not the fortunate possessors of fishing-rods.

#### From "Down Under"

A nice letter from C. G. McC. (Dunedin, New Zealand) contains some interesting points from "Down Under." He says that the electron-coupled or "cathode reaction" circuit is extensively used, in straight receivers as well as in superhets. An unusual point is that reaction is often controlled, not by varying the screen or plate voltage, but by connecting a volume control across the cathode coil.

Superhets out there often use regeneration on the second detector for beat reception of C.W. American superhets favour the plan of using a separate oscillator at the intermediate frequency.

C. G. McC. uses an adaptor modelled on the one I designed for the Radio Exhibition number last year, and he has fed it into a

variety of circuits and different broadcast receivers.

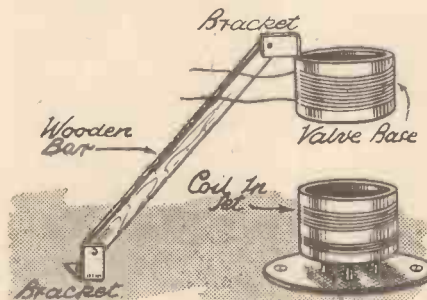
G. B. (Birmingham) wants to add band-spreading to the "Simplex" Three, and asks what size of condenser I recommend for the purpose. I think the usual .000015 is best for all-round use. He also suggests that it might be nice to use an air-dielectric condenser of about .0001 as grid condenser. Good scheme, but it probably won't make any noticeable improvement.

Finally, he sends in the proposed circuit of an extra stage of L.F. that he wants to add. It seems O.K., and I suggest that he tries it and lets me know what results are like, for the benefit of other readers.

#### Incorrect Wiring?

W. S. (Reading) seems to be in trouble with a single-valve short-waver, but his circuit diagram is perfectly O.K. and I can't suggest a fault from that. He gets no reaction—and that looks like incorrect wiring of the coil base. Has he struck that well-known snag of looking at them upside

### A READER'S HINT



A reader's hint for arranging variable aerial coupling with valve-base coils. The aerial coil is wound on a valve base from which the pins have been removed, and a pair of brackets and a wooden rod are arranged so that the coil may be mounted in any position.

down, I wonder? And with that gentle hint I must leave him to look round and give me more details.

F. R. (Hornsey) wants full particulars and layout of a two-stage H.F. amplifier. He wants to use it in front of an "Empire Super" which is giving good service at Salisbury (Southern Rhodesia). Since other readers have asked for the same thing, I have arranged for a full constructional article to appear as soon as possible.

#### Bad Reception Conditions

There has been a real epidemic of "moans" about receivers that have been refusing to bring in American amateurs on 20 metres lately. Personally, I think it's all due to the spell of abnormally bad conditions through which we have been passing. There must be many thousands of short-wave listeners who have never experienced really bad conditions before, having been brought up, so to speak, in the lap of luxury. A few years ago the present spell would have passed almost unnoticed; nowadays it pulls us up with a bit of a jerk.

A week or so ago I referred to a card sent to A. A. (Selkirk) from W2 IXY. Since then A. A. has pointed out in a letter that he didn't give me permission to quote what was really a private affair. I thought my little quotation quite harmless, but I hasten to make my humble apologies herewith.

## THE HUMOROUS SIDE

THOSE who can't occasionally forget their troubles and see the funny side of things—even in short-wave reception—must be missing a lot. Just recently I have come across innumerable specimens of choice humour (some of them unconscious, it must be admitted!) on the part of amateurs and broadcasters alike.

But the matter came to a head when I received, the other morning, a card worded as follows:

"Hello, Radio G—; Your illustrious sigs staggered into my dust absorber at 1.30 p.m., Mar. 13th, '37. Your mighty QSA5R7 wallop warped the diaphragms under the spell of your conquering T9 tone. My assortment of relics commonly known as W9—, as a transmitter resembles WIZ except in appearance and power.

"This lead-pencil destroyer answers to the stupendous moniker of crystal control, but will not bite if good pencils are used. The transmitter is warmed by 1,200 jolts supplied by wreck-'em bulbs. DX accumulated with the aid of a V-beam ether adornment. QSO'S are sponsored by the chief bar-tender.

"Awake, awake for pity's sake, and listen while I tell—with might and main, I try in vain to find your QSL."

I haven't given the W9's call sign in full, in case you all imagined that you had heard him and wrote off for one of these curious cards!

#### "The Old Stairway Climber"

Remember EAQ in the old days? The American announcer used to call himself "The Old Spanish Caballero." But one day, during the elevator strike, he arrived in the studio a few minutes late, terribly out of breath. He apologised for the delay occasioned by climbing twelve flights of stairs, and announced himself as "The Old Stairway Climber."

And then there was the "ham" who tried to drive a generator by weights and a block-and-tackle arrangement hung out of the window. Whenever his transmission came to an abrupt end we knew that the weights had "touched bottom." He invariably managed to gasp "By the deep—nine!" before dashing down the stairs to wind the thing up again.

And I heard a pair of stations on duplex the other day. One of them was said to be relaying from the local zoo. That zoo must have been pretty fortunate, for the broadcasters I heard were Donald Duck, Pluto, the Goof, Clara Cluck and the rest of that crazy gang!

Once upon a time a certain London "ham" came out with an I.C.W. note of the most amazing quality. Nothing like it had ever been heard before. I tried in vain to get out of him what he was using; but all he would tell me was that he had a bluebottle in a test-tube, and sent his Morse by "keying" the cottonwool plug in the end of same, holding it up in front of the mike.

Perhaps it doesn't look funny on paper, but if you hear anything humorous on the air you might pass it on for cheering up other readers now and then. W. L. S.

FROM OUR READERS

# VERIFICATION COLLECTION IN AUSTRALIA

The Editor, POPULAR WIRELESS.

Dear Sir,—I do not know whether you receive many letters from overseas readers—especially from those in Australia. I have not yet seen any in your admirable magazine, and since first becoming a regular reader I have been intending to write you a line, and the recent correspondence over verifications and their negative or positive values somewhat bestirred me to get down to the job!

It may interest readers in the Old Country to read of the experience of one "Down Under" here in Western Australia. Some of your readers seem to have been unfortunate with the results of their reports; but I think I can truthfully affirm that if a report is really of some use to a station, and is good DX from their point of view, then they will gratefully acknowledge it, even though one may not receive the QSL until some months have passed. Quite recently I received a card from Iceland acknowledging a report sent eighteen months before, but that is often to be expected with the huge mail these stations receive and the consequent sorting out of the useful from the useless reports. There are many reports sent to stations that are of no help whatever.

On reports that I forward I put my own name and address PLAINLY, the station's name, its call and frequency, the date received, and the time in local and G.M.T. Then come specifications of my antennae, i.e. 1/4w. Marconi 30m., and then I give particulars of my receivers. I then give a report of sigs. using the R, QSA, and T code. Particulars of fading, interference and atmospherics are fully given, and where possible full details of weather are given, including temperature, wind, etc. After that, I give programme details for verification.

Another detail which I find to be very helpful to the station is the lat. and long. of one's town and type of country. A report such as this will nearly always bring an appreciative reply. One can't expect replies from all stations, as they must receive thousands, and even the best of organizations sometimes mislay or forget letters. It must be granted that there are some from whom it is difficult to obtain a veri., and that makes it all the more valuable. It may interest readers to have a list of my veris. received over a period of twelve months' listening. I have mislaid my list of reports mado, so I can only give you my reports received. A point about these that bears out my statement that when a report is good DX and is of some value to a station, is the success I have had with South American stations here. These are very difficult to pick up here in W. Australia and don't often get through, and when they do they entail long, patient listening to identify. We only get them in the early hours of the morning and with a very high noise level.

The following is my list (I am, of course, omitting all Australian stations):

Europe 36; N. America 13; S. America 19; Asia 15; Africa 3; Oceania 4.

These figures may not impress, but I did not report unless I considered it good DX or unless the station is asking for reports. I always pay more attention to amateurs.

Two of my most prized veris. are those from Iceland and Abyssinia, the former representing the best DX one can get from here.

I wonder if anyone can tell me if the B E R U is open to S.W. listeners and if so how one joins up with it?

Wishing you all luck with your very excellent magazine.

JOSEPH L. BULL (Head Teacher).  
Member of: W.R.R.L.; S.W. League (N.Y.); I.B.C.; All-World All-Wave DX Club. Official receiving station A W 146 DX.  
State School, Beria, W.A.

"PLEASE QSL"

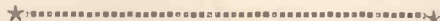
The Editor "Popular Wireless."  
Dear Sir,—I read with much interest the article by W. L. S. under the heading "PLEASE

Everyone will be interested in the experiences described by one of our overseas readers

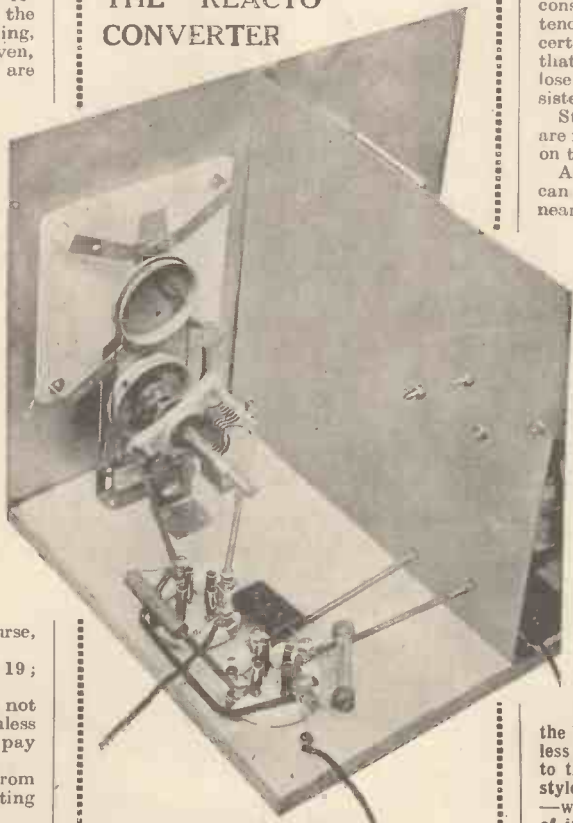


QSL." I quite agree that short-wave reporting can, and is, being overdone. He mentions the listener's report on a QSL card. I should like to give my method of reporting. I fail to see how such information as is needed for a comprehensive report can be contained in so small a space as a QSL card offers. I am of the opinion that the transmitter does not value a listener's QSL—as he gets so many by direct contact. I always report by letter.

A short introduction as to why I am reporting, then a separate report, containing everything that may prove useful, not forgetting to give an extract of something that has been said. This last, I think, definitely establishes that you were listening to the complete transmission. In conclusion let me say that I do not possess a "heap" of QSL cards. But those I have all contain a note of thanks for the "useful information" I



## THE "REACTO" CONVERTER



A view of the oscillator section of the short-wave converter described in last week's "P.W."



have sent them. I have never yet sent a reply coupon.

F. C. SMITH.  
86, Graving Dock Street, Barry Dock.

WOULD LIKE "P.W." ALTERED

The Editor, POPULAR WIRELESS.  
Dear Sir,—I have a grouse. On reading the issue of POPULAR WIRELESS dated May 8th I find articles dotted about all over the paper.

For instance, on page 195 there is a television article. Stuck in the bottom a bit by F. C. on All About Electricity. More television on page 207 and on page 213 still more television. In between "From Our Readers" and Questions and Answers comes a review of a commercial receiver:

Now, say we rearrange the book in some definite manner, thus: Broadcasting Inside and Out," "Short Waves," "Technical and Practical Matters," regular staff contributors ("Aric...") Dr. J. H. T. Roberts, Victor King, etc.), and "Readers' Pages." Keep these articles in their right order each week. What would your readers think of the suggestion? After all, it is, I believe, by a general universal suggestion by readers that we get what we want, and you have repeatedly asked for suggestions from us.

So if your readers will gather together and say what they think—well, we shall all help.

I should like to know the possibilities (by your readers or by the staff) of receiving short waves on a crystal set. Last week I tried my hand at it without success. Any suggestions will be helpful, but please don't neglect Mr. Chester for humble me.

F. WARD

2, Brookdown Terrace,  
Saltash, Cornwall.

Ed. NOTE.—Variety is the spice of life, you know, F. W. Perhaps many readers would consider too rigid a plan of make-up for "P.W." tended towards monotony. We do carry out a certain amount of grouping, but we believe that, carried to extremes, your "P.W." would lose something of the freshness that we so consistently endeavour to preserve.

Still, it's a point of view, and maybe there are more than we think to support it. Postcards on the subject will be gratefully received.

As for S.W. reception on a crystal set, this can only be expected from an extremely nearby station. Interesting comments on the reception of the Alexandra Palace on a crystal set were given in a letter in "P.W." for April 24th.

SUGGESTION AND COMMENT

The Editor "Popular Wireless."

Dear Sir,—I was very interested in Mr. Lowe's letter and quite agree it would be very useful, but I would like to go a step further. Why not when giving circuits also give instructions for making the various components such as coils, chokes, etc.? This in many cases would save money and, I think, prove interesting to many of us. I remember in the old days you used to give instructions for making such things as variable condensers—this was a long time ago, I think.

Although I have taken in "Popular Wireless" since it started, for some years I did not read it seriously, but started to take up the hobby again about twelve months ago, and now I find it rather difficult to follow sometimes.

I should like to see a series of articles on instruction in wireless, starting right from the beginning, so that anyone just beginning wireless can start to learn and work right through to the modern practice, say something after the style of "A Course of Wireless"—my heading—what one would expect to receive at a course of instruction at a class. It need not be a long article each week and would, I think, prove useful and interesting to many readers. Is this possible?

H. W. WHITE.

"Overdale," Morris Road, South Nutfield Surrey.

[We doubt if there are many readers prepared to spend the time making components for modern sets, as these have to be constructed to such fine limits—electrically and mechanically—and call for considerable skill. Also the saving entailed is not likely to be much if the cost of materials

(Continued overleaf.)

## FROM OUR READERS—Continued

and special tools is remembered. However, we would welcome other readers' comments on this matter.

With reference to the beginners' series, we have a novel idea in this connection under consideration.—Ed.]

### A READER'S OPINION

The Editor, POPULAR WIRELESS.

Dear Sir,—Allow me to give some comment on your article "Safety at Sea," which appeared in POPULAR WIRELESS of May 22nd. There is nothing new in the device called "Automatic Radio Alarm" (A.R.A.), as it presents a British invention from shortly after the war, and which was forcibly introduced into European ship-board radio service on January 1st, 1934, and has gained the professional radio operators' hatred ever since. Listening, thinking and acting are not the only features of this human-like device, which performs miracles under the testers' hands—nay, it is also subject to "sea-sickness." Tests on shore however—they may last sixty days or sixty years—conducted by these or those engineers, always give optimistic results. Accidentally, none of the interested authorities ever went to sea with their beloved protégé, in order to experience how the Lady behaves; moreover, they are deaf to the huge mountain of complaints.

Let me say never did any A.R.A. registrate any distress call—never did it protect any life, in the three years and over of its existence. And there have been hundreds of calls for rescue during that time! One notorious case is, among many others, the capsizing of the Dutch East Indian steamer Van der Wyck, on the Java coast, on one October night of last year, resulting in tens of victims. After the operator of this steamer had radioed the now classic words: "SOS—heavy list," nothing was heard of the vessel again. The only man who picked up

this distress call nearly immediately gave the alarm signal: twelve dashes of three to five seconds' duration. And though there were about five or six

vessels equipped with an A.R.A. in this range (30 to 100 miles), none of these sea-sick Ladies gave any notice. They all were examined profoundly after, with the result that half of them remained still sick ashore, and some others had recovered in time. (The operator of the coast station "Sourabaya radio.")

And yet they are tested at least four times every day. But the test is carried out with a buzzer, not more than two feet away from the receiver unit of the device. So the results are more or less optimistic. Dashes of 4 seconds' duration not only originate from an alarm source, but also from statics and dense radio traffic. It is not seldom heard that Miss A.R.A. makes false alarm, ten, twenty, thirty times a

day, waking up the operator or tearing him off his dinner. And, as said before, never warned for a real alarm, to magnify the "Safety at Sea."

Now, what is new in your mentioned article? If not the "new radio device," it's the fact that American authorities have now fallen in love with Miss A.R.A.—just as

European authorities did nearly four years ago. But insiders know that it represents a financial ally, not a "liaison-d'amour." What then, is the case? The "Madrid Convention" of December 9th, 1932 (the Convention of Safety of Life at Sea), commands the establishment of continuous radio watch on cargo vessels of 5,500 gross tons and over, leaving it to the signatory nations to partly mechanise this continuous watch with the assistance of an "Automatic Radio Alarm." Again, this device was approved by the Convention after the same inadequate test ashore, as mentioned in your article. That this device was not recognised by the U.S. officials was a meagre satisfaction to the insiders, but gave them at least some hope.

A. DE KRAAUW.

Wireless operator, Dutch m/v  
Miralda, Preston.  
Piet Paaltjes Straat 26, The  
Hague, Holland.

[ED. NOTE: It will be appreciated by all our readers that POPULAR WIRELESS does not necessarily associate itself with the points of view and criticisms expressed in the above interesting letter. Indeed we give it as our opinion that the practical value of the "automatic radio alarm" does not deserve to and cannot be discounted as our correspondent suggests. Nevertheless, his remarks constitute an interesting theme for discussion.]

### AN S.T.800 "CORNER"

The Editor, "Popular Wireless."

Dear Sir,—May I suggest that you reserve a "Corner" in your popular weekly for S.T.800 enthusiasts to comment upon their varied reception on this particular set.

GEORGE J. PULLER.

"Deva," Arnside Rd., Southport.  
[Will others interested in this please let us know.—Ed.]

### LUXEMBOURG EFFECT

The Editor, POPULAR WIRELESS.

Dear Sir,—The amount of recent correspondence re the interference with the Luxembourg programme has not apparently cleared up this matter, and some doubt still seems to exist as to the origin of the interference.

As pointed out by Mr. Rogers, the Russian transmitter Leningrad (100 kw.) has for some time been transmitting on the same channel as Luxembourg (232 kc.), and it is obvious that jamming is bound to occur, especially after dusk when both stations are usually working.

The interference in this district varies from day to day, sometimes a loud whistle or a bubbling noise and occasionally a combination of both, resulting in a complete jam.

"N.F.'s" neighbour, of Elgin, who states that he receives Luxembourg clear of interference, has apparently not been listening when Leningrad has been on the air, or has based his statement on daylight reception, which is always reliable. If two powerful transmitters, such as Luxembourg (150 kw.) and Leningrad (100 kw.) are transmitting on the same wave-length, no receiver outside the service area of either station will separate the individual programmes.

Perhaps "N.F.'s" neighbour is using a new kind of Hyper-super Stenode, with a bunch of crystal gates and a cascade of tone correctors.

The secondary whistle noticed by Mr. Rogers

has been observed from time to time by the writer, and is probably due, as Mr. Rogers suggests, to a harmonic or heterodyne, several of which can be heard on the long waveband.

"N.F.'s" other neighbour, who only complains of a slight whistle when other sets in the vicinity are being jammed, is undoubtedly using a

set which has a poorer frequency response than his own.

Apart from the above fact a three-valve super-heterodyne is often guilty of generating whistles on the long waveband, especially if the I.F. stage is 450-465 kc., with only one circuit at signal frequency.

There is no doubt whatever that Leningrad is responsible for the interference, and until the long waveband has been "sorted out" there are only three possible suggestions to make:

1. Move nearer to Luxembourg.
2. Wait for Luxembourg to come nearer to you.
3. Build a set like "N.F.'s" neighbour from Elgin.

"READER SINCE NO. 1."

Stroud, Gloucestershire.

### A SOLUTION

The Editor, POPULAR WIRELESS.

Dear Sir,—On reading the letter of John Lowe on junk components in "P.W." dated May 15th, I should like to offer an obvious solution to his difficulty. As one who started on radio at an equally early age, and has had a great deal of enforced experience with junk parts, I maintain that it is an impossibility for "P.W." to design a worth-while set to suit a variety of prehistoric components.

At the same time, however, your correspondent should have little difficulty in evolving an efficient lay-out to suit his own particular "junk" providing that he is supplied with a good theoretical circuit. In this way he will obtain better results and, what is more important, will derive far more knowledge from individual thought than from pure copy-work. As your correspondent is interested in short waves, I should like to suggest a few points which are often overlooked.

A double-spaced '0005 will be found to work much better if each plate is thoroughly and individually cleaned with any of the popular chemical cleaners. Ordinary valve holders are easily convertible to S.W. types by removing the central "boss" and remounting the pins on top of the annular formation left. Wanderplug insulators are used to keep it clear of the chassis. A point which is worth consideration is that "head-capacity" effects are often removed by using a metal chassis and mounting all the L.F. components on the opposite side to the H.F.

A little patience and elbow-grease are all that is needed to make the chassis. The main point is that junk parts need not be very inefficient if one is prepared to expend a little time and ingenuity upon them.

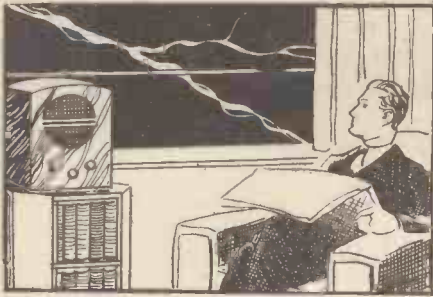
J. HAY.

29, Jerningham Road, Liverpool. 11.

## A TWO-WAY RADIO CAR

The German Post Office Service has been supplied with Telefunken radio cars—one of which is illustrated here—and from which broadcasts may be given at any time of the day. A short-wave transmitter links the van with the broadcast station, and a receiver is also incorporated for re-broadcasting transmissions on special occasions.





Although the chances of damage by lightning are extremely slight, it is always worth fitting a lightning switch or other device.

### THOSE LIGHTNING GADGETS

DESPITE the fact that millions of listeners take no precautions, lightning has up to the present done very little damage to radio installations anywhere in the world.

And even in the very few instances where there has been a "strike," we have nothing to show us that the lightning wouldn't have struck in any case. Further, we have no record that serious bodily harm has resulted as a consequence of any domestic exhibition of Nature's own radio transmission.

What, then, is the case for the so-called lightning protector or earthing switch? It is just this:

Such gadgets cost little, and they definitely do add security to a radio installation. We advise their use even if the odds against them ever being called into action are extremely long.

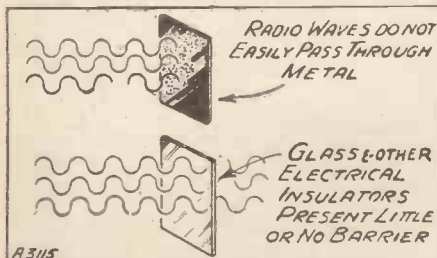
Only one listener using an unearthed aerial during a thunderstorm may be given a severe shock during the next year or two. But you don't want to be that listener, do you?

### RADIO IN DRY WEATHER

WIRELESS reception ought to be much better when it is wet. There seems to be a common belief that the reverse is what should be expected, and that dry conditions favour radio.

But it must be remembered that wireless waves do not conform to the same laws that

### HOW WAVES BEHAVE



Wireless waves pass easily through insulators although these are barriers to ordinary electrical currents.

govern electrical currents. These latter travel easily through such things as copper, iron and aluminium—all the metals, in fact. But these act as reflectors to wireless waves.

Wireless waves pass easily through substances such as glass, mica and wood, which are barriers to electrical currents.

# PRACTICAL POINTERS

## HINTS AND TIPS FOR CONSTRUCTORS

When the ground is made wet by the rain it becomes electrically conductive, but—and here is the vital point—it will reflect wireless waves. Therefore these do not tend to become absorbed to the same extent as when it is dry.

Also, there is this important factor: the average outdoor earth connection encountered in broadcast reception is not a particularly deeply buried one. The moisture around it caused by the percolating rain is likely vastly to improve its efficiency, and thereby improve the listener's results.

### LOST EMISSION

IT is unfortunate but true that the life of a valve is limited—anyway, its useful life. However, modern valves last a very long time if carefully operated.

We have a dozen valves which have all exceeded the two-thousand-hour mark and are still in good condition!

Sometimes the life of a valve is accidentally curtailed by its filament being burnt out. Given careful use, it is generally a gradual wearing out that marks the end of a valve's life.

### WHEN TIGHTENING SCREWS

NO doubt quite a number of constructors try to tighten the screw terminals of their sets so as to prevent any possibility of looseness occurring. But that is almost an impossibility if lock-nuts or some other "locking" method is not adopted.

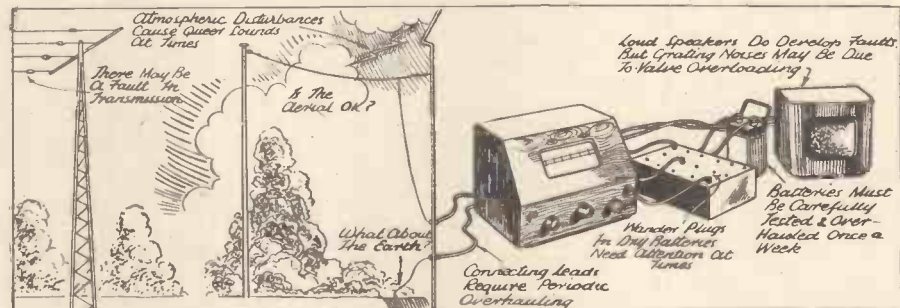
Temperature changes causing expansion and contraction of metal and the constant mechanical vibration to which all radio sets are subjected while they are working is almost certain to loosen screws in time. Both effects are generally extremely slight, but, nevertheless, they are there.

There is nothing to be gained in tightening a nut or screw more than a certain amount. Indeed, you are likely to strip the thread if you indiscriminately apply force. And the threads of brass screws are particularly easy to strip.

The screws should be tightened up as much as possible with the fingers, and a half turn given to each with the pliers after that.

All the screws (we are, of course, referring to metal screws screwed into metal or similar hard material) and nuts ought to be examined

### SOME FAULT-FINDING AND MAINTENANCE TIPS



These sketches will help you to keep your set up to scratch and also give you an idea of where to look for a possible fault.

The filament or cathode loses its power to emit electrons in the original quantity. In short, the "emission" falls off.

This is at once shown by a milliammeter. As we all know, with a given H.T. and G.B. a certain anode current should flow; the valve-makers' leaflets provide the information.

#### Dealers Will Test Them

With loss of emission the current drops and, of course, the valve tends to become inefficient.

There is nothing to be done about it except buy a new valve! So if your set begins to grow less sensitive or, despite correct H.T. and G.B. voltages, there is distortion, suspect that one or other of the valves is losing its emission.

Most dealers will test valves free of charge.

If your set has seen a lot of service you will be surprised at the difference a new valve or set of valves may make. Many listeners who think their sets are becoming "worn out" do not realise that it is merely a question of ageing valves and that when the necessary replacements have been made they will be as good as ever again.

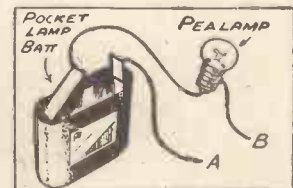
periodically—every few months, say—and any loose ones tightened up.

### SIMPLE TESTING

PROBABLY the simplest of all testing instruments is a flashlamp and battery connected as shown in the sketch.

#### VERY HANDY

An easily made tester. Test prods can be fitted to the leads A and B.



With it anyone can conduct numerous tests.

The two leads A and B will be easier to handle if what are known as "test prods" are fitted to them.

In use this simple device forms an excellent tester of contacts and terminal connections, and of low-resistance metallic paths such as are provided by loudspeaker connecting cords, battery leads, and so on.

# RANDOM RADIO REFLECTIONS

LITTLE THINGS THAT SLIP THROUGH THE B.B.C. :: PORTABLE TRANSMITTER IN THE ABBEY  
 ART—WITH A CAPITAL "A" :: WHAT YOU CAN DO WITH A WATT

By Victor King

## RED LIGHT

**C**URIOS how often little things slip through our immaculate B.B.C. I mean, before and after talks, for the most part. You'd think the announcers would train their clients a bit more carefully. Did you hear that broadcaster the other Sunday get on to the air with "I'll just finish it and wait"?



.....  
 "He quite nimbly beat the announcer to it and got in with 'Just fourt—'"  
 .....

If you did, you probably, like yours truly, thought to yourself, "Well, that lad won't blurt out a 'How do you think that went over?' or something similar, to the announcer immediately he's finished and before the switch can be plonked out."

And, also like yours truly, you were quite wrong. He quite nimbly beat the announcer to it, and got in with "Just fourt—" before the "silence" gesture of the agitated B.B.C. official (I'm using my imagination here) could do its work.

One can speculate for a long time as to exactly what he was going to say, but I reckon it was "Just fourteen minutes."

The classic incident of this kind is, of course, that of the Bishop who finished his broadcast with, "We shall meet in Heaven—I don't think." The last three words were part of an observation he was about to make to the announcer before he was switched off. And then there was that awful language—but that's best forgotten!

## SHORT-WAVE EXCITEMENT

**I** WISH I could have gone in for the "P.W." Short-Wave Competition. But I couldn't—being a regular contributor to "P.W." Do you know what I should have described as my most interesting experience during that period?

Something that can't be printed. Quite by chance on May 11th I found myself eavesdropping on some British police radio. And that's all I can say about it if I want to keep clear of Bow Street. Would such an entry have qualified?

You know there's some ripe stuff on the ether for those with radio sets capable of getting in line with it. I wonder if anyone heard an American newspaper reporter giving a running commentary on a little portable transmitter from inside the Abbey during the Coronation ceremonies?

It seems almost incredible to me that such a thing could have happened. But apparently it did.

This "Yank" had one of those very small short-wave outfits which are being used quite a bit in the States these days. Batteries in a body-belt, aerial down your back, mike in the palm of your hand. You pretend politely to yawn and keep your fist over your mouth the while you whisper things into the ether for a nearby receiving and relaying outfit to pick up.

## ART FOR ART'S SAKE

**H**OW do you like my little sketches? No—don't tell me, it won't make any difference.

Going into Tallis House one morning to deliver a batch of my Notes I handed one of these little pictures to "P.W.'s" Query Editor and waited, hopefully, for his criticism.

For a few minutes he looked at it numbly.

"Well, what do you think of it?" I urged.

"Can't quite make it out," he replied slowly. "What's the chap trying to do? Seems a funny-looking circuit to me."

Anyway, drawing them provides me with many hours of quiet pleasure. So what?

.....  
 "What's the chap trying to do? Seems a funny-looking circuit to me."  
 .....



## DO YOU KNOW WATT?

**O**NE of my correspondents is very worried because his electricity meter won't stop ticking over. Even when every switch in the house is off, and even when the mains switch is pulled out, he can still, as he thinks, hear his pennies ticking away.

He complained to the supply company and they sent a man down—a phlegmatic, voiceless creature who poked about a while, spat on the coals and departed. But still the meter ticked on singing its little song, as he thought, of pennies going up to Heaven and nothing coming down for them.

Actually, I don't think he need worry. It's probably one of those meters which don't show anything on the clock until the current rises above a certain point. In this way a slight leakage doesn't reflect on the bill. In any case, even if there were a leak—which most probably there isn't, except an inherent meter leakage which is all a part of the game—the current consumption thereby caused wouldn't cost him enough in a year's run to buy an ant a necktie.

You've got to suck the juice out of the mains fairly heftily before you start

spending any money that really matters.

Do you know a watt? One amp. at 1 volt. Point five of an amp. at 200 volts is 100 watts. Well, moving on our intricate course of electrical engineering, we come to the Unit—the thing you have to pay about twopence for. This Unit of Electricity equals 1,000 watts for one hour, or 1 watt for 1,000 hours, if you feel economical.

It's a jolly good leak that takes a watt of juice, and you can, as you see, enjoy such a leak for 1,000 hours before you hit up one unit.

As a matter of interest, let's see what one can do with one unit of juice from the mains. You could run a cinema organ for about ten minutes—if you desired such bliss and had the organ. Reminds you of that old gag: If I had some eggs, I could have some eggs and bacon—if I had some bacon.

Also, with one unit you could boil about twenty pints of water in an electric kettle, and then, with another unit, run an electric fan for some twelve hours; and that ought to be long enough to cool the water off again.

Then, still at the cost of only one unit, you could keep a vacuum-cleaner humming for five hours or so, or operate a sewing-machine for eighteen hours, or cook all the food you wanted for one whole day—so long, of course, that you didn't bake a joint and boil Christmas puddings.

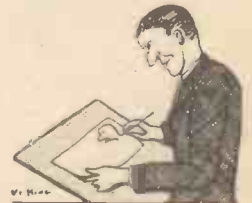
Finally, a radio could be kept going for anything up to about fifteen hours, after which you'd probably reckon you'd had a jolly good twopennyworth.

## TELEVISION IN PUES

**I** AM told by one who has a wide experience of those places where men foregather to play darts and sample new-brews, near-beers and old-and-milds, that quite a number of London public-houses are now equipped with television outfits.

Apparently there are at least two in Stratford. I asked this "cheerio" expert what sort of reception they got. "From a radio point of view, first-class," he said.

.....  
 "Anyway, drawing them provides me with many hours o' quiet pleasure"  
 .....



"The pictures come through very well. And, generally speaking, they seem to be extremely popular, particularly among the younger customers. But it takes a lot to drag some of the older ones away from their billiards, darts and other diversions.

I bet some of the pictures some of the customers think they see near the end of the 9-10 p.m. session are a bit different from what the B.B.C. puts on the air!

# THOSE "ADDERS"

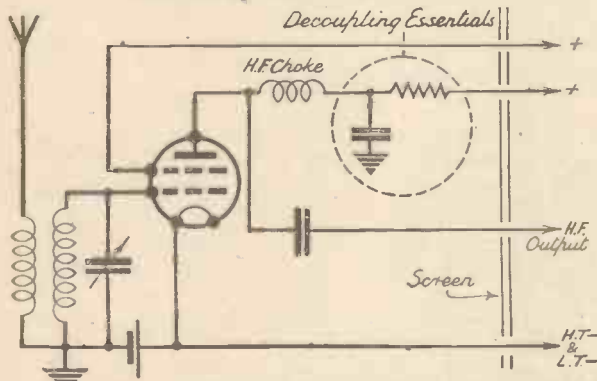
Constructors often desire to make certain additions or alterations to their sets, and frequently these modifications, when completed, do not give the anticipated results. Here are some valuable hints on the subject, by one who has had long experience in dealing with readers' queries. All constructors should read this helpful article

By K. D. ROGERS

**N**O, I am not going to talk about snakes. I am going to concern myself with those radio fans who want to "add." The people who write in to me and to the Query Department and ask whether they can stick this, that or the other on their radio sets.

I am afraid they must very often be sadly disappointed with the answers they receive. They must think that we on "P.W." either have very little sympathy with them or are hopeless nitwits where technical things are concerned.

## ADDING AN H.F. UNIT



When adding an H.F. unit it should be well decoupled and a screen be incorporated, or better still the whole unit be enclosed in a metal box so that there shall be no interaction between it and any following H.F. or detector circuit. The lead connecting the terminal marked "H.F. output" to the set should be as short as possible.

I can imagine some of them saying to themselves, "But Fred told me I could add an amplifier to my set; surely those people ought to know how to do it."

If such a thought strikes you, dear reader, please try to remember one thing. That though it is always possible—or nearly always possible—to add anything to anything else in radio, it is not always possible to do so without practically redesigning the whole outfit, and going to such an expense that it would hardly be worth while.

### The Question of Overloading

It may seem simple to add a single valve amplifier to a certain battery set. You have a screen grid, detector and one L.F. (pentode), and want to turn it into a four-valve set with two L.F. Quite likely you ask us to give you a circuit that will give you a pentode output with the new arrangement.

You receive a reply saying that we think you would do better to add an H.F. stage if you want more power on distant stations, and that if you add an L.F. stage you will be troubled with overloading.

That is the truth. It is not that we do not want you to get louder results, but the

technical fact is that especially with battery valves you are limited to the amount of output you can have without going in for push-pull and immediately increasing the H.T. costs tremendously.

Though the addition of an extra L.F. stage would give you increased volume on distant stations it is doubtful in the case I have instanced, if you would benefit one whit from the change on local stations. And, as a matter of fact, with a pentode in your present set you are probably fully loading the valve on quite a number of transmissions. What, then, is going to happen when you add the extra L.F. stage?

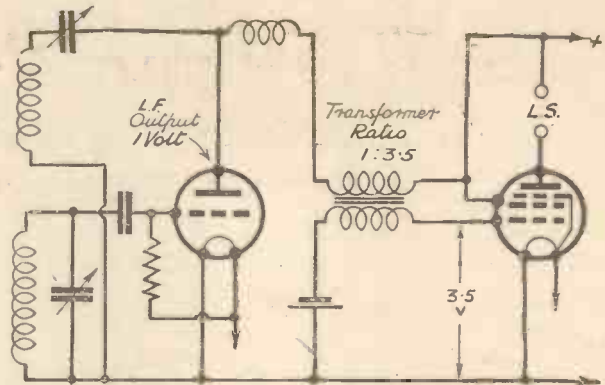
You will have to run it with the volume control down a very great deal on all but distant stations, because you will not be able to put in an output valve that will stand the input voltage you are going to give it. In other words, what you want really is an H.F. stage to bring up your distant stations and not an L.F. stage to amplify the L.F. further.

A subtle difference maybe, but it is a real one.

Consider further. You may still be adamant regarding the What valve are you going to use for the output?

I have taken a certain maker's catalogue of valves at random. The largest pentode output valve is the P.T.2. It will take an input voltage of about 4.5 volts. You can give that voltage to it from your detector stage on quite a number of stations. Therefore, you are going to have to cut down your L.F. volume to 4.5 volts when you add your extra stage to avoid overloading.

There is no larger battery pentode in that range and most makers have valves which correspond fairly closely to one another. That about washes out the idea of the pentode output. You could use Class B, of course, but that would not only mean adding a



A simple detector and L.F. circuit with pentode output. If the detector output is about 1 volt, which means roughly about a third of a volt H.F. input, and it may well be on quite average reception distances, the output valve will get 3.5 volts grid input. It is nearly fully loaded. The maximum grid swing in either positive or negative direction that most battery pentodes will take is about 4.5 volts. If an intermediate valve is added you can see that even the slightest amplification is going to cause overloading of the output valve.

stage, but redesigning the set to a large extent to include the driver transformer and a driver valve. The expense would not be worth taking.

Push-pull output valves would give you the extra volume all right, but they would not only be expensive in themselves and the apparatus required, but also in H.T. consumption, and we are dealing with a battery set. You see our difficulty? Thank you!

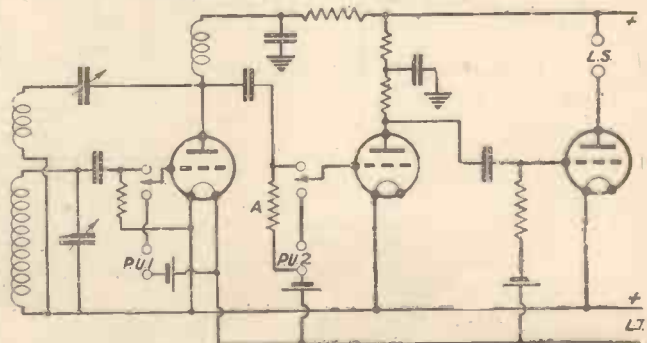
### This Frequently Happens

Now take another case. The man who wants to add a short-wave adaptor to his set. He writes: "I have a detector and L.F. receiver and want to add a short-wave superhet converter." We tell him we think he would be well advised to use an ordinary adaptor unless he is prepared to use a converter plus an extra stage of H.F.

He writes back to say that he asked for details of a converter, he wants a converter, and he wants only one valve. He saw one advertised, and surely we can dish him out with one like that.

We can. If we do he will probably write back and say that considering the cost of the converter he is getting rotten results and we are no good.

## INSERTING A PICK-UP



A simple three-valve circuit showing the alternative points where a pick-up can be added. No. 1 should be used where the pick-up is of the insensitive type, and No. 2 where it is a sensitive model such as the piezo-electric. It is assumed that the volume control for the pick-up is on the pick-up. No volume control has been shown in the circuit, though if it has one for radio purposes it will no doubt be connected at "A," the grid leak itself constituting the control.

If we tell him we don't like the scheme he may say he won't take the paper any more or he may give up the whole idea. (Continued overleaf.)

# THE G.E.C. TRANSPORTABLE FIVE

An attractive design giving high sensitivity and good quality reproduction

THE magic and mystery of radio are completely demonstrated in the G.E.C. "Transportable Five." But the sophisticated listening public of this Coronation year are less likely to appreciate that aspect of the receiver than its wonderful attractions as a self-contained unit of entertainment.

No external aerial or earth is needed. It can be connected to any convenient power or light point in the house and is able immediately to tune-in programmes.

So it can be carried from room to room, and that operation is facilitated by the provision of simple grips that are neatly let into its sides. Apart from these, and they are far from being obtrusive, the set is entirely normal in appearance. Normal but not undistinguished.

As a matter of fact, it is one of the handsomest sets we have ever seen, for the cabinet work is superb. It is a pity more

manufacturers do not realise that design counts for nothing if craftsmanship is poor. But here we have an excellent design on pleasing modern lines plus really high-grade workmanship.

## Accurate Calibration

The set is a five-valve superhet incorporating A.V.C., tone control and "muting." The large dial is clearly calibrated in wavelengths and station names. And it is with much amazement that, remembering one's experiences with other "calibrated" sets on test, one discovers the markings to be accurate all round the dial on both long and medium bands. Though perhaps that observation is hardly fair to G.E.C. whose sets have always been strictly "honest" in this respect, even if in some past models parallax error has not been entirely absent!

Now, there may be readers who would

feel that they were losing something by not having an external aerial. Well, one can be connected to this G.E.C. transportable set easily enough, if desired, for aerial and earth sockets are to be found on the back of it.

But we do not expect many would use them, for the performance of the set is quite extraordinary, and the scores of stations that are easily on tap give one the impression that the receiver is joined to some giant, invisible antenna reaching hundreds of feet up into space.

It is true that the noise-signal ratio on the very weakest of signals may be a bit up when the receiver is functioning on its internal frame aerial, but there is the compensating factor of its directional qualities. There is a built-in turntable on which the set can be swung, and the effects of this will be quite interesting to those whose experiences are limited to ordinary indoor and outdoor aerials. For example, many of the interfering heterodynes can be vastly reduced if not completely eliminated, especially when it happens that the directions of the overlapping stations are widely different.

No, in view of the G.E.C. "Transportable Five's" great sensitivity, its inherent freedom from undue background noises, and the advantages of direction reception,

(Please turn to cover iii.)

## THOSE "ADDERS"

(Continued from previous page.)

In which case, some year or two later he will write again to us with another query and we shall find that he has after all disregarded our advice, and is using, or trying to use, the converter and is finding it not very satisfactory.

Now, enough of this atmosphere talk. What is the matter with these "adders"? Usually friends who have different sets from theirs and who are getting results that they want to copy.

There are plenty of snags in the adding business. On H.F. and L.F. sides there is always the snag of decoupling. That must either be increased or introduced in order to make sure the set will not "motor-boat" or spill over.

Then there is the snag of overloading, especially on the L.F. side. You cannot add valves indiscriminately. You must consider whether your voltage input to their grids is to be O.K. If it is too much you are going to get trouble with overloading.

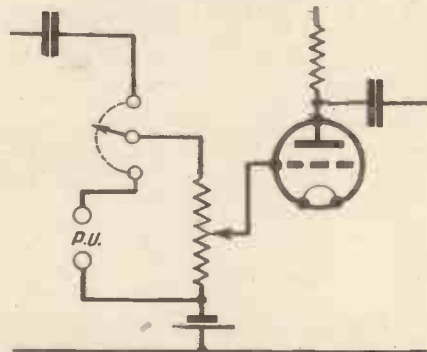
### S.W. Converters

In the H.F. additions you have to consider screening; you have to consider the voltage supplied to the detector grid; and you have to consider ease of tuning. If you have a set with one H.F. with separate tuning condensers you do not want another tuning control to operate. Three tuning controls usually make the set a nightmare to handle.

The short-wave converter snag is this: If you have one or two good H.F. stages in your broadcast set, or if it is a superhet, you can usually add a converter with the greatest hope of success. But if you have no H.F. it is sheer waste of money, in my opinion, unless you are prepared to make a converter which has an intermediate H.F. stage incorporated.

The addition of a pick-up is a thing that we are often asked to discuss. Usually it is an easy business, but the mere switching of the detector or first L.F. stage does not complete the scheme. If you have a detector and one L.F. receiver and want to add a pick-up you must take into consideration the make of pick-up. Such a set will not be any good for the needle armature type of pick-up and you must choose one of the more sensitive types.

## USING AN EXTERNAL VOLUME CONTROL



If no volume control is incorporated in the pick-up an external control may be connected as shown here, in place of the grid leak "A" seen in the circuit on the previous page. Care must be taken in such an instance if a piezo-electric pick-up is used that the control is of 500,000 ohms value. The volume control depicted is also effective on radio.

On the other hand, a man with a detector and two L.F. set, or any set with two L.F. stages, will not want to add a piezo-electric pick-up into the detector stage if he really knows what he is doing. That type of pick-up is very sensitive.

I get many letters from readers who have added pick-ups and have been surprised with the ease with which their sets distort. They consider the addition

of a pick-up will give them a tremendous volume from their records.

So it will if they have mains sets, but if they have battery three-valvers, or, in fact, any battery sets, they cannot hope to get any more out of the sets on gramophone than they do on radio. Their limit is the output of the valves, which is the same whether they are using a pick-up or radio.

There is a good deal of difference between the 500 milliwatts that a battery pentode will give and the 2,000 or more milliwatts that you hear when you listen to a record being played at the shop on an all-electric radiogram. And somehow we seem to expect to get a bigger punch out of our records than we do from the radio.

One more word to the "adders." When you do add and have the addition attached to the mains set by lengths of flex or other wire for goodness' sake do keep that wire short. If not, you are courting disaster. If you add an L.F. stage make sure that your H.T. battery can stand the extra drain with economy. If you add an H.F. stage keep the wires short throughout, and don't place the stage in such a position that it can interact with the next H.F. stage or with the speaker leads—the latter being a very common fault.

I like to hear of readers adding things to their sets. But I want them to get successful results. That is why so often they receive answers to their questions that must seem unsatisfactory.

We cannot tell the full tale to every reader who writes in. We have to cut down our replies to reasonable lengths. But, believe me, there are some frightful snags to consider in this adding business, especially when we ourselves shall never have an opportunity of seeing the sets to which we are asked to add units or extra valve stages. That is a point that wants careful remembrance. We do not see the sets, we have to design or advise on rough details, and you cannot afford to be too rough in radio.



# RADIO FADE-OUTS

By Dr. R. S. Richardson

*Does the sun affect radio reception? This is a question often asked, and this week we are able to publish some authoritative information on the subject, based on special observations made at the Mount Wilson Observatory, Washington*

IN October, 1935, Dr. J. H. Dellinger of the National Bureau of Standards described several sudden and remarkable fade-outs of high-frequency radio transmission, affecting the daylight side of the earth and lasting for about fifteen minutes each. He suggested that these disturbances of radio might be connected with solar eruptions, and asked that special efforts be made at the Mount Wilson Observatory of the Carnegie Institution to observe the sun continuously in order to see whether any unusual sunspot activity occurred at the time of the next fade-out, which Dr. Dellinger believed might be expected after an interval of about 54 days.

## Special Observations Planned

An examination of photographs showing the distribution of hydrogen and calcium in the sun's atmosphere, taken at Mount Wilson as part of the routine solar work, showed that on three occasions bright chromospheric eruptions had been photographed within a few minutes of the radio fade-outs reported by Dr. Dellinger. (The chromosphere or "colour-sphere" is the scarlet-coloured gaseous envelope encompassing the sun.) This agreement was so striking that special observations were planned for several days before and after the date of the next predicted disturbance of radio transmission.

As already implied, one of the interesting features connected with the first four fade-outs was their occurrence at intervals of 53.4, 55.1, and 55.4 days, the mean being 54.5 days. This interval is twice the time it takes a point on the sun in latitude 16° to make a complete rotation, although the agreement may be only accidental.

## Interesting Data Obtained

The first observing programme was accordingly set for the latter part of October, 1935. An eruption of moderate intensity was photographed on October 24, 54.9 days after the preceding fade-out and eruption. On October 10 the National Bureau of Standards noted a general improvement in radio transmission on the higher frequencies, which continued until October 21 to 23 when the upper limit of frequency reached the highest value the investigators had ever observed. On October 24, however, the upper limit dropped to half its value on the preceding days, and then, on October 25, returned to its previous high value.

A repetition of the phenomenon was expected about the middle of December. A brilliant eruption took place on December 16, 53 days after October 24, but no radio anomalies were noted on that date.

The next radio disturbance was expected about the middle of February, on the assumption that one should have occurred on December 16. This time observers were

not disappointed, for a widespread fade-out occurred on February 14, 59.7 days following the solar eruption of December 16. Clouds prevented observations at Mount Wilson, but a bright eruption of major importance was seen at Greenwich about three hours before the fade-out. Whether later observations were made is not known.

Another fade-out and a bright eruption took place 54.1 days later, on April 8, and again on June 3, after an interval of 56 days. Although a minor fade-out was noted 53 days later, on July 26, the cycle evidently ended on June 3; at least the important disturbances of radio reported since then have not been in accordance with any simple and obvious law.

## Automatic Spectroheliograms

The observing programme in October and December, 1935, and April, 1936, consisted simply in taking hydrogen spectroheliograms, showing the distribution of that gas, about every five minutes, unless interrupted by clouds or instrumental adjustments. Beginning in May, Dr. Seth B. Nicholson of the Mount Wilson Observatory installed a camera which takes spectroheliograms automatically on 35-mm. motion picture film. The interval

## TAKEN IN 1928



This photo was taken on Dec. 29th, 1928, and shows an unusually large area of bright hydrogen to the left centre.

between exposures is ordinarily about four minutes, while the actual time required for the image to pass across the slit and thus complete the exposure is about fifty seconds. The instrument is started soon after sunrise and operates continuously with very little attention until shut off about an hour before sunset. As a result, a nearly complete record of the appearance of the sun is available for all clear days at Mount Wilson since May, 1936. The data now accumulated are sufficient to permit interesting conclusions to be drawn.



The sunspot in the upper centre of this photo is the largest ever observed in modern times. It was photographed on Jan. 24th, 1926. The spot is surrounded by luminous hydrogen gas.

## Probability of Relationship

Dr. Dellinger reports that from July, 1934, to June, 1936, thirty-nine fade-outs of high-frequency radio transmission have coincided so closely with observations of bright chromospheric eruptions that the probability of a relation between the two phenomena is very strong. Fifteen eruptions were photographed at Mount Wilson and are described here.

In five cases, the time when the eruption was first seen agrees to a minute or less with the time when the fade-out began. In all five cases solar observations had been made shortly before the fade-out occurred, the longest interval being eleven minutes.

About eight minutes are required for light to reach us from the sun. Hence if the observed beginning of an eruption were to coincide exactly with the beginning of a fade-out, it would seem highly probable that energy emitted from the solar eruption with the velocity of light was the direct cause of the fade-out.

## What the Photos Showed

The evidence to this effect is particularly strong for the disturbance on April 8, 1936. A spectroheliogram taken at 16 hr. 22 min. (reckoning from midnight) was quite normal. The next plate, taken at 16 hr. 47 min., showed that an unusually brilliant eruption had in the meantime occurred over a large spot-group near the central meridian. From the appearance of the bright flocculi (clouds of calcium- and hydrogen-vapour) and from previous experience with such eruptions, it was estimated that the outburst began only a few minutes before the exposure made at 16 hr. 47 min.

This estimate was confirmed later by observations made at the Huancayo Magnetic Observatory in Peru, maintained by the Department of Terrestrial Magnetism of the Carnegie Institution. The observers at this station witnessed the eruption with the spectrohelioscope, noting the first signs of activity at 16 hr. 45 min. A major fade-out was experienced at 16 hr. 46 min., which lasted from 15 to 30 minutes, for various radio frequencies.

## Further Interpretations

Six of the eruptions have apparently preceded the fade-out by from two to twelve minutes. The best example is that of August 30, 1935. A sudden fade-out took place at 23 hr. 20 min. Examination of a

(Continued overleaf.)

## RADIO FADE-OUTS

(Continued from previous page.)

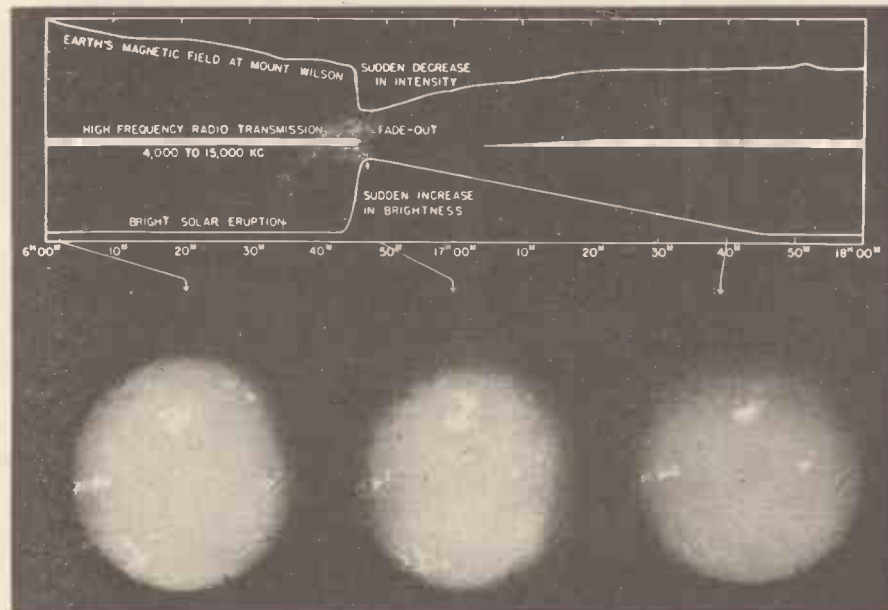
series of exposures, taken every four minutes from 22 hr. 30 min. to 23 hr. 30 min., indicates that the eruption started as early as 23 hr., and at 23 hr. 8 min. had become very intense. Here at least twelve minutes seem to have elapsed between the time the eruption was well under way and the beginning of the fade-out.

For the four remaining fade-outs, the observations at Mount Wilson were all made from ten to thirty minutes after the radio disturbance began, when eruptions were found to be already in progress. It seems probable that earlier observations would have shown the eruption occurring

studied to see if they differ in any way from eruptions which do not coincide with known geophysical phenomena. The only distinguishing feature easily noted is that nearly all the eruptions producing fade-outs are much brighter than the average. On the scale of 1 to 3 adopted by the International Astronomical Union, six of the fifteen eruptions have been estimated to have been of maximum intensity 3, five of intensity 2, and four of intensity 1. Out of a total of 165 eruptions recorded at Mount Wilson from January 1 to October 31, 1936, only 7 per cent. were of intensity 3, 24 per cent. of intensity 2, while 69 per cent. were of intensity 1.

The mean latitude of the eruptions is the same in both hemispheres, namely 23°. The eruptions have thus far shown no

## RELATION OF SOLAR-ERUPTIONS TO FADE-OUTS



Showing a brilliant eruption on the sun, a disturbance of the earth's magnetic field, and a fade-out of radio signals occurring at the same time on April 8, 1936. Spectroheliograms of the sun are now taken automatically at the Mount Wilson Observatory on motion picture film. The interval between exposures is ordinarily about four minutes; the time required for the image to pass across the slit and complete the exposure is about fifty seconds. The instrument is started soon after sunrise and operates continuously until shut off about an hour before sunset.

slightly before, or at the time of, the fade-out. No fade-out is definitely known to have preceded an eruption with which it was obviously connected.

Disturbances of the earth's magnetic field and chromospheric eruptions occurred simultaneously with the radio fade-outs on November 28, 1934, February 14, April 8, and November 24, 1936. The disturbances of the earth's field as recorded at Mount Wilson all consist of a sudden decrease of about 10 gammas in the horizontal intensity accompanied by a change in declination of about 3' towards the east.

### Bright Eruptions, a Feature

These changes should not be confused with those characteristic of magnetic storms, which frequently last for several days, with fluctuations in horizontal intensity and declination often twenty times greater than those accompanying a radio fade-out. There is evidence that magnetic storms also may be caused by chromospheric eruptions, but with an interval of the order of 26 hours between the eruption and the commencement of the storm.

Spectroheliograms of the bright flocculi associated with radio fade-outs have been

definite tendency to favour any particular location on the sun or any special distance from its central meridian. It has long been known, however, that very intense magnetic storms are more frequent when large active spot-groups are near the central meridian.

This circumstance is naturally explained if we may assume that radio fade-outs are caused by radiation, and magnetic storms by charged particles ejected radially from sunspots with a high velocity. Radiant energy reaches the earth regardless of where it originates on the disc, but a stream of charged particles is not likely to encounter the earth unless ejected from a spot near the central meridian.

### A Natural Assumption

The radiation producing the fade-outs seems undoubtedly to come from the outbursts that show so conspicuously on hydrogen and calcium spectroheliograms. A natural assumption would be that a small area on the sun, at exceptionally high temperature, emits a great amount of black-body radiation of high frequency; but direct observational evidence shows that this assumption is untenable.

For many years the spectroheliograms at Mount Wilson were taken with two slits set about 5 cm. apart—one over the  $H_{\alpha}$  line of hydrogen or the K2 line of calcium, the other over some part of the continuous spectrum. Two images were thus obtained simultaneously: one showing the distribution of the light of hydrogen or of calcium, the other resembling a direct photograph of the sun but made with light of a single colour.

### Not Due to High Temperature

In the course of the routine solar observing we have by chance photographed many bright eruptions. If these eruptions were associated with black-body radiation of high temperature, they should also have shown conspicuously on the mono-chromatic images taken at the same time. An inspection of many plates recording violent hydrogen and calcium eruptions fails to show any trace of a corresponding image on the photographs made with the continuous spectrum.

These observations indicate that fade-outs are not caused by any increase in radiation of the kind associated with a great increase in temperature.

The question naturally arises why certain eruptions produce radio fade-outs while others do not. It is suggested that possibly the condition of the ionosphere, in addition to radiant energy from the sun, may be a factor in determining whether or not a fade-out of high frequency radio transmission occurs.

## SHORT-WAVE THRILLS FOR ALL

UNDOUBTEDLY many keen radio enthusiasts are only deterred from indulging in the fascinating entertainment of the short waves by the question of cost. They hear about the results which their friends get and long to equal or better them. "If only I could afford a short-wave set, I'd show 'em!" they say.

To look upon a short-wave receiver as being a costly proposition is quite wrong. You can build up a first-rate set for an amazingly small sum if you choose one of the new kits which are now being marketed by the New Times Sales Co., of 56, Ludgate Hill, London, E.C.4.

This was brought home to us on looking through the booklet of short-wave bargains just produced by this enterprising company. The prices are extraordinarily low and the various kits are available on easy terms to suit all pockets.

### Splendid Value

How's this for a bargain: a three-valve bandspread short-wave kit for 37s. 6d.! The set covers from 12-94 metres, and if you were to pay the ordinary list price for the parts it would cost you £3. Amazing, isn't it?

For 65s. the kit is supplied complete with three valves and a permanent magnet moving-coil speaker—a saving of 35s. on the list value!

Then there is that splendid little unit which can be used as an adaptor, converter, or single valve receiver.

You can use it in conjunction with your existing broadcast set, which then becomes an efficient short-wave receiver, or the unit can be employed as a self-contained one-valver. The price of the kit is 25s.—another example of excellent value!

These and other short-wave bargains are fully described in this N.T.S. booklet, which is available free on request to all "P.W." readers.

# SEEN ON THE AIR

News and views on the television programmes by our special radio-screen correspondent

L. MARSLAND GANDER

"CINEMA proprietors," I read, "are concerned with the prospect of an increasing number of licensed houses being equipped for television reception."

What the cinema exhibitors may interpret as bad news is definitely good news for the television industry and the viewer. I can think of few better methods of popularising television than by public exhibition in various ways. Sets are being installed not only in public-houses, but also in restaurants and cinema lounges.

Now the London and Home Counties Branch of the Cinematograph Exhibitors' Association has approached the London County Council in the matter, and the L.C.C. Entertainments Committee has decided for the time being to take no action. Complicated legal aspects of the question are under consideration. The Cinematograph Exhibitors' Association urges that if inns are to enter into what they call "competition" they should be required to take out entertainment licences.

**"Other Interests"**

I have been unravelling the tangles of the situation, and the results of my investigation may be stated quite simply. Many persons are publicly exhibiting television, not only in licensed houses but also, as I have said, in restaurants.

No legal objection has yet been raised. The B.B.C. is definitely encouraging public exhibition of television, with the qualification that "other interests must be recognised." What are the other interests?

We have seen that the L.C.C. has decided to take no action in the matter of entertainment licences. There remains the question of copyright fees for broadcast material, and the question of the copyright in news reels and other films which may be transmitted.

In the case of sound broadcasting, the Performing Right Society issues a licence to public-houses, restaurants and cafés which rediffuse copyright music to customers. The fee varies according to the premises, but is generally about two or three guineas. Television seems to offer an exactly parallel case, and although the Performing Right Society has yet issued no official ruling it seems that the same considerations must apply.

But I wonder why the cinema exhibitors are so concerned with television competition? It is an old story. The newspapers were at one time somewhat apprehensive of the effects of broadcasting

competition. After ten years of broadcasting we find that newspaper circulations are far greater than ever before. It is needless to labour the point, but experience shows that the spoken and written word are complementary.

I am, probably, one of the most enthusiastic televiewers in the country—I have a set both at the office and at home. Yet I still visit the cinema. In fact, since television began I have been to the cinema as frequently as before. I went to two or three cinemas to see films after having seen excerpts on the television screen.

As the spoken and written word are

poned. The Derby, at the time of writing, was planned as a commentary illustrated with still photographs of the scenes and a plan of the course. This is such a shadow of what-might-have-been that I doubt the advisability of it.

When the same treatment was applied to the Grand National, some of those watching in my room imagined that that was the best television could do with a race meeting. Of course, though it now appears that Epsom is a little outside the radius of the new television vans, we shall soon be able to watch the real thing on the courses nearer London.

Candidly, I think that in summer television talks will have to be dropped altogether. Another point that strikes me in connection with summer viewing is one that concerns manufacturers. On the long light evenings viewers will not be so easily persuaded to sit in the dark. But is it necessary?

**Easily Overcome**

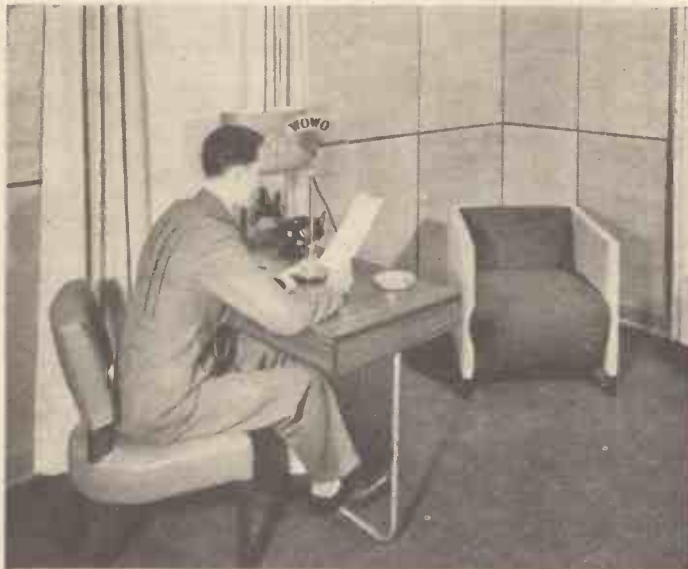
I have noticed that on the indirect viewing model, with the mirror underneath a raised lid, the picture glows feebly in competition with sunlight. Service engineers have invented their own method of dealing with the problem. They place a coat over the lid, screening the two sides, and the picture immediately stands out brilliantly. This is a better method than drawing the curtains on a summer's evening. To my non-inventive mind it seems that a simple screening arrangement on the principle of a camera bellows would do the trick; or, better still, there could be attached to each side of the lid two fan-shaped pieces of metal. When the lid is closed

these would sink into special slots. When it was opened they would enclose the screen in a sort of triangular box.

Having relieved my mind of its grouses, I now tackle the much pleasanter task of finding some nice things to say about the transmissions. I much appreciated the scenes from "The School for Scandal," featuring Greer Garson and Campbell Gullan. So coherent, well acted and well presented was the play that it had the air of having been written specially for television. Billie Houston and Nina Devitt brought personality into the studio.

Oliver Wakefield made two converts to television among my visitors. And my one regret at leaving for the Continent on Saturday morning was that I missed Mr. Gillie Potter in the evening—but there aren't portable television sets yet!

★.....★  
**"THIS IS STATION WOWO . . ."**



The announcer's room at the new headquarters of the American Westinghouse, stations WOWO and WGL, Fort Wayne. Bob Wilson, ace news commentator, is at the mike.

related, so it seems to me are the television and the recorded picture or the film. Those people who rushed to see the televised pictures of the Coronation procession would wish also to see the film record.

On the eve of a holiday, during which I regret to say it will be necessary to discontinue these notes for a week or two, I survey the stricken field of television. Why stricken? The fact is that the programmes have never recovered from the Coronation procession. All broadcasting is suffering from anti-climax, but no section so badly as television.

We have seen the real thing and long for more. Back to the studio is a setback for television. The programmes fail to reflect the holiday spirit and the open-air season. Mr. Howard Marshall's Sports Review, one of the most promising items, was post-

# "BRAKE" TUNING

An ingenious method of automatically locking the tuning knob in position at the correct tuning point of a worth-while broadcasting station.

By J. C. JEVONS.

BEFORE the days of A.V.C., sets were tuned by the ear alone. One adjusted the control knob for maximum sound, and left it there until such time as the signal began to "fade," when, of course, some more knob twiddling became necessary.

Now that most sets are fitted with automatic volume control, the programme will usually "stay put," once it is tuned-in, though, *per contra*, the circuits are not quite so easy to adjust properly, in the first place—at least not by ear. But with the aid of a glow lamp or other visual indicator the A.V.C. symptom of "flat" tuning is easily overcome.

Not content with using first the ear, and then the eye, the latest step is to bring the sense of touch into play, and to rely upon the "feel" of the control knob to indicate when the circuits are accurately in tune.

## "Off-Tune" Operation Impossible

When no signal is being received, the control knob turns quite freely. But as soon as a worth-while station comes in the control at once "stiffens up" just as though a brake had been applied. And that is, in fact, exactly what happens. The tuning spindle is automatically gripped by an electro-magnetic brake, and held at the exact point of resonance. Incidentally, this means that it is impossible to work the set "off tune."

If the station tuned-in is not the one required, a slight inward push on the tuning knob releases the brake, so that the spindle is once more free to rotate in the ordinary way.

This method of tuning is particularly useful in the case of a receiver fitted with "muting" circuits, which cut out inter-station noise. At first sight "muting" appears to increase the selectivity of the set, since all stations below a certain level of strength are cut out automatically together with the background of "mush" and noise. This naturally gives the effect of clear-cut reception against a silent background.

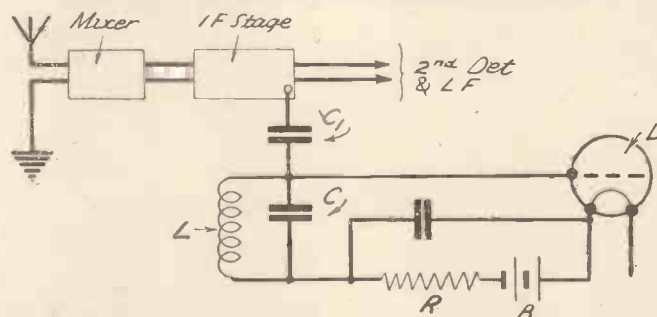
## Apparent Increase in Selectivity

But in point of fact the increased selectivity is more apparent than real. What actually happens is that the tuning becomes more critical, and therefore more difficult. It is easier, for instance, to overshoot a worth-while station when searching on a "muted" set, than it is on a receiver that is plain and unadorned. In the former case, if one moves the control a short distance past the correct mark, the muting device at once comes into operation and cuts out all reception.

In other words the path to the loud-speaker only remains open so long as the control knob is kept within a short distance to one side or the other of the true tuning point. For all other "interstation" settings, the muting circuit takes charge and the set is deliberately made silent.

Tuning by touch makes it impossible to overshoot any station by mistake. The tuning knob is firmly locked each time it passes through any worth-while carrier-wave, and must be deliberately released before searching can continue. In one arrangement an electro-magnetic brake is applied to the tuning spindle so as to lock it in position, automatically, at the correct tuning point. In another, the same effect

## THE AUTOMATIC CONTROL CIRCUIT



The voltage across the resistance R forms the starting-point of the automatic braking action. This voltage energises a magnet which draws a disc into contact with the pole pieces and so exerts the necessary braking action on the tuning condenser spindle.

is obtained by means of an electro-magnetic clutch.

The clutch, for instance, is inserted between the control knob and the tuning condenser, and transmits the drive in the ordinary way so long as no signal is being received. But when a worth-while station comes in, the current through the clutch winding falls to zero just as the correct tuning point is reached. Since there is then no "drive" from the control knob, the tuning condensers necessarily "stay put" until the drive of the clutch is deliberately restored. This can be done, when it is desired to tune-in another station, by pushing the control knob inwards.

## Obtaining the Motive Force

As in most other systems of "automatic tuning" control, the motive force used to operate either the brake or the clutch is obtained either directly or indirectly from the intermediate-frequency stages of a superhet receiver. In this type of set, as we know, local oscillations are combined with the incoming signals to produce beats of a certain frequency, to which the I.F. stages are tuned. The current in the I.F. stages therefore reaches its maximum amplitude only when the circuits are accurately in tune, and advantage is taken of this fact.

In the simplified diagram, the essential "control" circuit L C is shown coupled to one of the I.F. stages through a condenser  $C_1$ . It is tuned to the intermediate frequency, and is shunted across a diode-rectifier D, which is initially biased by a battery B so that it does not normally pass current.

When a worth-while signal comes in, however, the current in the circuit L C builds up to a point at which the voltage on the anode of the rectifier exceeds the negative bias applied from the battery B. Rectified current then begins to pass through the diode and sets up a voltage across the resistance R, which, in turn, forms the starting-point of the automatic braking action.

By making a suitable choice of the negative bias from the battery B, one can regulate the sharpness of the control, and determine for what strength of signal the brake on the tuning shaft shall come into play. Also by using a second diode valve, negatively biased by the voltage from R, it is possible to arrange for the brake to be applied as effectively for a strong incoming station as for a weak one—provided of course that the latter is of sufficient strength to pass through the muting device.

## The Brake

In practice the diode D is coupled to the I.F. stages of the receiver through an amplifying valve instead of directly through the condenser  $C_1$ , so that a large voltage is developed across R. This is first fed back to bias the grid of the same

valve, and the output current from the latter then operates the brake.

The brake consists of an iron disc which is keyed to the spindle of the tuning knob. It turns solid with the spindle, but is free to move a short distance along it, against the pull of a spring. A small electro-magnet is arranged with its pole-pieces close to but not quite touching the disc.

When a signal is received, the voltage from R is applied to energise the magnet. This draws the disc into contact with the pole-pieces, and the resulting friction brakes the spindle. By pushing the tuning knob inwards, the circuit of the electro-magnet is broken, and the tuning-knob can be freed for further searching when desired.

## JOURNEY WITH A MADMAN

WHAT would you do if you discovered that your solitary companion in a railway carriage was a homicidal lunatic? It is a problem that would tax even the traditional resourcefulness of the average Englishman. Lord Dunsany has already necessarily found a solution, because the situation is the theme of his radio play, "Atmospherics," which Felix Felton will produce in the National programme on June 15th and in the Regional programme on June 17th.

From a railway carriage, the scene for another radio play, called "Little Ena," which will be broadcast immediately afterwards, shifts to a first-class railway waiting-room at a junction 170 miles from London. The play has been written by Norman Edwards.

# EFFECT OF JOINING A VARIABLE RESISTANCE ACROSS THE SPEAKER

H. L. R. (Chadwell Heath).—*I have been told by a friend that the fitting of a volume control across the speaker will result in bad quality. Is that so?*

It probably is. It depends exactly what you mean. If you consider placing a variable resistance across the input to the loudspeaker you will certainly cause poor quality—in theory, at any rate. Whether you hear it or not depends on the loudspeaker and your set. But the effect of such a resistance is definitely to impair the quality in direct ratio as the resistance is reduced in value. And in practice the effect of the resistance connected in this manner is in increasing ratio as the frequency of the audio input increases.

What happens is that you have placed a non-inductive impedance, if I may call it such, across an inductive impedance. You have two sets of resistances in parallel, one (the volume control) which offers the same resistance to all frequencies, and the other (the speaker transformer) which offers an increasing resistance as the frequencies increase.

At the low frequencies the resistance and the speaker impedances may be widely different, that of the speaker being the lesser. In that case the resistance will not affect the low notes by by-passing much of the sound. But when you get, say, to 2,000 cycles, you may find the resistance becoming nearer the impedance of the speaker circuit, and at 4,000 it may quite well be almost equal in value. In that case you will lose half the signals. They will split up, some going through the speaker and the rest through the resistance.

At 6,000 cycles, that frequency which, with the others above it, has such a large bearing on the characteristic quality of the broadcasts, you are by-passing quite a lot of the sound, and you are therefore not getting the right proportion of high notes in your speaker.

The result of this is that the brilliance of the reproduction suffers, for you must not forget that the impedance of the speaker goes up with frequency, and "the higher the fewer" is the motto where such a volume control system is concerned—the higher the note the less the volume available.

Naturally, it depends on the value of the resistance at what point the by-passing becomes serious, but if you have the resistance too high you will not get a good volume control effect on the middle and lower ranges. You are really between the devil and the deep. You want to control volume, and the only way to do it with a non-compensated resistance scheme such as you propose is to by-pass the currents that should feed the speaker. And doing that gives you this unbalanced control.

## WHAT ABOUT IT?

G. P. (Seaford) writes to ask if capacity does not come into the question of the "change in inductance" of a coil which I discussed on page 136 of "P.W." for April 17th.

Sorry, G. P. you are a bit muddled here. The capacity of the piece of metal held near the coil, i.e. the capacity which it has between itself and the coil, cannot affect the INDUCTANCE of the latter. It may change the tuning, or the inductance capacity ratio, but it won't affect the inductance.

What does affect the inductance is the eddy current field of the piece of metal, as explained in the answer to T. W. P. (Llandudno)

## INCREASING POWER

K. H. (Harrogate).—*I have an autodyne short-wave converter and find that by disconnecting the tank condenser and tuning only on the bandsread condenser I get much louder results. Is this normal?*

I would not like to say it was necessarily normal, but it is certainly logical. The voltage developed across a coil depends to some extent on the L/C ratio. If the capacity is too high the efficiency of the circuit is impaired. On the other hand, there must be some capacity in the circuit in order to allow of tuning. I think you will find that it is general that a set—especially a short-wave set—is more efficient on the bottom ends of the tuning scales than at the other ends. That is for the same reason.

Changing the makes of condensers as you have done will not assist things. You are in the unhappy position that you cannot have your cake and eat it. In other words, if you want the convenience of a wide tuning spread on your set, and therefore use a comparatively large "tank" condenser, you must expect some loss of efficiency. But—the loss of

efficiency in your case certainly seems to be unduly large. Do you get better results with the tank condenser out than in circuit but on the same station?

If that is the case it rather looks as if the tank condenser is dielectrically inefficient and is causing losses. Carry out this test. Tune to a station that requires the tank condenser at minimum and the bandsread at about half way in or even at maximum. Then remove the bandsread condenser from the circuit and tune the station in with the tank condenser only. If there is no loss of strength you can reckon that the bandsread condenser is O.K. anyway. Then reverse the procedure. Tune in the same station with the bandsread condenser only in circuit, and with the tank condenser removed. If there is now an improvement you can be pretty sure that your trouble is not one of capacity loss but one of dielectric losses, and you will have to find a condenser that does not give that loss.

There is one possibility that I have not mentioned—the losses caused by the wiring to the tank condenser. If this wiring is inefficient you may be getting your loss there.

## POWER FACTOR

A. E. B. (Tooting).—*What is the power factor of a circuit?*

A short question, if you like, but, gee, what a corker! To be academic, the power factor is equal to the actual power in a circuit (A.C.) in watts divided by the product of the current and volts (volt-amps). It is also the figure obtained by dividing the resistance in a circuit by the impedance.

You know that in an A.C. circuit which has no impedance (or reactance) and only resistance the voltage and current are in phase. In such a circuit the wattage is the same as the volt-ampereage. And the power factor is unity.

When capacity only is present in a circuit it causes the current to "lead" the voltage, for current must flow into a condenser before a voltage can be built up across it. When there is only inductance in the circuit the current lags behind the voltage owing to the delay caused by the electrical inertia of the inductance.

With capacity the current leads by a quarter of a cycle and where only the inductance is present the current lags by a quarter of a cycle in relation to the voltage.

Now at a given instance the power in an A.C. circuit is obviously not the same as it is in D.C. circuits; it is not merely the volts multiplied by the amps. You may have amps and no volts, or volts and no amps. The power in the circuit is given in watts, but the watts are not arrived at in the same way as they are in D.C.

They are arrived at by means of the power factor, which is, in terms of the circuit, equal to the resistance of the circuit divided by the impedance.

It thus takes into account the proportion of resistance (having no phase effect, but having a current effect) to impedance (having no current effect, but having a phase effect.)

Thus in computing the power in an A.C. circuit we measure the volts and amps and then with a knowledge of the capacity, inductance and the resistance of the circuit we can calculate the power by means of the power factor.

Thus if the resistance divided by the impedance gives a figure of  $\frac{80}{100}$  (100 is usually taken as unity) we know that the power in watts in the circuit is the measured volt-amps times  $\frac{80}{100}$ , or .8 times the volt-amps.

The power factor is used in another way, too. It is used to denote the degree of goodness of a choke or condenser, or of a resistance. A perfect choke or condenser having no resistance should have a power factor of zero. That is, the circuit with only the choke in it would have no resistance and thus the power factor would equal zero divided by the reactance of the choke, which would work out to zero. In the same way a circuit, or component with no resistance but all capacity would give a similar equation.

$$P \text{ (power factor)} = \frac{R}{Z} = \frac{0}{Z} = 0$$

Where resistance only is concerned the power factor formula becomes  $P = \frac{R}{R} = 1$ . That may seem

funny, you thought it would be R divided by 0? Yes, at first sight it seems so, but you must not forget that if a circuit has only resistance and no inductance or capacity it must still have some figure included in the impedance figure for impedance is not only inductance or capacity or both, but resistance as well.

## A Typical Example

Let me explain again. Take a choke which has one henry inductance. Assume it has no ohmic resistance. Its impedance would be calculated on the fact that it had one henry inductance. But if it had resistance as well, say, 10 ohms, the impedance of that choke would be more than if it had no resistance. That is because not only will the inductance of the choke limit the current change but the resistance will limit its flow. Similarly in a condenser the reactance of the condenser must be considered and so must resistance.

Now you will see why the power factor of a circuit or component can only be unity when there is only resistance there, while it is zero if there is only inductance and no resistance.

Thus we find that chokes, condensers and resistances are given power factors to denote the efficiency of the component. A perfect choke or condenser would have a factor of zero, for it would have no resistance. A perfect resistance would have a power factor of unity, or 100 per cent., for it would have no impedance.

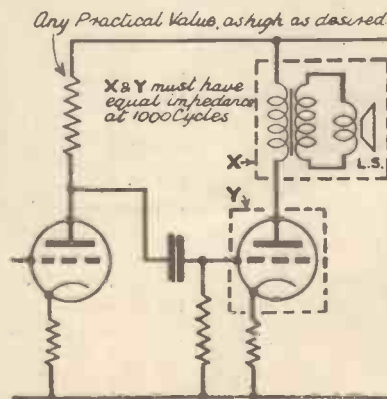
I hope I have cleared the matter up for you. It is a knotty problem to explain without going into lengthy discussions on A.C. working. But that briefly is what the power factor is. It is usable in two equations, one to determine the actual power in watts in an A.C. circuit knowing the volt-amps.

$$P = \frac{W}{VA}$$

And it can be used to find either the resistance or the impedance of a circuit provided the other is known.  $P = \frac{R}{Z}$ .

## TECHNICALITIES EXPLAINED—No. 55

### Matching



The term used to denote that the impedance of an output valve and that of the loudspeaker into which it feeds power is the same.

It is essential that the impedance of the two be the same at any arbitrary frequency—usually about 1,000 cycles—in order that the valve may deliver its maximum power to the loudspeaker. Where a valve is used as a voltage amplifier as in the earlier stages of the set the anode load may be as high in impedance as you like, the higher it is the more amplification is obtained provided that the H.T. voltage is maintained.

But when it comes to the output valve it is a different story. In this case the valve has to turn grid volts input into anode circuit watts. It has to pass current, and to deliver as great an anode current change as possible. It does this when the load in its output circuit is equal to the working impedance of the valve. It is the achievement of this condition that we call matching.

# MIDNIGHT SEARCH FOR CABARET STARS

Archie Campbell gives "P.W." some interesting facts about his popular variety shows

LONDON after midnight is a metropolis of strange contrasts.

Within the square mile of the City's boundaries, towering blocks of offices stand gaunt and empty along deserted streets. Now and again a passing taxi or a market-gardener's van bound for Covent Garden breaks the silence of the night.

Yet only a few miles away in the heart of the West End it is "peak hour" in the night clubs, where hundreds of immaculate bright young things—and bright old things, for that matter—find their fun in the early hours of a new day.

### Special Visits by Producers

Cabarets come to life. Like sophisticated pixies, the gay makers of West End whoopee work while dew is gathering on the roofs of London's dormitory suburbs. But the whims, the vogues of cabaret audiences are capricious; so soon do they tire of an "act," even of a "star," that the hectic pursuit by theatreland for something temptingly novel and new is eclipsed by Mayfair's unending treasure-hunt for talent.

Consequently, cabaret merits frequent visits by the B.B.C. producers who specialise in the production of shows akin to cabaret.

During the two years that Archie Campbell's productions of the intimate, sophisticated type of variety show have become well known to listeners, he has visited practically every important cabaret show in the West End. As a result, many artists who otherwise would have been unknown to radio have taken part in B.B.C. programmes.

"One of the things that I have tried to do," he said, "is to put coloured cabaret on the air. A great many coloured artists were appearing in the West End, but we had not used them very much. In an attempt to cover this deficiency we started in a very humble way with a 'Harlem Half-Hour' series of isolated turns. Then, with the help of Annette Mills, we devised a show with a Harlem atmosphere called 'Molasses Club' and, since, 'Night at Molasses Club.' A New York negro collaborated with us to get the right sort of dialogue.

"The main difficulty was in getting coloured artists—in fact, cabaret stars in general—to attend rehearsals in the morning. They work all night and sleep till noon, as a rule; so we just have to arrange afternoon rehearsals.

"Once one has a 'star' for radio cabaret there is a lot of work to be done in arranging the act in a way that makes the artist 'recognisable' over the air. Normally, so much depends in cabaret upon what the audience sees; absence of vision complicates matters for us.

"Douglas Byng, for example, invariably appears first in 'tails' and then in comedy dress. One needs just the right thing for him to sing, so as to compensate for the fact that listeners cannot see him. So you can understand that his numbers either need a strong character angle or must have lyrics that are sufficiently descriptive. You know, things like 'Milly the Messy Old Mermaid.'

"Then there is the importance of getting your 'star' in the right part of the show; for although in ordinary cabaret the usual thing is to build up to the biggest act, it may be preferable in radio cabaret to have the star turn in the middle of the show. Very different, even, from cabaret on the cabaret floor.

### Good Native Fun Wanted

"Cleaning up scripts is a pretty pastime." Archie Campbell's look of disgust belied his words.

"You see," he said, "certain artists who are well known in cabaret do sometimes use material that is not, shall we say, possible on the air. It is part of our job to draw the line for a radio show without spoiling the act. But the B.B.C.'s attitude is that ripe English humour is not necessarily a miss, so long as it is not suggestive or otherwise nasty. Good native fun is the thing.

(Continued on next page.)

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OSLO 1 p.m.				ROME 1 p.m.
LENINGRAD 2 p.m.				ISTANBUL 2 p.m.
TORONTO 7 a.m.				HELSINKI 2 p.m.

## MIDNIGHT SEARCH FOR CABARET STARS

(Continued from previous page.)

"It is only fair here for me to emphasise that cabaret artists themselves are most anxious for us to do any spring-cleaning that we think necessary. They are the very last people who would wish to offend any listener.

"For bigger light musical shows it is necessary to work to a rather different plan. First I read the script; the music is tuneful and the story quite picturesque, with scope for a background that will let listeners know at once where the scene is set. So far, so good.

### Careful Casting Essential

"At this stage I usually re-write the whole thing, adapting it to my own ideas and casting it in my mind as I go along. Then I see if my imaginary cast can come to life—whether the people who I have in mind are available. If the 'star' cannot

accept the engagement, it is often essential to re-build the entire cast around another personality.

"Of course, the music has to be orchestrated always by someone who has a flair for the type of show concerned.

"But careful casting is really fifty per cent. of the show. After that, the most important thing is to present a sound picture that is not a flat canvas. In other words, I try to make the characters and scenes stand out in their correct perspective. That is frequently possible by such little dodges as getting members of the cast to speak from different spots, or walk past the microphone as they speak their lines, and so on. During a show the other day, one of the principals was supposed to be driving up in a pony-trap, to be greeted as she stopped by a number of people. It was easy to get the necessary sound effect by arranging for the welcoming crowd to stand at first some distance from the microphone and to walk slowly towards it as they called their greetings. In effect, the microphone became the pony-trap."

### Thousands of Stations

It needs very little imagination to see that if all these precautions have had to be taken in regard to a few hundred broadcast stations, it would be well-nigh hopeless to expect any sort of satisfactory working when literally millions of small transmitters would be operating and criss-crossing with one another throughout the world. You may say that these small private transmitters would mostly be used for short-distance communication, but this is really a fallacy. In the first place, they would not be of great use if they were limited to short range, although they would still serve a purpose, and in the second place, even though they should be only capable of sending over a short range, there would still be infinite confusion within that range. Just think of the state of affairs in London, for example, if there were, say, 500,000 transmitters, of which 50,000 might be operating simultaneously at any one time, even if the range were limited to 5 or 10 miles.

### What of the Future?

At the present time the proposal is quite unthinkable, but that is not to say that some day radio engineers will not find a solution to it. In the United States, short-wave transmission and reception are used quite a good deal by manufacturers and others for private communication between one factory and another, often separated by distances of many miles. This problem of private radio communication is first cousin to that of the "radio relay" which is now proving so popular in this country. The radio relay system receives broadcast programmes by radio and then sends them out to its various subscribers by means of what are virtually telephone lines. In the United States the same sort of thing is done by the system called "wired radio," whereby radio transmissions may be superimposed over the ordinary telephone line. You can still use your telephone line for its ordinary purpose, but it serves also as a "guide" or channel for the high-frequency radio broadcast. In this way the radio is fed along the particular conductor and so is not "broadcast" in the ordinary sense.

(Continued overleaf.)

## TECHNICAL JOTTINGS

From an Expert's Notebook

By Dr. J. H. T. Roberts, F.Inst.P.

### Home Transmitters

Ever since radio was first thought of people have been saying that the time must come when we shall all have small home radio receiving and transmitting sets with which we shall be able to communicate with selected individuals, friends and others, just as we can now pick up the ordinary telephone and ring up anybody in practically any part of the world.

This would certainly be a very desirable state of affairs, but it seems that, for the present, at any rate, and perhaps for a long time to come, the natural difficulties of the problem will prevent us from finding a solution. In particular I refer to the difficulty of avoiding chaos in the ether, with almost innumerable transmissions being sent out on wavelengths which would be very close together and in many cases actually identical.

### Broadcasting Channels

We all know the difficulties which have been met with in finding suitable channels for the various broadcasting stations in Europe. The total number of such stations is infinitesimal compared with the number of "insect" stations which would be in operation if everybody who has an ordinary telephone to-day had a private radio transmitter to-morrow. With regard to the European broadcasting situation, various international conferences have from time to time been held, attended by some of the greatest engineering experts in the world, with the object of finding means of avoiding the interference and confusion which would otherwise arise between these stations. As you probably know, agreements have had to be made between different countries with regard to the allocation of particular wavelength bands and all manner of restrictions and mutual working arrangements have had to be devised and entered into, so as to keep the party clean, as it were.

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**TECHNICAL JOTTINGS**

(Continued from previous page.)

**Edison's Inventions**

I dare say many of you will be surprised to know that Edison, amongst his many inventions, worked out a system for communicating with trains whilst actually in motion. It is fairly commonplace nowadays to communicate with moving vehicles by means of radio, but long before radio as we now know it was invented it was possible to communicate with a moving train; this was done by an electro-magnetic induction system working from a telegraph wire alongside the track and an extended wire—what we might now call an aerial—fitted along the length of the train. Without any further explanation you can easily see how inductive effects would take place between these two parallel wires, and the fact that one of them was moving in a direction parallel to itself would make no difference.

**Talking to Moving Trains**

Communication with moving trains in this way has often been used by railway concerns, and the question has many a time been raised as to whether the same system could be applied to moving cars on the road. There are many technical points that would have to be solved, one of which is that the communication would be common to all cars and would not be limited to any particular car or set of cars except, of course, by some sort of code arrangement. But if something of the kind could be evolved it would be a great advantage for cars to be able to receive messages and instructions while actually in transit on the roads.

For still further increase in transmission speed, machine "keying" is used, and it is promised that before another year is out this system will be developed and extended so as to provide "facsimile transmission" to aeroplanes.

**MARCONI—THE MAN AND HIS WIRELESS**

(Continued from page 316.)

"What new and great discoveries lie beyond this wall no one knows," said Dr. Bose; "but more than one high authority believes that these discoveries will startle the twentieth century more greatly than the nineteenth has been startled. To suggest in the crudest possible fashion how the ether is at present regarded by scientists, imagine that the whole universe, to the uttermost stars, is a solid mass of colourless jelly; that in this jelly the stars, solar systems and space-worlds are embedded like cherries in a mould of fruit jelly. . . . In short, this jelly or ether is a universal substance so thin that it permeates everything in space on earth. Only by its quivering, only by the waves in it, which light rays and electric rays excite, are these rays enabled to travel and produce their various results.

"Strange to say, considering the number of brilliant electricians to-day, and the enormous amount of interest in electrical phenomena, it has been left to a young Italian scientist, Guglielmo Marconi, to frame the largest conception of what might be done with electric waves and to invent instruments for doing it."

*One ship drives east, and another west,  
With the self-same winds that blow;  
'Tis the set of the sails, and not the gales,  
Which decide the way we go.*

*Like the winds of the sea are the ways of fate,  
As we voyage along through life;  
'Tis the will of the soul that decides its goal  
And not the calm or the strife.*

REBECCA WILLIAMS.

**OUR SHORT-WAVE CONTEST**

Will readers please note that the names of the winners of the above contest will appear in next week's "P.W."

These are just a few of the practical complications of radio—using the term now in its very widest sense—which may materialise during the course of the next few years. The more we see of radio the more we realise that, so far from its possibilities becoming exhausted, they seem to be ever increasing.

**A Novel Aerial**

An interesting new type of aerial is one which has lately been installed at a station in California by the American Air Lines Company for the purpose of sending code messages across the country without relay stations. The aerial consists of a huge 20-ft. loop and is used in conjunction with an 800-watt transmitter. In addition to sending code messages long distances without relays, this also sends modulated messages—voice transmissions—over 500 miles. The transmitter is also equipped with a dialphone system for changing instantly from day to night frequencies.

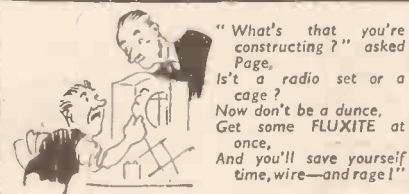
By the use of this new "beam" transmitter for sending messages much more rapidly, it is expected that the safety of the aeroplane service will be greatly improved.

**NEXT WEEK**

**CHAPTER III**

**ACTS IN AN OCCULT DRAMA**

Marconi's conquest of space—Efforts to belittle his achievement—What he accomplished where others failed—His foresight in wireless—Lessons he learned from electrical pioneers—Maxwell discovered the "ether"—Hertz produced electromagnetic waves—Foundations upon which Marconi built—What Popoff did—A phenomenon Edison saw in his lamp—An outstanding prophecy by Sir William Crookes—Marconi's practical tricks of magic on the stage science set for him.



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# THE "P.W." CROSS-COUNTRY TEST

Details of the 40-metre experiments conducted during the  
Whitsuntide week-end

By **LESLIE W. ORTON**

**W**ELL, boys, at last your patience is being rewarded, and here is the tale of the POPULAR WIRELESS cross-country test which I conducted recently. A tale of misfortune and thrills, a tale that will awaken the spirit of adventure in many of you and make you yearn for the wide open spaces—Hyde Park, and so on!

### Bad Luck

At the stroke of 4 p.m. the test commenced, when G 6 A Q took the air on 40 metres, and my colleague (Mr. Arthur Bird) gave some preliminary tests to let our invisible audience know that we were alive and kicking! Then we set off for South Wales full of good cheer. Unfortunately, in this topsy-turvy world it often happens that when everything seems to be going on splendidly Fate has a nasty jar awaiting you. And on this occasion we ran over the jar near Stokenchurch. With many a muttered exclamation the driver and I set about repairing the damage, whilst Arthur, fortunate fellow, had the more enviable job of carrying on with the tests—it being nearly 5 p.m.

Reception in this part of the world was excellent, and besides logging numerous amateurs I also heard several broadcasters at excellent strength, despite the fact that our aerial was decidedly poor.

### Towards Wales

Our next test was conducted midway between Oxford and Witney, and once again our aerials would have disheartened a charwoman if she were to use it as a clothes-line—the highest point was four feet! We called several amateur stations, and our transmissions were heard by several listeners. Reception at Witney appeared to be blanketed, however!

Just over two hours later we passed through the broad streets of Cheltenham. Then on to Gloucester, across the Severn, through Lydney and Chepstow, to Newport.

G 2 J L of Newport was co-operating with us, and we gave this hardened "ham" a call, and then went on our way towards Cardiff.

### Help from the Cardiff Club

Ahead of us we saw a sign "Croesaw gan Caerdydd." No, it was not a new form of traffic sign, but Welsh for "Welcome to Cardiff"!

And what a royal welcome we were given by the Cardiff and District Short-Wave Club boys, who turned up in force to greet us; you would have thought that they hadn't seen a car before, they were so excited!

The co-operation of this club was something to be remembered, and I was delighted to have the opportunity of personally thanking Mr. Hugh Phillips, its secretary, and those present for their splendid help.

Determined not to miss such a merry group our Press photographer rigged up his camera. "Whatever are you doing,

man?" a passer-by inquired, with a look in the car. "Transmitting to the moon," we explained; we were enjoying ourselves!

The South Wales stations G 5 B I and G 8 N P of Cardiff and G 8 A M of Penarth were co-operating with us, and so we gave them a call—thence on to Porthcawl.

### Porthcawl is Surprised

Next morning, thoroughly refreshed after a good night's sleep, we got into the car and proceeded to a lane some distance from Porthcawl. Here we rigged up two splendid aerials, one for transmitting and the other for receiving, and from 10 a.m. to 12.30 p.m. we conducted tests with other stations. Our signals were heard well in the surrounding district, despite the fact that our power was a mere 3 watts.

Optimism seized us, and we gave a call in French (Parlez vous Francaise?) and almost immediately a French station came back calling "Le station Anglais," but the operator spoke so rapidly that we quickly realised it was hopeless to try to discover whether he were replying to us or not.

During the morning I arranged with members of a radio club to operate receivers in the vicinity so that we might get some cue as to how well we were getting out. We were delighted, volume and quality were

excellent, and "G 6 A Q calling test from a car in Porthcawl, Glamorganshire" created quite a sensation in the neighbourhood!

### Homeward Bound

The return journey was commenced earlier than originally intended owing to a poor tyre having been substituted for the punctured one.

Transmissions were, of course, made according to schedule, and among the stations called were G 6 D B; G 2 J R, Coventry; G 8 G N, Monmouth; G 2 V J, London (designer of the portable X'mitter); G 1 G T K, Belfast; and our Cardiff, Newport and Penarth friends.

Although our schedules were put out somewhat by unforeseen circumstances (resulting in a number of listeners missing the tests), the experiment as a whole was thoroughly successful, and I would like to take this opportunity of thanking you all for your able co-operation—I'm proud of you!


## SOCIETY NEWS

**R**ECENT activities of the Southall Radio Society (Hon. Sec., H. F. Reeve, 26, Green Drive, Southall) have been a very successful trip to Paris and direction-finding experiments.

The Paris excursion, arranged in connection with the Paris Salon T.S.F., was supported by more than thirty members and friends. Mr. S. Gould was the organiser.

In the direction-finding contest of the Golders Green and Hendon Society, Southall teams finished 1st, 2nd, 3rd and 5th, the leaders being Messrs. Swann, Lee, Rapsey and Pinsent.



**HAVE** you ever  wondered why "Popular Wireless" always specify a Stentorian—why your friends, asking a set maker about using extension speakers, are nearly always given the same advice?

If you go to your dealer's and **HEAR** one, you'll quickly know; and nothing will stop you from having one yourself! Prices from 23/6.

# 1937 Stentorian

PERMANENT MAGNET MOVING COIL SPEAKERS

Write for booklet to WHITELEY ELECTRICAL RADIO CO., LTD. (Information Dept.), MANSFIELD, NOTTS.

# THE SULTAN WHOSE HOBBY IS RADIO

(Continued from page 313.)

found the two Norwegians very consistent in daylight, but at night they are spoiled by Lisbon, who shares that wavelength.

The Norwegian relays on 352.9 metres—Bodo, Porsgrund and Stavanger—are in the "pretty-decent-as-a-rule" class. But the promotion of Bergen and Fredrikstad to 415.4 metres seems to have turned the heads of those two young fellows, and little has been heard of them.

"Medium Wave" promises to write me again soon, giving the latest news of reception on his aerial.

## The George Washington of Space

ALL the Daventry short-wave transmitters have call-signs beginning with G, so our American friends call them the G-string. This serves to distinguish them from the German short-wavers which are known, for similar reasons, as the D-string.



America is now tuning-in the G-string with great interest, because of its new high-power transmitters

recently put into operation. There are three of them, having a power of 50 kw. each; and though they made Daventry the best-equipped station of its kind in the world room has been left for a fourth transmitter, just in case it's wanted.

It is too early to know what the world thinks of the new G-string, but Daventry's old 10-kilowatters had many friends abroad, because of their freedom from propaganda and political bias. As one American writer put it, "When you hear the Daventry announcer you hear the George Washington of Space."

## "Good Morning, Boys!"

HOW would you have liked to learn your lessons in a classroom containing a concealed microphone, controlled by a switch in the headmaster's study?



This Narkovian touch in education has been introduced with some success in America. Without leaving his study the headmaster has "visited" class after class in quick succession, to find out exactly what

they were doing. The scholars were unconscious of the visit at the time—but I dare say they heard about it later!

It should not be beyond the wit of school-boys to prove that two can play at this kind of game. One of these days the headmaster, switching on his loudspeaker, is going to get the biggest earful of home truth that scholarly research can reveal.

## O.K., N.P.L.

AMONG the frivolity and thistledown which usually comprises my correspondence there sometimes intrudes the stern-looking letter of Officialdom. Opening a massive missive from the Department of Scientific and Industrial Research the other day, I learned, with trepidation, that the Secretary of the Department of Scientific and Industrial Research presented his compliments and begged to announce—*here, what's this?* He begged to announce that the Lord President of the Council has appointed Professor W. L. Bragg, O.B.E., F.R.S., to be director of the National Physical Laboratory.

This is great news, chaps. We all know Professor Bragg. He is a scientist so eminent that he does not need to look down on you and me, but treats us as though we knew what he is talking about—which, by the mercy of Allah, we sometimes do!

Professor Bragg will assume duty next autumn. All together, whoopee! for the N.P.L.'s new Director.

## "MIKE" SLIPS AND QUIPS

### Cricket Commentator:

The stands are crowded with men and boys, also ladies—in fact, the ladies are just as keen on cricket and the results these days as men—er—men are these days.

### During a Talk:

Although I am happily married, I hear other wives openly disgusting their husbands—I mean discussing their husbands.

### Announcer:

Now we have the married man's theme song: "I'd rather listen to your eyes."

### Announcer:

In fact, his voice earns him many a golden guinea every time he lifts it up.

### Uncle in Children's Hour:

He opened the letter, blew his nose, folded it in two, and put it on the mantelshelf.

## Called to the Courts

TUCKED away in a corner of my newspaper I saw the other day a curious new use to which radio has been put in Vienna.

For the first time in history an ecclesiastical court made use of broadcasting to summon one of the parties, an English-woman by birth, to the trial of a matrimonial suit.

This novel method of summoning the woman was used because her address was not known. Unless she appears before the court on June 14th the case will be settled in her absence.

## The Radio Sultan

BROWSING round the radio sets in the Science Museum, South Kensington, the other day, was a tall, distinguished foreigner, who cast an expert eye over all the exhibits relating to wireless. He was the Sultan of Sheher and Mulkalla.

Unless your geography is of matriculation standard you will not know where Sheher and Mulkalla are; but if you imagine you are on a ship going down the Red Sea, and you have just reached the end of Arabia and turned left for India, well,

Sheher and Mulkalla are just over there on your left, near Aden.

The Sultan has made so many receiving and transmitting sets that nothing will now satisfy him but to build his own broadcasting station, so he is taking the gear back with him.

Where hobbies are concerned, radio is "tops" with the Sultan. He loves motor-ing also, and of the fourteen cars in his country seven of them are in the royal garage.

## Educational Interlude

IT is a long while since we had a schoolboy story, so I recount the following with special gladness.

The teacher had been explaining the word "international" to the class. To make sure that it was clearly understood, he said, "Write down a sentence in which the word 'international' is used."



Brows were bent and pencils were bitten over this problem, and then the results were read out. One genius had written, "Our wireless set is good on the Regional, but some foreign station always butts international and spoils the programme!"

## Television D X

Television's sound accompaniment from the Alexandra Palace station, London, has been picked up on a one-valve ultra-short-wave pocket receiver at Swindon, Wilts.

## 30,000 Intruders Invade Studio!

EVERYBODY realises that one unwanted broadcaster in a studio can spoil a programme; but all radio records were broken recently in Boston, Mass., when 30,000 intruders started kicking up a very father and mother of a row in the middle of a broadcast.



They were on the warpath, too, for buzzes and yells announced to astonished listeners that something altogether out of the ordinary was happening. It was. Somebody had dropped a hive of bees!

There was no warning of this remarkable incident. At one moment an official of the State Department of Agriculture was talking quietly about keeping bees; the next moment he had dropped a big hive, and the 30,000 stinging interrogators were out looking for trouble.

Nobody knows how many stings that official got, but he kept his head like a hero. No bees escaped from the studio, and eventually, with the aid of stink bombs and such, all the bees settled down again.

ARIEL.

# The RADIO Bulletin

Up-to-the minute news concerning the radio industry

**A**N amplifier designed for P.A. hire work has been introduced by Watamps of Tottenham, London. Called the "Dealer's" amplifier, it is designed for operation from A.C. mains and includes a gramophone motor and pick-up. The total weight is 70 lbs. and the circuit features a push-pull output stage giving an undistorted output of 20 watts. Two meters are connected in circuit with the output valves so that a visual check can be made of the quality going out to the loudspeakers. The gain is sufficient to enable a carbon type microphone to be worked and fully to load the output valves.

Gramophone and microphone inputs may be suitably mixed and superimposed. A tone control is also incorporated.

The price of the amplifier is 29 guineas.

## HOW BROADCASTING HELPS

Radio artists sometimes find that broadcasting proves a short cut to fame in other spheres of entertainment. Mr. Leslie Cardew, who is Publicity Manager of the Pinewood Film Studios, is one of those who listen to likely broadcast programmes with the idea of spotting talent. It is interesting to note that Mr. Cardew uses a G.E.C. car radio receiver when on the road. This set incidentally has a double interest as it is now being used in "Night Ride," a Paramount British film in course of production at Pinewood.

## NEW MAINS VALVES

The Ever Ready Radio Valve Company, Ltd., announce two new A.C. mains valves. One of these, the A70E, is an output pentode with a seven-pin base, priced at 18s. It is designed for a heater voltage of 4; a heater current of 2.1 amps.; a maximum anode voltage of 250 and a maximum auxiliary grid voltage of 250.

The second valve, the A36B, is a triode hexode frequency changer with seven-pin base, and costs 15s. In this case the heater voltage is 4; heater current, 1.45 amps.; maximum anode voltage, 250; maximum screen voltage, 150; and maximum oscillator anode voltage, 100.

## PROPER INSTALLATION DESIRABLE

Philco's draw timely attention to the desirability of proper set installation. Many of the advantages of the modern set, they point out, can be nullified if an inexperienced person installs the aerial and the receiver, or if the aerial is not suitable. Hence all owners of new Philco sets are urged to allow their dealer to install both receiver and aerial so that the highest efficiency can be obtained.

## LATEST PHILCO ALL-WAVER

This well-known firm, by the way, has just released another People's set. This new model, which sells for nine guineas, is designed for A.C. mains and covers the

short waves as well as the medium and long wavebands. On the short waves the wave-range is 16.6 to 52.6 metres. The circuit is a superhet and five valves are employed. The undistorted output is 3 watts and the power consumption 60 watts. A new design dial is fitted, this being calibrated in kilocycles and megacycles with the names of short-, medium- and long-wave stations plainly marked.

## FOR BATTERY USERS

Portadyne Radio have introduced a new all-wave battery superhet. This set is priced at £9 17s. 6d. less batteries, and is fitted with full A.V.C. On the short waves the coverage is 16 to 48 metres and the H.T. battery current consumption on the medium and long waves is 9 milliamperes, and on the short waves 13.5 milliamperes. A switch is incorporated in the set to cut out the pilot lamps when not required, so as to economise in L.T. current.

The dial is calibrated in wavelengths and station names, and provision is made for a gramophone pick-up or an extension speaker to be used if required.

## THE G.E.C. TRANSPORTABLE FIVE

(Continued from page 326.)

we do not believe more than a very few of the purchasers of this model will even try an external aerial. They will find the performance without it absolutely satisfactory.

Yet we would not raise one word of criticism regarding the provision of aerial and earth sockets. At most they can add but a copper or two to the cost of the set, and that is hardly likely to influence the list price at all, but if they weren't there...! Their value is largely psychological but none the less real.

There are, however, two other sockets which will probably be used extensively. These are for connecting external low-impedance loudspeakers. A plug is supplied for this connection. When the plug is pushed right in the loudspeaker in the set itself is switched out of action. By partially withdrawing the plug the speaker comes into operation again. The external speakers will work until the plug is completely withdrawn.

A very simple, ingenious and useful idea, and one which we believe is only to be found on G.E.C. sets.

### For A.C. Operation

The "Transportable Five" is for use on A.C. mains between 190 and 250 volts (40-100 cycles), and there is a special model for mains of 110-130 volts. This model is also suitable for 210-230-volt mains.

The wavebands covered are: 200-550 metres and 1,000-2,000 metres.

An undistorted output of 3 watts is given.

The quality is really first-rate, and tuning with the aid of the large, smoothly operating single-tuning control, the accurate calibration and very alert and bright visual tuning indicator so simple that anyone can tune-in even distant stations with the greatest of ease.

At 16 guineas we consider this G.E.C. "Transportable Five" a most attractive proposition and one which we can unhesitatingly recommend to our readers.

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All communications should be addressed to Advertisement Department, "Popular Wireless," John Carpenter House, John Carpenter Street, London, E.C.4.

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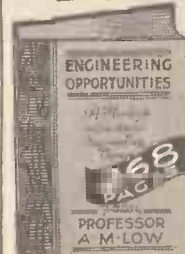
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# "P.W." LIST OF EUROPEAN BROADCASTERS

This list contains the more important European medium and long-wave stations which are likely to be received in this country. There are some relay stations working on very low power and sharing common wavelengths. These have been omitted because their programmes are usually too weak or badly interfered with to be of value to British listeners.

WAVE-LENGTH.	STATION MEDIUM WAVEBAND.	COUNTRY	POWER KW.	WAVE-LENGTH.	STATION MEDIUM WAVEBAND.	COUNTRY.	POWER KW.
203.5	Plymouth	Gt. Britain	0.3	356.7	Berlin	Germany	100
203.5	Bournemouth	"	1	360.6	Kiev	U.S.S.R.	35
206	Eiffel Tower (Paris)	France	7	364.5	Bucharest	Rumania	12
215.4	Radio-Lyons	"	25	368.6	Milan (No. 1)	Italy	50
233.5	Aberdeen	Gt. Britain	1	373.1	West Regional	Gt. Britain	70
236.8	Nürnberg	Germany	2		Penmon	"	5
238.5	Riga	Latvia	15	377.4	Lwów	Poland	50
240.2	Saarbrücken	Germany	17	382.2	Leipzig	Germany	120
242.9	Cork	Irish Free State	1	386.6	Toulouse (P T T)	France	120
243.7	Gleitwitz	Germany	5	391.1	Scottish Regional	Gt. Britain	70
245.5	Radio Marconi (Bologna)	Italy	50	400.5	Burghead	"	60
247.3	Lille (Radio P T T Nord)	France	60	405.4	Marseilles (P T T)	France	100
251	Frankfurt	Germany	25	405.4	Munich	Germany	100
253.2	Nice Cote d'Azur	France	60	410.4	Tallinn	Estonia	20
255.1	Copenhagen	Denmark	10	415.4	Kharkov	U.S.S.R.	10
257.1	Monte Ceneri	Switzerland	15	420.8	Rome (No. 1)	Italy	50
259.1	Kosice	Czechoslovakia	10	426.1	Stockholm	Sweden	55
	West National	Gt. Britain	20	431.7	Paris (P T T)	France	120
261.1	North National	"	20	443.1	Sottens	Switzerland	100
	London National	"	20	449.1	North Regional	Gt. Britain	70
263.2	Trieste	Italy	10	455.9	Cologne	Germany	100
265.3	Hörby	Sweden	10	463	Lyons (P T T)	France	100
267.4	Newcastle	Gt. Britain	1	470.2	Prague (No. 1)	Czechoslovakia	120
269.5	Radio Normandie (Fécamp)	France	15	476.9	Lisbon	Portugal	15
269.5	Moravska-Ostrava	Czechoslovakia	11.2	476.9	Trondelag	Norway	20
271.7	Kuldiga	Latvia	10	483.9	Brussels (No. 1)	Belgium	15
274	Vinnitsa	U.S.S.R.	10	491.8	Florence	Italy	20
278.6	Bordeaux-Lafayette	France	35	499.2	Sundsvall	Sweden	10
283.3	Bari (No. 1)	Italy	20	499.2	Rabat	Morocco	25
285.7	Scottish National	Gt. Britain	50	506.8	Vienna	Austria	100
288.5	Rennes-Bretagne	France	120	514.6	Madona	Latvia	50
291	Königsberg (No. 1)	Germany	100	522.6	Stuttgart	Germany	100
296.2	Midland Regional	Gt. Britain	70	531	Athlone	Irish Free State	100
298.8	Bratislava	Czechoslovakia	13.5	539.6	Beromunster	Switzerland	100
301.5	Hilversum (No. 2)	Holland	60	549.5	Budapest (No. 1)	Hungary	120
304.3	Torun	Poland	24	559.7	Wilno	Poland	50
304.3	Genoa	Italy	10	569.3	Viiupuri	Finland	10
307.1	Northern Ireland Regional	Northern Ireland	100				
312.8	Poste Parisien	France	60		LONG WAVEBAND		
315.8	Breslau	Germany	100	1107	Moscow (No. 2)	U.S.S.R.	100
318.8	Goteborg	Sweden	10	1153.8	Oslo	Norway	60
321.9	Brussels (No. 2)	Belgium	15	1250	Kalundborg	Denmark	60
325.4	Brno	Czechoslovakia	32	1293	Luxembourg	Luxembourg	150
328.6	Toulouse	France	60	1339	Warsaw (No. 1)	Poland	120
331.9	Hamburg	Germany	100	1379	Novosibirsk	U.S.S.R.	100
335.2	Helsinki	Finland	10	1389	Mofala	Sweden	150
338.6	Linz	Austria	15	1500	Droitwich	Gt. Britain	150
342.1	London Regional	Gt. Britain	70	1571	Deutschlandsender	Germany	60
345.6	Poznan	Poland	16	1648	Radio-Paris	France	80
349.2	Strasbourg	France	100	1744	Moscow (No. 1)	U.S.S.R.	500
				1807	Lahti	Finland	150
				1875	Radio-Rumania	Rumania	150
				1875	Hilversum (No. 1)	Holland	150