

MARCONI'S AUTHORISED LIFE-STORY (BEGINS) (INSIDE)

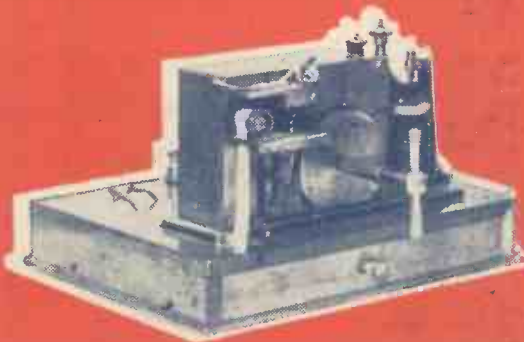
Popular Wireless & TELEVISION TIMES

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POPULAR WIRELESS AND TELEVISION TIMES

Editor: G. V. Dowding

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

ROYAL RADIO
REAL DX
B.B.C. HOAXED

RADIO NOTES & NEWS

LEONARD LAUGHS
OVER THE EIGHT
NEW HONOURS

Settling Down

ALTHOUGH the magnificent reception of the Coronation ceremonies in all parts of the world reflects, to some degree, the success of the new short-wave transmitters installed at Daventry, we have yet to feel the full benefit of these. Apart from the transmitters themselves the aerial system with which each is used is of great importance, and till now there has been little time to find the best combination of aerial system and high-power transmitter.

Tests will be going on continually for some time, but already the results indicate that our new Empire service, in its own field, is as pre-eminent as the home service of the B.B.C.

Royal Radio

YOU will remember that I have often recorded the great interest shown in radio matters by royalty all over the world. I think I should be right in claiming that Britain now has the most radio expert king of all.

When King George VI was Duke of York he became a keen radio set-builder, and one of his rooms was devoted to the duties of a workshop. Here he built sets not only for his own use, but for other members of the Royal Family, for friends, and for hospitals.

Only a few months ago he had two sets of his own make in constant use—one a radio gramophone, and the other an ambitious all-waver. Whether his new responsibilities will leave him time for wireless I cannot guess; but we can be sure that his heart will always be in our great hobby.

One-Girl Quartet

AMONG the Coronation visitors to London was a Danish girl, Miss Ann de Ohla, who has a four-in-one-voice. She can sing baritone, tenor, contralto and soprano.

When John Sharman, B.B.C.'s Music Hall Director, heard her, that much disillusioned official started to slap; he first slapped his thigh, and then slapped the lady's name down for a broadcast on June 10th. "For," said John, "it's uncanny; you can't detect even the slightest pause between her singing in each voice. The only trouble is that listeners will hardly believe that one person—a woman, too—is singing alone."

So make a note of the date, chaps: June 10th.

MY WORD

By THE EDITOR

FIFTEEN YEARS

This week "Popular Wireless and Television Times" reaches the completion of its Fifteenth Year. So I think we can claim to be "well established," don't you?

Certainly, we whose job and pleasure it is to produce your weekly "P.W." feel that those fifteen years lie behind us as a solid foundation. Not to rest upon, but to build on for the future.

Sometimes I rather envy those folk who can dig themselves down comfortably in a rut. And keep on doing the same thing in the same way year after year.



I said sometimes. That's not often. Those who live and labour on a low tempo don't get anywhere, and, believe me, the high-spots are worth aiming at, even if you can't always hit them, and you meet with frustration and disappointment now and then.

That's how we run "P.W." for you, anyway, and our growing number of new readers is proof that it is the right way, if proof were needed.

But it isn't, really.

It's just common sense. The snag is that generally the other way, the "sit-down" way, is the easier.

Not with "P.W.," though; those fifteen years are too important.

America on Medium Waves

MY old friend "Medium Wave" of Worksop, Notts, is back again in my post-bag, with a letter full of DX interest. Even with his uncanny instinct for receiving American stations on medium wavelengths, the months of April, May and June are reckoned to be a close season—though I should never be surprised to learn that "Medium Wave" had bagged a Yank during that apparently impossible period!

He gives DX-ers one first-rate tip: the best medium-wave transatlantic conditions are when there are a full moon, frost, and an anticyclone over the Atlantic. (The former two conditions are worthless without the latter.)

When "deep disturbances" are coming over the Atlantic it's a wash-out; on the odd occasions when an American signal can penetrate even a shallow disturbance "it comes through like a flea flying through a barrel of treacle!"

South America, Too

NOT content with picking up North America, my friend "Medium Wave" often gets South American stations on the ordinary medium wavelengths. He says: "When conditions are good for South American medium-wavers they positively bump in—in fact, sometimes I've wondered if I've got hold of a Continental station."

"As a rule S. American favourable conditions tally with unfavourable conditions for the Northerners; in other words, when the North is dead the South is alive. And when conditions are excellent the North and South Americans come over very strong together; when they share a wavelength you can imagine what it is like!"

Well, "Medium Wave," old chap, I hand it to you! It makes my envious gorge rise to know of a chap who—on ordinary wavelengths, mark you, not the shorts—gets South American stations so strongly that they jam the States.

That, my hearties, is capital D capital X, and no mistake.

It was a Hoax, Folks

IT is pleasant to be able to record that the B.B.C., having been hoaxed as completely as the veriest country cousin, came out of the amazing affair with credit; for the announcer in the National programme disarmed criticism when he said "Although that is the end of the news, here is some news of ourselves and a story against ourselves."

(Please turn to page 308.)



Courtesy Marconi's Wireless Telegraph Co., Ltd.
GUGLIELMO MARCONI, wizard of radio, was born at Bologna, Italy, on April 25th, 1874. You see him here (left) as a small child with his mother and brother.

GUGLIELMO MARCONI is an Italian who speaks English as fluently as his wireless "talks" all the languages of mankind. He is the last survivor of a romantic age in science; the last of the dramatic Edison era in which a man's invention bore his name as did his child.

Marconi's triumph lives with the radio; Morse's with the telegraph; Bell's with the telephone. They pioneered in the nineteenth century—in the Victorian era, when rugged individualism was a potent force in science. There may never be another genius to whom science will award the sole honour of a great discovery and historically link his name with the invention. Mass effort in the twentieth century's highly specialised era of mass production has put an end to such single-handed achievements.

Invention is now developed, promoted, commercialised and merchandised by specialists, but in Marconi's day the complete problem belonged to him who nurtured the idea. His invention was the mere beginning; "selling" the idea was the herculean task, testing every ounce of the inventor's stamina and courage. He stood alone!

To-day the glory of discovery is divided. No one man wears the crown. Invention is a laboratory product; a complex mathematical offensive, no longer the evolution of a simple idea born in the solitude of some visionary youth's attic workshop. Science now scatters and shares the inventive laurels; it emblazons the name of no lone

inventor. The new instrument emerges from the perfectly equipped, highly financed realm of research in which the worker's identity is lost amid plans, formulæ, slide-rules and machines. Already the forces of progress threaten to divorce Marconi's name from the ever-expanding invention, as is invariably the case when the originator's fame is dwarfed by the perpetuity of his achievement. Once it was always "Marconi wireless"; he personified wireless, and wireless was his life electrified. But when wireless gave way to the word "radio," and then radio to "broadcasting" and "television," the name Marconi was spoken less. Time, it can be seen, has a way of glorifying an invention, but the man who invented it shrinks into the ages which year after year dim the power of his name with the eventuality that he becomes almost a myth and his creation a commonplace thing.

Already the next generation may be heard inquiring who invented radio; who invented television? Old-timers and history books will tell them that Marconi discovered wireless, and from that as the root the communication tree spread its branches. Now it's nobody's radio; nobody's television, but it is Marconi wireless! Those who remember the Titanic will never forget!

Guglielmo Marconi brought everlasting glory to Italy. He was one of two Italians possessed of the idea of encircling the earth; one with sails, the other with sound.

Three hundred and eighty-two years after Christopher Columbus excited the imagination of the fifteenth century, Marconi was born, destined to thrill the twentieth century to the utmost as did the Genoese sailor before him. Columbus voyaged in the age of silence. His was an adventure of dangerous solitude on an ocean believed to be flat. From Spain, scoffing mariners watched his sails drop over the edge of the earth, gone for ever, but like some phantom he returned over a rounded sphere to tell the strange story of new lands over which he had unfurled the royal banner of Spain. He lived unaware that he had stepped upon a new continent. He died believing that he had sailed around the world to Asia.

MARCONI-

CHAPTER 1: THE BIRTH OF A WIZARD

The world as Marconi found it—Romance of invention—Marconi's birth-place—His parents—Influence of his mother and father—Traits he inherited—Boyhood and school—His introduction to Hertzian waves—Problems confronting the youthful experimenter—Steps that led to wireless—The conception of a big idea—The wireless dream comes true—First tests at Bologna—Instruments used to introduce Marconi wireless—How Branly's coherer helped—A father's scepticism and a mother's faith—The amazement of scientific patriarchs—Marconi's far-reaching conception of wireless—His first public demonstration—Bologna where invention thrives—The Marconi home—Marconi's first "laboratory"—Historic sign-posts in Bologna—An old-timer's recollections of Marconi, the boy—The triumph of "speechless messages."

Now, across an invisible sea of "ether" there lay hidden an unexplored continent in science. He who discovered it would find a short path to the Indies and to every city and hamlet on the face of the globe. The scoffers said no; by mathematics they attempted to show how the curvature of the earth, the very thing that Columbus proved, would stop such signals if ever hurled against the horizon by some man-made machine. They argued the world would have to be flat if such waves were to go far; they knew, however, the earth was an inter-stellar ball.

Science called upon Italy for a genius.

Had not the gifted Roman, Strada, fascinatingly anticipated that from Italy would come wireless, when in 1617 he published his "Prolusiones"? He envisaged two friends corresponding by the aid of "a certain loadstone, which had such virtue in it that if it touched several needles one began to move, the other, though at never so great a distance, moved at the same time and in the same manner." Each owner of such a needle device was portrayed adjusting it to a dial plate with the letters of the alphabet disposed around its rim. When they wished to converse one of them spelled the words, and they were reproduced at any distance by the sympathetic needle of the other.

Significant prophecy!

In the ancient city of Bologna lived the dignified Giuseppe Marconi, an able business man and gentleman of independent means, known among his neighbours as "the lightest-hearted and best-natured man in the town."¹ His first wife was of the Renoli family. She lived only long enough after her marriage to bear a child—a son, Luigi. In later years as a public servant he won the esteem of his native city in various capacities, finally being elected councilman on the strength of his personal charm and popularity among the people. By trade he was "an expert agriculturist."

Giuseppe Marconi's second marriage in 1864 at Boulogne-sur-Mer was with a blue-eyed, keen-witted Irish girl, Anna Jameson, youngest daughter of Andrew Jameson of Daphne Castle and Fairfield, Enniscorthy, County Wexford. The Jamesons were well-known whiskey distillers of Dublin. On the other side of her family she was related to the Scottish family of Haig. Anna went to Bologna to study music at the conservatory; she found love also.

¹ Died, March 27, 1904, Palazzo Alberghetti, Bologna (winter home).

-THE MAN AND HIS WIRELESS

By ORRIN E. DUNLAP, Jr.

This is the complete, authorised life-story of Radio's Number One Personality. Every paragraph of it has been read and corrected by Marconi himself. It will run exclusively in "Popular Wireless" in serial form and we feel sure readers will find it the grandest reading we have yet been privileged to provide. In the first long instalment you meet Marconi as a boy on the threshold of his amazing, dramatic career, with the key to world fame in his hand. But it is in the later chapters that the real drama of his life begins to unfold, and in these you will be able to read about his struggles to achieve full recognition, his historic legal battles and many thrilling incidents which signalled Man's conquest of the ether. Tell your friends about this great radio biography. It is unique and, aptly, is an exclusive "Popular Wireless" presentation.



THE KELVIN MEDAL is among the most valued of the many scientific honours awarded to Marconi. This historic photograph was taken on the occasion of the presentation of the medal by Lord Rutherford, at the Institution of Civil Engineers, in 1932.

Two children were the issue of this union: Alfonso, born November 22, 1865, and Guglielmo, who nine years later first saw the light of day on April 25, 1874, in the massive, heavily shuttered Marescalchi Palace (now Orlandini Palace), Via Tre Novembre 5, near the centre of Bologna and not far from the city hall. Guglielmo was baptised a Catholic in the Church of St. Peter at Bologna; his father was of the Catholic faith, his mother of the Protestant.

"Che orecchi grandi ha!" ("What big ears he has!") exclaimed an old servant of the house on seeing the little stranger for the first time. And what historic sounds they would hear when science tapped on their drums!

Time was all he needed. Here was an Italian born with a secret; in that drowsy bambino's dreams and in the solemn silence of the ether, wireless was lost.

² Died, April 24th, 1936, heart attack in London.

The world in 1874, plunging towards a century of greater speed and tumult, was more concerned with current schemes in the minds of men. What mattered another Italian baby born of an Irish mother? That was not news. Here's what the telegraph clicked on that day for the presses to print:

"April 25, 1874—President Grant vetoed inflation." That was the big story of the day in America.

Then more dots and dashes, "The King of the Fijis formally ceded the islands to England." . . . In New York, "Very respectable clergymen were discussing the Temperance movement and the nature of wine used at the feast of Cana." . . . In London Victoria was Queen; Mr. Gladstone made a speech

reviewing the Budget; Disraeli spoke about war rewards, in the House of Commons. . . . In New York the Italian opera "Don Giovanni" was sung at the Academy; Barnum's New Roman Hippodrome was in full swing "lit with a galaxy of lights, a dazzling appearance." . . . A survey-

(Continued overleaf.)

MARCONI: HIS HONOURS AND DEGREES

HONOURS

- 1897 Italian Knighthood.
 - 1902 Knight of the Russian Order of St. Anne.
 - 1905 Knight of the Civil Order of Savoy.
Knight of the Italian Order of Workers.
 - 1912 Grand Cross of the Spanish Order of Alfonso XII.
Medal of the African War (Italy).
Grand Cross of the Order of the Crown of Italy.
 - 1914 Knight Grand Cross of the Royal Victorian Order.
Senatore of the Kingdom of Italy.
 - 1919 Military Cross for World War Service.
 - 1929 Spanish Order of "Plus Ultra."
Created Italian Marquis by H.M. the King of Italy.
 - 1931 Knight Grand Cross of the Order of Menelik, Abyssinia.
Grand Cross of the Order of Pius, Vatican City State.
Grand Cross of the Sovereign Military Order of Malta.
 - 1932 Grand Cross of the Italian Order of St. Maurice and St. Lazarus.
 - 1933 Grand Cross of the Japanese Order of the Rising Sun.
 - 1935 Grand Cross of the Brazilian Order of the Southern Cross.
 - 1936 Grand Cross of the Chinese Order of the Jade.
Rear Admiral of the Italian Naval Reserve (June 20).
- Honorary Citizenships: Rome, Milan, Florence, Leghorn, Pisa, Genova, Bari, Rieti, Civitavecchia, San Francisco, California, Rio de Janeiro.

HONORARY DEGREES

- Doctor of Engineering: University of Bologna, University of Pisa.
- Doctor of Science: Oxford University, Cambridge University.
- Doctor of Law: Glasgow University; Aberdeen, University; Liverpool University; University of Pennsylvania; Louisiana University; Columbia University; Notre Dame University; Loyola University; Northwestern University.

- Doctor of Physics: Rio de Janeiro University.
- Professor of Electro-Magnetic Waves at the Rome University.

PRINCIPAL AWARDS

- Nobel Prize for Physics, 1909.
- Albert Medals, Royal Society of Arts (London).
- Gold Medal, Institute of Radio Engineers (New York).
- Gold Medal, Franklin Institute (Philadelphia).
- John Fritz Medal (awarded jointly by Institutes of Electrical Engineers and Mining Engineers for achievement in applied science, United States, with the motivation "for the invention of Wireless Telegraphy").
- Gold Medal, University of Bologna (awarded at Silver Jubilee of invention of wireless).
- John Scott Medal (Philadelphia).
- Silver Medal (International Mark Twain Society).
- Kelvin Medal, Institution of Civil Engineers, London.
- Goethe Medal, presented by President Paul von Hindenburg (Germany in 1932).
- Gold Medal, Royal Society of Rome.
- Gold Medal, Royal Academy of Science (Turin, Italy).
- Gold Medal, Italian Society of Science.
- Gold Medal, New York Electrical Society.
- Gold Tablet, Italian Institute of Electrical Engineers.
- Gold Medals from the cities of Bologna, Florence, Venice, Madrid.
- Gold Tablet by the survivors of S.S. Titanic.
- Gold Medal and Diploma of the Veteran Wireless Operators Association, New York.
- Medal "Gustave Traserter," Liège, Belgium.
- Medal "Exner," Vienna.
- Diploma of Merit in Science by the Pontificia Accademia Tiberina, Rome.
- Tablet "Viani" by the Humanitarian Society, Milan.

MARCONI—THE MAN AND HIS WIRELESS—Continued.

ing expedition was examining the proposed route for an inter-ocean canal across the isthmus through the State of Nicaragua.

Britain was building twenty-seven vessels-of-war, the largest the *Inflexible*, 11,165 tons, and the *Fury*, 10,950.

From Albany came the news that the Senate passed the Brooklyn Bridge Bill.

Sermons of Henry Ward Beecher were published in New York.

In Washington Congress appointed a committee to report on the desirability of establishing a postal telegraph system in the United States.

Opposition was rife in the forty-third Congress against a proposed item of \$2,000 to provide horses and carriages for the Department of Justice; a Senator recalled an old Spanish proverb, "Put a beggar on horseback and he will ride to the devil." Two widely discussed topics in the news were cremation as a great reform, and the "invention" of oleomargarin as a threat to butter.

Such was the world and its problems on the day Guglielmo Marconi first cried, cooed and whimpered a bit.

Columns and columns of news, long stories about people and things soon to wither in the news; not a single sentence about that boy born at Bologna, Italy. Too many others born the same day, and no way of telling if any one would leave more of a mark upon the world than greenbacks, rapid transit, or Gladstone oratory. Time gripped the answer in a babe's clenched fist, which only the years could open.

No soul in all Italy had the slightest inkling of what was inscribed in the book of life for this boy, else some fortune-teller might have hastened to read the stars. But it was just as well, for no one would have believed the tale could the lad's path have been charted from the cradle to the grave. It would have been too unreal; too unlike anything that had ever gone before in science. No one dreamed that the germ of a great scientific truth was hidden in that tiny head, back of those little blue eyes. Yet, Italian parents might well envisage accolades of science for each cradled son, for had not Italy presented Galileo, Galvani and Volta!

Who could have suspected that this babe "with no language but a cry," when grown to manhood would turn to the Pope in Vatican City and dramatically exclaim, "Be pleased, I pray you, let your voice be heard all over the world!"

The canopy of the heavens, the very emptiness of space far and beyond the spinning stars would be his laboratory as some day he moved to unmask a new science.

The story of this youth who hitched wireless to Italy's star is not that of the poor boy who climbed by sheer grit through misfortune and poverty. His life is no Horatio Alger from "rags to riches" yarn. It is the opposite; evidence that the rich man's son can strive and succeed.

Whether heredity or environment counts most in life matters not in this case, for Guglielmo Marconi was endowed with a richly balanced quality of both. Italo-Hibernian heritage is a rare combination which largely accounts for independent action, intensity and vision. From his Gaelic mother he inherited persistence, alertness, initiative and musical refinement;

from his Italian father, the power of conception, indomitable will and accuracy with a good business sense.

Guglielmo was very fond of his parents, and was particularly close to his mother, who was a guiding factor in his life. Hers was an immense influence. He does not remember that she ever scolded him for youthful impulses, for she was lenient as a rule, while the father was rather strict. Always with serenity the mother encouraged him in his studies and work. From her he inherited blue penetrating eyes and a cold countenance which concealed strong sentiments and emotions.

Boyhood was passed in the country at his father's extensive estate in Pontecchio, near Bologna, except for an interlude in

THE FIRST TRANSMITTER



Courtesy Marconi's Wireless Telegraph Co., Ltd.

A model of the first wireless transmitter used by Marconi. On the table is the induction coil, Morse key, and multiple ball spark gap. One side of the latter is connected to the aerial, which takes the form of a copper sheet slung between two posts. The other side of the spark gap is joined to earth.

London where he went with his parents when three years old. Old residents remember him as a delicate lad who shrank from rugged play, and early found his chief delight in books. There was quite a complete scientific library in Villa Grifone, the family residence, and he revelled in reading about steam engines and electricity; he learned all he could about them. Chemistry attracted him and he attempted to extract nitrate from the atmosphere. That helped to lure him into space! In the history books, men who interested him most were Napoleon, Garibaldi, George Washington and Edison.

Here was a boy of surpassing imagination, foreordained to venture far to the Antipodes

and out across the frontiers of the planet. He would go off the beaten paths of science; his vision would influence the subsequent course and history and the lives of his fellow men. But none of the neighbours suspected it.

Marconi never attended public school. His tutor on the parental estate was Germano Bollini, a grammar-school teacher of Pontecchio. When the family sojourned to Florence or to Livorno for the winter an instructor was engaged so the boy's studies would not be interrupted. When seven years old he attended the "Istituto di Cavallero Via delle Terme," at Florence. Some years later at Livorno he met Professor Vincenzo Rosa under whom he was initiated into the study of physics at the request of Signora Marconi, who was amazed at her son's passion for anything pertaining to electricity.

These winter migrations, made chiefly to dodge the severe weather at Bologna, because of Signora Marconi's health, were extremely educational for young Marconi. It was at Bologna, however, that he met Professor Augusto Righi of the University of Bologna, where Dante and Petrarch had studied and Tasso stood trial for his gall-dipped pen. Marconi was never a student at this or any other university. Nevertheless, both Rosa and Righi were attracted by the ardour the young man put into his studies, and by his intense interest in science.

After Marconi learned something of electromagnetic theories it did not take long for him to realise he was confronted with a jigsaw puzzle. All mixed up; all in tiny pieces, yet each fragment of utmost importance to some one who would fit ideas and devices into a finished picture—a practical system of communication for signalling through space without the use of connecting wires. Before this youth were strewn the pieces of a problem as cut out of electrical science by noted theorists and experimenters. A visionary with a practical mind was needed to put them together.

The young Italian observed a marked difference between Hertzian oscillations and ordinary alternating currents which had attracted the attention of several experimenters. This was the Marconi explanation:

An analogy may be found in the case of a sound wave in the air. The swing of a bell in a church steeple to and fro will produce no wave and no further sound. But if the rim of the bell is struck with a hammer it affects the air with sufficient suddenness to make a sound.

Hence it appears absolutely clear to me that there is no Hertzian wave telegraphy without the essential feature for producing Hertzian waves, which is the Hertzian spark.

Static or atmospheric electricity aroused his curiosity. He had read about Benjamin Franklin's experiments with a kite during a thunderstorm, and how Franklin proved lightning to be electricity. He studied Franklin's letter to the Royal Society of London in 1750, in which he suggested, "electrical fire might be drawn silently out of a cloud before it came nigh enough to strike."

In a reminiscent mood he told how as an inquisitive youth, he once erected a spear-like zinc contraption on the roof and connected it to apparatus inside the house. When sufficient static electricity was

collected a bell jingled. He was always on the watch for electrical storms, but when fellow students laughed at his bell-ringing alarm Marconi "closed up like a clam and went fishing." That was his great sport; he had the patience of an expert angler. Next to fishing he liked to ride horseback and travel; they were his hobbies, so his brother Alfonso recalled, until wireless came along, but even that did not dim his love for travel, especially at sea.

This "fisherman" and traveller at the age of twenty was ready to embark on an invisible sea on which no bearded savant had ever travelled.

The summer of 1894 found Guglielmo and Luigi in the Italian Alps on vacation. While enjoying leisure in the mountains of Biellese, the younger of the two Marconis happened to pick up an electrical journal in which appeared an article describing in detail the work of Hertz, who had died in January of that year. The story told how Hertz radiated electromagnetic waves with an electric oscillator he had developed, and how little sparks appeared in the tiny gap of a metal loop across the room, although there was no connecting link except the air. There was the germ of an idea and Marconi had time up there in the mountains to think it over. Why not use these Hertzian waves for communication? If they could leap across a room they might cross a town, a country, a continent—perhaps the oceans!

"It seemed to me," said Marconi in a lecture years later, recalling those thought-provoking vacation days in Biellese mountains, where he worked the idea out in his imagination, "that if the radiation could be increased, developed and controlled it would be possible to signal across space for considerable distances. My chief trouble was that the idea was so elementary, so simple in logic, that it seemed difficult to believe no one else had thought of putting it into practice. I argued, there must be more mature scientists who had followed the same line of thought and arrived at almost similar conclusions. From the first the idea was so real to me that I did not realise that to others the theory might appear quite fantastic."

Throughout that summer in the Alps, Marconi's brother found him always figuring and sketching queer-looking diagrams that looked like the hieroglyphics of some unborn race, for Marconi was no artist; he had no talents for drawing or painting; in fact, his wireless hook-ups had to be supplemented by verbal or written explanations. All summer long the dream of wireless floated vaguely, ever changing like a chameleon. The idea that had shaped in his mind's eye made him restless. Dreaming day and night of signalling with electric waves, he confessed, "the idea obsessed me more and more in the mountains of Biellese." When he left for home he followed a vision embedded in his mind. Something new in electricity—a winged spectre had beckoned to a restless youth. Irresistibly he followed it.

Upon arrival early in the autumn at Villa Grifone in Pontecchio, he lost no time in going to his third-floor workshop—the first Marconi laboratory. Within a month or two he was ready to test the idea. The results, however, were not so spectacular as the dream.

The spark sputtered across the induction coil's gap faithful to the laws of physics, but there was no sign of electrical life at

the receiver, as there had been in the scheme that buzzed in his mind. Someone with less confidence in science might have thought the idea but a mystification after all. Not so with this young man. He rearranged the instruments again and again for other tests, but all were disappointments.

It was autumn in 1894. And looking back to those portentous days he declared: "Ma non mi persi di coraggio"—"But I did not lose my courage."

Work, work, work, day and night—in fact, he lost interest in everything else. His mother became worried at the drawn, wan face; his eyes revealed the need of sleep.

Alfonso was his assistant; so were the peasants on the estate. Alfonso always delighted in telling the story of the beginning of wireless. The years never dimmed his memory of those historic days in the Marconi "backyard." Only a few days before his sudden death in the spring of 1936 he recalled the story of how his brother actually made many different tests before the electric "buzzes" really indicated they were "going places."

After having worked for a month or more to perfect the instruments, Guglielmo invited his father and mother upstairs, and in Alfonso's presence, too, the "wizard" demonstrated that he was able to ring a bell on the ground floor by pressing a button on the third floor without any connecting wires.

A few days later and signals were transmitted from one end of the house to the other, then from the house to the lawn. Wireless was on its way! Signora Marconi, although it was all a miracle to her, was firmly convinced that her boy was playing no prank. The father scratched his head; he wanted to figure it out. There was too much mystery in it for him. If there was any trick in it he would find out. He suggested that Guglielmo send the Morse letter "S"; he would go to the receiver on the lawn, and if the machine tapped off three dots he would be sure the magic worked through the air. And it did!

Signor Marconi was now more willing to lend financial assistance, so, when prevailed upon by Signora Marconi, Giuseppe contributed 5,000 lire (about £200) to the cause of wireless. With this financial assistance from his father and the moral support of his mother, the "boy" inventor, in the spring of 1895, was ready to test wireless in the wide-open spaces, and, if successful, offer it to the world.

On the work bench, close to the "laboratory" window of his father's villa, Marconi had built his first sending station. From that secluded spot where he had spent hour after hour had come the frequent requests for money to buy long lengths of copper wire, batteries, induction coils, and other electrical gadgets. More than once the father had wondered what was going on up on the third floor of his home. He was by no means alone in doubting that messages could go through the air; never-



MARCONI PRESENTS A WIRELESS SET TO HIS WIFE
This magnificent Marconiphone radiogram is one of the beautiful gifts given by the Marchese Marconi to his wife. He chose it as a Christmas present for the Marchesa four years ago.

theless, he had grumblingly financed his son's queer notions. But now he had more faith; seeing and hearing were believing to him. He had seen the sparks; he had heard the clicks at the receiver!

Nothing could stop the Marconis now. Again and again Guglielmo tried to make the ether "talk" by using different arrangements of the instruments, but always utilising the induction coil as the Hertzian wave emitter, and the ball discharger or gap described by Professor Righi in his scientific papers. It consisted of four brass balls separated by small gaps and immersed in vaseline oil. To control the electric discharge across the gap a telegraph key was wired in the primary circuit of the induction coil. This enabled him to cause sparks to leap the gap in dot-dash form, corresponding, of course, to the length of time the key was held down.

After the indoor tests across the length of the house, and then to the lawn, Marconi moved the paraphernalia farther out in the garden, hopeful that experiments in the open might prove that wireless could cover a longer distance. This was a lucky step. In rearranging the equipment and in adapting it to outdoor conditions an important advance was made. Instead of employing the two rods of the Hertzian oscillator, one terminal of the "spark" discharger was connected to a metal cylinder or elevated conductor on top of a pole. The other terminal was attached to a metal plate on the ground. This gave Marconi an elevated aerial discharge across the gap to the earth, greatly increasing the signal strength, the range and reliability. Wireless by this step definitely went out of the "laboratory" and into the air. Now there seemed to be no limit to what the embryonic sparks might do and where they might go. The secret of covering greater distance was to "pump" more power into the waves.

Maxwell, of course, had "found" the ether; Hertz, the waves. Marconi

(Please turn to page 309.)

THE DIAL REVOLVES

By LESLIE W. ORTON

THINGS AREN'T TOO EASY FOR THE SPANISH S.W. FAN

SEARCHING FOR AMATEURS AT 6 A.M. :: AMAZING RECEPTION ON THE ULTRA-SHORTS

THE Catalan Government have, I understand from reliable sources, made it illegal to listen to any station except Barcelona which (you guessed correctly) broadcasts government news and propaganda. This in itself is bad enough, but matters are made ten times worse by visits from Spanish "cops" every hour or so. If you are listening to Barcelona all is well. If not—!

Dare-Devil DX-ers!

It appears that a certain Spanish short-wave enthusiast found it decidedly irksome to sit down and listen to the local—that wasn't his idea of DX!—and so, wishing the police in a hotter place than Spain (and that's saying something!), he got his short-wave set going and was so delighted with reception in general and W2XAF and its news reports in particular that he passed the word around among other DX-ers and now, according to this listener (who, by the way, is now residing in this country), there are a crowd of enthusiasts listening for the police with one ear and to W2XAF and other DX stations with the other—a set tuned to Barcelona ready to switch on at a moment's notice! Long live the DX-er!

Amateur Stations

I felt quite a hero when I got up at 6 a.m. the other morning to search the amateur bands. You see, I'm one of those individuals who find it easier to go to bed than get up. Some people call it laziness, but I call it anything but that!

Among the stations I tuned-in were W4AH, W4AXO, W9SD, W9AT, W8DA, and, to crown the lot, W6BQ—all on the 20-metre band. Not bad, considering that I was barely awake!

Conditions are also excellent around midnight and I've heard the following, and many more, stations at good strength: W1HAT, W3AD, W2MD, W2RG, W2OJ, W2GO, W4BE, W3FO, W5BCU, W4AZA, and VF1BI. By the way, I've given up the idea of collecting QSL cards from all the amateurs I hear—only a Rothschild could afford to do that!

Incidentally, have you heard W9DX yet? The operator, Miss Alice R. Bourke, of Chicago, verifies reception with a photograph of her station. Whether she is in the photograph I cannot say. Hey! Wait a moment—the post doesn't go for an hour yet!

Exciting Times

Christopher Columbus could hardly have been more excited when he discovered a new continent than I was the other night. Reception was amazing, and I tuned-in station after station at excellent strength.

W2XAD, Schenectady, and W8XK

Pittsburg, set the ball rolling. JZJ, Tokio, on 25.42 metres quickly followed, and then the ether seemed to spring alive with stations. EAJ43, Tenerife, Canary Islands, with its English bulletin; EAQ1 and EAQ2, Madrid, and many other European stations were followed by W2XAF, W1XK and, surprisingly faint, W3XAU.

The Cubans COCH and COCQ were heard at greater strength than for a long time, and PRF5, Rio de Janeiro, was also a good signal.

Higher up the waveband conditions were, if anything, more exciting. From North America I picked up CRCX, Toronto; W8XAL, Cincinnati and, of course, W3XAL and W8XK.

The best-heard Latin-American stations were YV5RD, Caracas; and COCD, Havana. Indeed, I enjoyed myself so much that I did not get between the blankets until after 2 a.m.—bad boy!

Ultra-Short Wave DX

Excitement reigned supreme when I tuned-in a television station just above Alexandra Palace the other day. Implored for silence and turning the cat from the room to help ensure it, I listened. Unfortunately, it was the vision (not the sound) programme, and although doubtless wonder-



A few outstanding 20-metre amateurs worth trying for. Search for them after 11 p.m.

ful to look at it was no "great guns" to listen to!

Maybe it was W6XAO, Los Angeles, on 6.667 metres, maybe not. However, it has set me fervently searching for W2XDV, Wayne, on 7.32, 7.78 and 8.43 metres—I wonder whether any of you fellows have had better luck than I?

New 10-metre Stations

Here is another "bumper" batch of 10-metre "dope" for you, boys.

First, news of some broadcasters. W9XJL, Superior, Wisconsin, has been picked up on 9.494 metres by a Newcastle reader. His schedule is from 4 p.m. to midnight daily.

Several listeners have heard W3XKA relaying KYW, also on 9.494 metres. According to my log book this station is a mobile one operated by the Westinghouse Electric people.

Now for a "star" news item. A new Texan station will shortly commence operation on the 10-metre band with a power of 100 watts. Located in Grapevine, Texas, it is likely to take the air any moment. How about trying for it? It's sure to operate on 9.494 metres!

S.W. STATION IDENTIFICATION

By F. A. BEANE

CONCLUDING THE SOUTH AMERICAN TOUR

FROM Bogota, where we discontinued our "tour of investigation" last week, we wend our way in a north-westerly direction to the 4th Colombian District, where we discover quite a number of well-known and popular transmitters. The chief characteristics of these will be found below.

HJ4ABB (49.12 m.) Manizales, announces every fifteen minutes as "Radio Manizales" and often employs English.

HJ4ABE (49.20 m.) Medellin, uses a four-chime signal and the slogan "La Voz de Antioquia." English used at times.

HJ4ABH (31.51 m.) Armenia, uses a single chime between announcements; four or five chimes and the slogan "La Voz de Armenia" and occasionally the English announcement: "This is Short-Wave Station HJ4ABH, and Long Wave HJ4ABN, in the city of Armenia, Caldes, Colombia."

HJ4ABP (49.7 m.) Medellin, uses N.B.C. type chimes, also single chime between announcements at times. Slogan "Emisora Philco," but will probably be changed to "The General Electric Station." Relays HJ4ABQ and often uses English; also gives English news

and programme every Sunday from 05.00-06.00.

HJ4ABU (48.85 m.) Pereira, often mentions the title "La Voz de Pereira" and "General Electric."

HJU (31.58 m.) Buenaventura, announces in English often and employs the slogan "La Voz del Pacifico," and is a station of the National Railroads of Colombia.

HJ5ABC (48.78 m.) Cali, now thought to be off the air, but when operating uses three N.B.C. type chimes and the slogan "La Voz de Colombia."

HJ5ABD (49.3 m.) Cali, now seldom heard, uses three chimes like those of the N.B.C. and the title "La Voz del Valle."

HJN (51.45 m.) Bogota, announces often as "Radio Nacional." Incidentally, all of the above have been heard by the writer and verification of reception received from all but HJ4ABP, 4ABH, 5ABD and HJN. The last-named has never been known to answer reports.

Having completed our circuit of the South American continent, we will proceed to the countries of Central America, and thence to North America, but for the present our imaginary tour must end until next week.

ON THE

SHORT WAVES



THE SINGLE-VALVER
GROWS UP
By W. L. S.

ONCE upon a time there was a man who used to say that you couldn't beat a single-valve receiver for short-wave reception. He was a bit of a crank, but, surprisingly enough, he used to prove his point by picking up on his single-valver all sorts of things that other people with great big expensive sets couldn't get.

He had quite a following for a while, and he described his single-valver in "P.W." You know by now who that man was!

Well, after a little while people began to say, "Look here; I say, old man," and all sorts of very deep things like that. In fact, one of them said, "You simply can't do that there, not here, so to speak!" and proceeded to prove how absolutely futile it was to expect to receive anything at all on one valve.

One tuned circuit, one valve—ridiculous! Just a plaything; might keep the children amused for a few minutes, but as for any serious work—no!

Doing Good Work

Well, strange though it may seem, that single-valver was passed on, exactly as it was, to a reader who used to be extremely helpful, and he is still using it. He claimed his "18 Club" Certificate almost as soon as the thing was announced, and he has heard nearly everything that anyone else has ever heard; and the single-valver remains exactly the same as it was.

Meanwhile, however, a copy of the same set has been undergoing a series of delicate operations, and now bears little resemblance to the original. It has grown up! The other was a mere child's toy (so they said); this specially treated version cannot hope to aspire to manhood, but it is an adolescent, at any rate, and it has particularly good lungs and heart which enable it to perform all sorts of feats.

Now, relapsing into the first person singular, let me say that I have been so badgered and pestered to talk a little more about single-valvers that I don't care what anyone says about me any more. Here is a single-valver of which I am not ashamed, any more than I was of the first version. It cost next to nothing to make, and it does anything that you can reasonably expect a short-wave radio receiver to do. So why hide its light under a bushel?

Look at the layout on this page, and you'll notice sundry differences from most accepted ideas of single-valvers, but they're not fundamental differences. They are mostly matters of layout.

The two condensers on the front panel are the band-setter and the band-spreader. The condenser round on the left-hand side is the reaction control. The valveholder and coilholder are mounted in the good old way, side by side, so as to necessitate hardly any wiring in the grid circuit and the reaction circuit.

The H.F. choke leads off to the head-phone terminals at the rear of the base-board, and there is a large blank space suitable for the addition of an L.F. stage when one is wanted.

The aerial is coupled, through the usual neutralising condenser, to the fixed plates

of very tight aerial coupling, which also introduces dead spots in the tuning range and all sorts of undesirable factors.

General controllability includes selectivity, ease of handling the reaction control, freedom from hand-capacity and other silly effects, and the all-round "feel" of the set—and I give this single-valver full marks for it. Just why that happens I can't say—it must just be that everything happens to have fallen together nicely, and I've been lucky.

The original single-valver about which I spoke has a comparatively poor layout and no band-spreading—and yet it does wonders in the hands of a man who knows it inside out. What he will do with this one I have yet to find out. I hope to report progress soon.

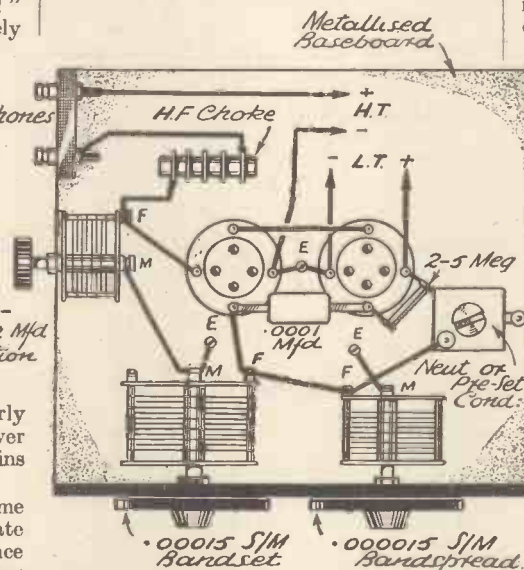
Meanwhile, if anyone else still believes that a single-valver is worth building and using, I hope he will get down to it right away and make a copy of this one. I shall be more than interested to hear of the results.

An Inexpensive Set

I have not given a series of photographs and large-size working diagrams, simply because this set has been built from home-made junk, and no "posh" components have found their way into it. I have done this from pure cussedness, since so many readers tell me that "it must be easy to get results when you can afford the best of everything."

By next week I shall have got together a log of stations heard on this little set, and I will pass it on. Conditions are bad at the moment of writing, and I'm rather glad, since no one can say, "You ought to hear plenty with conditions as good as they are now."

Readers have been talking a lot about the financial side of short-wave set construction. I think the article on "Home-Made Components" (May 15th issue), and this little plan of the single-valver will show that it needn't worry you unduly. Of course, if you must join the upper circle and run a superhet of vast dimensions, you must think of the other side of it as well. But don't forget that there are two sides!



This is the wiring and layout of the single-valve short-waver described by W. L. S. on this page.

of the band-spreading condenser—and that's about all there is to it.

Sensitivity, with good modern valves, is largely a matter of efficient coils and efficient layout. The coils can be of the commercial variety, or they may be made at home to conform more or less with the others. Selectivity is a matter that is looked after largely by the efficient use of reaction, and this can only be achieved when the reaction control is absolutely perfect.

This, again, is a matter of layout, of coils, and of the choice of correct size of grid leak and condenser, not forgetting the correct choice of H.T. voltage.

And lastly—and very important—comes the degree of aerial coupling that you use. Most sets with single-circuit tuning that give poor selectivity are spoilt by the use

★-----★
A REGULAR ORDER
for
"Popular Wireless"
will ensure you do not
miss any chapters of
MARCONI'S LIFE STORY
★-----★

ON THE SHORT WAVES—Page 2.

POINTS *from the* POST-BAG

W. L. S. Replies to Correspondents

R. G. (Sheffield) wants to go in for the "18" Club Certificate, and has no QSL cards at all. He read my recent article on QSL-ing, expecting to learn how to go about it, and was rather surprised to find that it was a sort of general discouragement instead of an encouragement! However, he says that he has picked up several tips which should be useful to him, so all's well.

Now he raises some queries about how to address reports to stations. When a station is very well known indeed, the full address is hardly necessary. For instance, a letter addressed to "Short-Wave Station D J N, Zeesen, Germany" would be pretty sure of getting there all right.

With amateurs it is different, although a letter addressed with just my own call-sign and "London, England" on it has been delivered to me—although I don't live in the London postal area! I should imagine that a letter addressed "Radio S U I K G, Alexandria, Egypt" would get to S U I K G; I hope the postal authorities in Alexandria won't be after my blood for this, though!

An Output Query

G. S. R. (Tonbridge) wants to know if it is "safe" to connect the output terminals of a battery two-valve set to the pick-up terminals of an all-mains commercial receiver. Well, it's a hazardous procedure unless one knows the circuit arrangement of both sets. If the battery short-waver has choke-filter or transformer output you will be safe enough. If it hasn't, you may get positive H.T. on to the grid of the first amplifier in the commercial set—and if it doesn't actually do any damage you won't get results.

It is dead safe, however, to take the output terminals of a short-waver to the primary terminals of an L.F. transformer, and to connect the secondary terminals of the same transformer to the pick-up terminals of the broadcast set.

B. M. S. (Surbiton) asks two important queries. He is in much the same position as Lionel Chester—whose experiences you have been reading in "P.W." for some weeks—he started with a one-valver, which was very successful, and now he's getting ambitious.

Resistance Coupling

B. M. S. asks, first, "Is it worth one's while to change from a three-range coil unit to separate plug-in coils? Does the extra efficiency warrant the change-over?" My answer to that is "Yes; if you really want the last drop of efficiency. But if you are getting really good results with the three-range unit, I should advise you not to bother."

Next he asks, "Why do most short-wave sets use resistance coupling? I have a good transformer and don't want to incur extra expense unless the results warrant it." The answer here is that certain

little snags which sometimes rear up their nasty heads in short-wave sets are less likely to be there with resistance coupling than with transformer. Instability and a tendency to threshold howl are nearly always cured by changing from transformer to resistance. If, on the other hand, a set is already working well with transformer coupling, then there isn't the slightest point in changing over to resistance. You won't improve results, and the amplification will decrease somewhat.

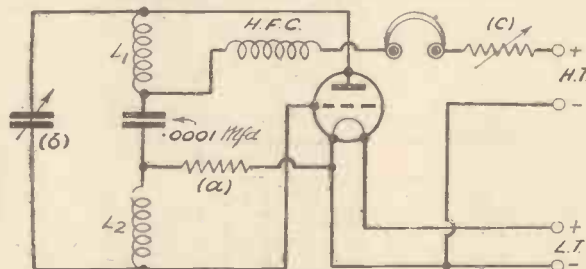
S. S. (Sheffield) sends in a single-valve layout and asks for my comments. I think my own layout on the previous page will answer all his queries, and I suggest that he studies it forthwith.

Building the "Simplex"

H. H. (Buxton) reports making a short-waver out of old junk, but "every time I went near it, it practically stood on its head and made me dizzy." So now—wise man—he's making the "Simplex" Two. He would do even better to go for the "Simplex" Three, but his mind seems to be made up. Now for his queries:

Types of valves—general-purpose triodes

THE SPLIT-COLPITTS CIRCUIT



In this circuit (b) is the tuning condenser and has a value of about '0001 mid., while (a) is the grid leak. The variable resistance (c) controls the reaction.

of the "HL" type. Capacity of neutralising condenser—unimportant, as long as it has a very low minimum, which most types have. Valve holders and neutralising condenser should be raised about $\frac{1}{2}$ in. above the baseboard by those little ebonite spacers that you can get in most places nowadays.

Last week I promised some more details about the Split-Colpitts circuit. Here is the circuit, on this page. As you will see, it is an unconventional-looking affair when drawn out this way; but I have drawn this particular shape because it almost gives you the layout as well.

Component Values

On the left is the tuning condenser (b)—which should be of about '0001 capacity for all-round work; across it are the two coils, separated in the centre by a fixed condenser. Also across the condenser are the plate and grid of the valve.

The grid leak (a) is in a funny position, and should be of about 1 megohm for detection, or less—50,000 ohms or so—if you are just using the circuit as an oscillator. There is no grid condenser.

Reaction is controlled by the variable resistance (c) of 50,000 ohms or thereabouts. Aerial coupling is arranged just as in any other circuit—by a further coil coupled to the grid coil, or by a small capacity coupling to some point on the grid circuit.

SHORT-WAVE MISCELLANY

LETTERS and messages from all parts suggest that May 12th, 1937 was the greatest triumph for modern short-wave technique that could be imagined. In a long chat with an American "ham friend" of mine the other day, I heard some very interesting accounts of how the great broadcast was received over there.

A 19-Metre Thrill

Scorning to take it from the local medium-wave station, this chap took Daventry (19 metres) on his single-signal super and "held it" throughout, with never a hitch. Said he: "I don't know how you get W 2 X A D over there, old timer, but I guess it has nothing on the way your station came in here on Coronation Day. We heard the rustling of papers in the Abbey and we heard quiet whisperings in the mike before the King began his speech in the evening. There were twelve of us here, listening every minute, and, boy, what a thrill!"

I found a few spare minutes to listen round the amateur bands at various times during the broadcast, and there was hardly a station on the air. All sorts of funny, unidentifiable stations were relaying London. In South Africa one amateur re-broadcast the whole thing for the benefit of his little town, not too well placed for short-wave reception. Great work, everyone concerned!

Two letters here, side by side on my desk. I would like to reproduce them "in parallel columns," as they say in the best circles, but we haven't got enough columns to spare. One says, "Please lay off the amateur stuff; you're giving us too much of it. We want more dope on the broadcast bands and on the stations, and the way they come in."

Comments will be Welcomed

The other (from the same town, curiously enough) says, "Now that Leslie Orton and F. A. Beane are covering the short-wave bands in such an excellent way, it's nice to see that you are released and able to give us more ham stuff. Fine business, and please keep it up."

So, in the words of the Songs My Mother Never Sang, you pay your money and you take your choice. Comments will be welcomed—do you want more or less "ham stuff"?

This week-end (June 5th and 6th) you will hear a large number of stations with strange call-signs—three letters ending in a "P" will distinguish them from the common herd. The event, of course, is National Field Day, the R.S.G.B.'s annual test of portable stations, and every district will be operating on four wavebands.

The fun starts at 7 p.m. on Saturday, and carries on till the same time on Sunday. Doubtless if you know any of the local lads you will know where to find their station. If you're not as interested as that, stay at home and see how many you can log.

W. L. S.

FROM OUR READERS

WIRELESS EVEN FASTER THAN GOSSIP!

The Editor, POPULAR WIRELESS.

Dear Sir,—No doubt many of your readers think this "All Wave" set business a new "gag." I know you, of course, are fully alive that this is not so, but, being in the same boat as "Ariel" the other week, when his favourite professor was giving a talk, I shall be unable to partake in your competition now running, being separated from my S.T.800 by some seven miles.

However, I did a little S.W. listening once, about 1928, I believe it was, with a set using three plug-in coils. (I used S.T. valves.) Whilst burning the midnight oil I received W 2 X A D (or was it F?), giving out its news bulletin, name of town, etc., first.

Imagine my surprise when he said "Melton Mowbray, England." The "sensational" news being that "H.R.H. the Prince of Wales visited M.M. to-day and viewed some hunters. He later returned to London." Although I was only a few hundred yards from where he had been, it was the first I had heard of his visit, thus proving that "wireless is even faster than gossip," the news having travelled several thousand miles when a few yards for me would have served the purpose.

I may also add the set contained two condensers which at that time one cost 25s., the other 20s., but still, they were and are condensers.

ARTHUR H. BARTRAM.

33, Rosebery Avenue, Melton Mowbray, Leicestershire.

"LONDON RATIONAL"

The Editor, "Popular Wireless."

Dear Sir,—After giving the B.B.C. programme planning my most careful consideration, I think—that taken all round—we don't get a square deal. Whereupon yours truly sat down and worked out the following; and if I don't get full marks for it being the ideal programme—well, I'll go and breed cabbages at Cambridge. Anyway, here goes:

LONDON RATIONAL PROGRAMME
(1,500 H.P.; 200 C.P.)

- 10.15 Big Ben, Little Len and a talk about pick-pockets in Aberdeen.
- 10.45 Things to Come. A talk on the Foundations of Music.
- 11.0 Time, relayed from the County Court.
- 11.30 Women's Hour.
This will continue until 2.30. Still going strong.
- 2.30 Professor Hossair will lecture on the Lesser-Tittle-Tattle.
- 4.0 The Pneumonia Harmonica Band, from the Infirmary, Blackpool.
- 5.0 Interval. Practical demonstration of a technical hitch.
- 6.0 More time, little weather, and very little news.
- 6.30 Music and the Extraordinary Listener. By Sir Smoker Blazes.
- 7.0 Popular Resorts; including In Bed Tonight.
- 8.0 Songs We Should Never Have Heard, with the Asthma Sextet.
- 8.30 Deadwood Dick will dabble on Diverting Disillusions, dealing with Dust-bins, Sand-bins and Has-bins.
- 9.0 Public Nuisances, including Foundations of Music.
- 9.20 Selection from Meddlesomes Dance of the Cockroach, by the B.B.C. Military Pickle.
- 9.50 Time signal from Greenwich.

A reader recounts an interesting short-wave experience he had several years ago

10.0 Time signal from the Gum and Gobstopper.
10.15 Dance Music. The programme will be interrupted while the Announcer pops around for a drink.

11.0 Double Whisky. A play in two parts.
11.30 Professor Allsortz will talk on Health. No. 1. Getting to bed early.
12.0 Closing Down with Big Ben. Good-nate, good-nate.

And if we had a programme on those lines every day, oh, boy, would the B.B.C. be brighter? On second thoughts it might be. Anyhow, it can't get much worse.

S. A. KNIGHT,
5, Bailey Rd., Westcott,
Nr. Dorking, Surrey.

WHAT'S THE ANSWER?

The Editor, POPULAR WIRELESS.

Dear Sir,—I have seen many queer questions asked and answered in "P.W." re affairs appertaining to wireless, and I submit this experience in the hope that it will give your transmitting members something to think about.

For quite a number of years I have been a short-wave enthusiast, and although not a transmitter I take more than a passing interest in that side of the amateur radio.

Recently I was listening on the 14-mc. band and heard a W4 "ham" working an XE.

To my surprise I heard the W4 give his report, saying he had 2 calibrated receivers in operation and was receiving the XE on 2 frequencies, viz. 14,250 kc., and 14,259 kc.

He said that he was so much surprised that he could hardly believe his ears, and that he had suspected his receiver had slipped a bit in calibration until he had checked both with his frequency metre and found everything as it ought to be. Further,

that the 14,259-kc. signal was QSA5 and a steady R7 throughout, while the 14,250-kc. signal was QSA4, R7 with QSB to QSA3R3.

"Now," said W4, "I am coming over to you for explanation."

As I always try to get both sides in a QSO, I also went over and succeeded in getting the reply from XE.

He said all that he could suggest was that, owing to the fact that he was driving very hard, the crystal may have been heating and thus causing frequency drift.

Now, to my way of thinking, even if the overheated crystal caused frequency drift, that could not account for two signals coming from one transmission, and furthermore 9 kes. is "some drift," isn't it? Also, the frequency separation (9 kes.) ousts any possibility of a harmonic.

Now you may get your "ether disturbers" into a huddle, as our cousins "across the Pond" say, and let's have the verdict. Have I a theory about it? Why, yes, to be sure! I suggest that the receivers used at W4's place

were superhets, and that the HFO's were not as well screened as they might have been.

If that were so, there may have been a beat between the HFO's and I.F. stages which caused the other signal.

I take it that 14,259 kes. was the fundamental frequency, since it remained a steady signal all the time.

You may knock spots out of my theory if you care, because if you can show how else it could happen I will have learned a little more about radio. Hoping this proves of interest to you, and wishing you and all your staff the very best 73's.

PETER WEIR.

125, Orbiston Street, Motherwell,
Lanarkshire.

L.T. FROM MAINS

The Editor, "Popular Wireless."

Dear Sir,—With reference to the query from "G.S." on page 185 of May 1st issue, the following may be of interest:

I, too, have one of the small 1/2-amp. 2-v. chargers which normally is used for charging the L.T. accumulator at night. On one occasion, however, I was stuck with a run-down battery, and of course just when a special programme was in urgent request! The difficulty was solved by running the set from the

charger, but with the L.T. accumulator floating across the terminals. This effectively smoothed out all roughness and also steadied the voltage to that of an accumulator on slow charge. Not having a sufficiently sensitive voltmeter I tested the arrangement with a test load in series with an ammeter—the load being adjusted to equal that of the filaments. When the accumulator was cut out the increase in current and the noise in the phones were remarkable.

A. E. EMERSON.

354, Perth Road, Dundee.

FIFTEEN YEARS OLD

The Editor, POPULAR WIRELESS.

Dear Sir,—I am only 15 years old and yet I have been taking "P.W." for the last three years. That goes to show I began being a keen radio fan at an early age. Very often upon reading this page I have made up my mind to write to you, but just lacked the confidence to do so.

I am now a very keen short-wave fan and follow your short-wave notes with great interest. Frankly speaking, I knew nothing about radio when I started taking your paper, but now I am progressing rapidly. I built the "Simplex," Two and a fine set it is. Now I want to build the "Simplex," Three which I consider is a very soundly designed set. Here is wishing your paper every success.

E. C. YOUNG.

High Street, Princes Risborough,
Aylesbury, Bucks.

[This reader is just the same age as POPULAR WIRELESS. May we grow up together.—ED.]

CALL AND SEE THE CALL BOOK

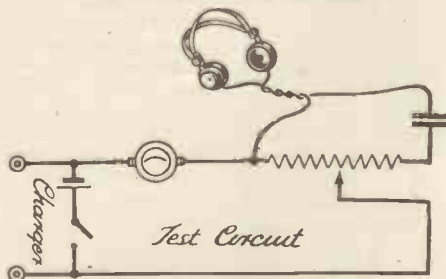
The Editor, "Popular Wireless."

Dear Sir,—May I be permitted to say a few words on the subject of the QSL "racket." Since the main idea behind the collection of "Wallpaper" seems to be to impress one's friends, why not adopt the scheme which I have been using? I have a large map of the world, mounted on plywood, fixed to the wall behind my bench, and on logging a new signal I mark it with a flag.

There must be no guesswork, of course, and I mark only those stations definitely identified by call-sign, even though I may be fairly certain in my own mind as to the location of an unidentified transmitter.

(Continued overleaf.)

CHECKING NOISE



How Mr. Emerson tested the smoothing properties of a floating L.T. accumulator.

FROM OUR READERS—Continued

This will cut down your postage bill, and, if all particulars as to call-sign, location, etc., are entered in the log at the same time, will form an up-to-date record without tedious waits for replies. You can always write if you think a report would definitely be of service to a particular transmitter.

I should also like to say for the benefit of short-wave fans in this district that I have asked for and have been successful in having the Amateur Call Book (spring edition) placed in the reference room of the Waterloo with Seaford public library.

GWILYM M. ARCHER.

10, Lulworth Avenue,
Waterloo, Liverpool 22.

M.C. SPEAKERS

The Editor, POPULAR WIRELESS.

Dear Sir,—Being somewhat averse to gardening one afternoon, I decided to try the suggestion given by Mr. A. G. Duff in "P.W." for May 15th.

My speaker is a Rola F6, and after taking it to bits I cut off about $\frac{1}{4}$ -in. or $\frac{1}{8}$ -in. from the cone, cut from a very soft felt hat two half-circles $\frac{1}{2}$ -in. wide, using the cardboard from the speaker as guide, glued the felt to the cone, then to the cardboard ring, and then glued ring to frame.

The whole job took me about 2½ hours, and believe me, 'twas well worth it! The difference in tone is all Mr. A. G. D. claims. Drums are drums! Solo instruments are definitely more real! Speech is most amazingly natural!

Other readers may like to try this, and, if so, I advise them to cut carefully and be sure to centre "dead" when re-assembling. Incidentally I took the chance to clear bits of metal from the "reed" which I found readily stuck to a needle which had become magnetised.

I have never written you before, but I have been an experimenter since "Writtle" days and a reader since No. 1.

I am now an S.W. convert and find many of your tips extremely useful.

Am using S.G. Buffer, Det., L.F. through Pent. of set. I get amazing results, my aerial being nicely clear. Here is an accidentally-found tip for selectivity on 31 m., which, as you know, is badly swamped by Zeesen and Prague at times.

I had some wire electricians had been using, about 3 ft (16 S.W.G., 3-strand), and messing about one day I rolled it to a coil and slung it over my lead in, which travels a short way across corner, took it to S. Waver; 31 m. was knife edge and very little loss in signal strength. Schenectady was quite free from swamping at 9.15 p.m.

Simple but true, and better than aerial condenser.

Now, in conclusion, may I say that my most interesting hour was before your competition started. I heard S.S. Normandie carrying out phone tests with New York, and by skilful manoeuvring heard both sides of conversation. First on 22 m., then 36 m. Also, I have heard the Hindenburg and many hundreds of American amateurs, all on loudspeaker.

Here is one question I should like to ask: How many of your readers have a wife who says on Saturday mornings, "You haven't bought your wireless book yet, dear"?

Best wishes to "P.W." and staff.

CHARLES SUDDARD.

14, Wellgarth Walk,
Bristol 4.

IN DISAGREEMENT

The Editor, "Popular Wireless."

Dear Sir,—I disagree with Mr. A. G. Duff when he says speakers costing only three pounds or over are worth while getting, as regards clarity of tone and faithfulness of reproducing sound either in the upper or the lower frequencies.

I have bought a 1937 model (type 37S) chassis-mounting "Stentorian" speaker, and no one could wish for a better speaker for reproducing sound either for clarity of speech or for instrumental music, whether it be in the upper musical scale or in the lower. This speaker did not cost anywhere near three pounds. The cost was forty-two shillings from the makers.

I have also two other speakers, one the same

make as the other, W.B. Junior (type P.M.5), and its companion cost only one pound from the retailer, brand new. All these are fitted with the cones A. G. Duff condemns. He must know more about quality of speakers than do the manufacturers who have spent time, money and patience in getting what the public want.

V. P. PELLOW.

9, Varly Cottages,
Liskeard, Cornwall.

A GENEROUS OFFER

The Editor, POPULAR WIRELESS.

Dear Sir,—As a regular reader of POPULAR WIRELESS of some years standing (and sitting), I have nothing but praise for your journal. It has been instrumental in teaching and helping me build up several sets. As for technical matters they are described easily for the beginner to be able to follow and understand them.

The short-wave section interests me most of all. At the moment I am listening to J. V. M., Tokio, on phones, as I write. I have veri's not from hundreds of stations but from British Guiana, Japan, Czechoslovakia, W2XAD, who also sent me a very nice letter, and the current edition of Radio News and Short-Wave Review of January, 1937, which arrived on Jan. 1st, 1937.

To get down to my real reason for writing you: In the May 15th number there is a letter from J. B. Lowe, "Fairlie," Compton Park Villas, Mannamead, Plymouth, who is fourteen, asking for a set of two or three valves. Would you, through the medium of your splendid weekly, offer him, free of charge, a set (less valves and batteries, as I am afraid to risk

POLLY WARD



Miss Polly Ward, who recently made her first appearance in television and who not long ago returned from broadcasting in America, as she appears in her latest film, "Feather Your Nest," just completed by Basil Dean at Ealing Studios.

damage in transit) namely, a two-valve set, the coil I will enclose, that I hope will afford some pleasure and a start on the short-wave listening.

If he is willing to accept my offer I will place set on test and check it, and will dispatch it to him. He seems a lad who is interested in the short waves. I know what it is to want a set and to experiment. Now I have three or four sets and they take up a lot of room. Thank you in advance for your help.

F. L. JACKSON.

(Member, B.L.D.W.C.)

47, Bathurst Gardens, Kensal Rise, N.W.10.
[Thank you for such a generous offer, Mr. Jackson. We feel sure you will hear without delay from J. B. Lowe.—Ed.]

ANY OTHERS?

The Editor, "Popular Wireless."

Dear Sir,—I read with interest one of the letters from your readers in the May 15th issue, by John B. Lowe, on making sets from cheap parts. As I am in something of his position, I for one, at any rate, would welcome such a set. I hope you will carry this idea into practice, as I am keenly awaiting further details.

D. THOMAS.

51, Yewfield Road, Willesden, N.W.

ALSO IN SUPPORT

The Editor, POPULAR WIRELESS.

Dear Sir,—I have been reading your paper for some time and followed many of the articles with great interest.

I have not written before, but on reading the letter of John B. Lowe in your issue of May 15th I should like to make an appeal for his idea about POPULAR WIRELESS designing a small two- or three-valve superhet or screen-grid set built out of parts that would be economical.

I have followed with keen interest the articles written by Mr. L. Chester, "My Short-Wave Adventures," for being a raw amateur myself I find the articles very helpful.

With best wishes to POPULAR WIRELESS.

RONALD J. COOPER.

104, Pineapple Road, Stirchley,
Birmingham.

TOKIO RECEPTION

The Editor, "Popular Wireless."

Dear Sir,—Since you published my letter in your issue of April 3rd on the reception of Tokio I have received letters from fellow readers asking for the date of my reception. I have written to these personally, but as I have noticed there are still one or two more letters on this subject perhaps you could kindly allow some of your valuable space to publish the time and the date for those interested.

This was on March 11th, between 8 and 8.30 p.m. When Tokio closed down they gave their time as 5.28 a.m. I wrote for confirmation, but so far have not had a reply.

I am not sure how long it takes for a reply to come from Japan, but perhaps there are other readers who have already had "veri's." It would be interesting to know about this point.

May I congratulate "P.W." on extending the short-wave features. I am sure these will be welcomed by the thousands of newcomers to the shorter wavebands.

T. E. PRESTON.

6, Treaford Lane, Birmingham 8.

P.S.—Readers may remember I received Tokio with my aerial lying on the garden. Since re-erecting this, the increase in strength of the Tokio signal was surprisingly small!

FROM WHITELEY ELECTRICAL CO.

The Editor, POPULAR WIRELESS.

Dear Sir,—The letter from Mr. A. G. Duff, of Ormskirk, published in your issue of the 15th May, shows evidence of much observation and thought. The facts he notes are quite correct, and are well known to speaker designers.

Speaker design is not, however, quite so simple as this; for to provide the finest possible results from a loudspeaker it is essential to consider the Receiver with which it is to be used. For the user of a high-quality set, such as Mr. Duff mentions—with extremely low H.F. sensitivity, low selectivity, low stage gain, high anode voltages, and several stages to give great output free from every avoidable trace of harmonic distortion—a speaker with a separate and highly flexible non-resonant

(Please turn to cover iii.)

HOW A THRESHOLD HOWL WAS CURED

NOW that I have more or less tamed my one-valver, naturally I turn to fresh fields—if not to conquer, at least to explore. So many signals are only just intelligible with one valve that I imagine there is every reason to add an amplifier.

It seemed a simple enough addition, anyway. Just a low-frequency transformer, another valve holder and a grid-bias battery, hooked up according to the Fig. 1 diagram. I have purposely skeletonised my diagrams this week, concentrating on the bits that matter.

Talking of skeletons, I have certainly got one in my cupboard at this moment. It stalks eerily through my little set, making unearthly noises that I have since discovered are well known to the experts as *threshold howls*.

And a very apt name for the squawks that assail one's tender eardrums when trying to work out a short-wave detector with a low-frequency amplifier using the Fig. 1 arrangement! I was taken completely off my guard, because at the first try-out the "O-V-1," as the hams call it, seemed to be working quite well. I got very loud signals from Paris and Germany at a fairly central setting of the dial.

Those Irritating "Squawks"

It was when I tried the same thing at low readings of my middle coil that I first made the horrible acquaintance of threshold howling. Just as I was supposed to be sliding smoothly into oscillation I heard the squawk that I have since learnt to hate. It made me tear off the 'phones very quickly.

A shabby trick this, I thought, to play on a poor, unsuspecting amateur! It simply endorsed my dormant fears about high-frequency currents getting into the 'phones circuit—although subsequent chats with real hams reveal that my diagnosis of the effect may be entirely wrong. No one seems certain what causes threshold howling—or does anyone, please?

Let's get on, anyhow. Fig. 2 shows my next move—a move that possibly I might have made in the first place. Here you see I have decoupled the primary of the low-frequency transformer with a 20,000 ohms resistance in series with the primary and a 2-microfarad fixed condenser between the junction of the resistance and primary and earth. *It didn't make the slightest difference.*

I was beginning to detest the low-frequency transformer, and thought of resistance-capacity coupling. Fig. 3 shows my

circuit, with valves chosen more or less at random, but later on varied without really audible effect. I am going to tell you exactly what I find, not merely reiterate the textbooks.

In going over from transformer to resistance-capacity coupling I realised I might be losing a lot of signal strength—but if I could lose threshold howling into the bargain I felt I should be recompensed. At the same time, I changed over my Hivac D210 to an H210 for extra amplification factor.

No Audible Increase

It worked nicely, my Fig. 3 amplifier. No howling at all, nice smooth reaction—in fact, all quiet. Too quiet, that was the trouble. Frankly—and I admit this rather disappointed me—the audible increase in signal strength was practically *nil*. I could get no more signals with the resistance capacity amplifier than with the one-valver—and so far as the weak signals were concerned they did not seem to be raised at all.

I rather wondered what should be tried next. For there I was with the extra rig of an amplifier and no appreciable gain in performance. Admittedly, I no longer rent

my eardrums with squawks—but nor had I done so with my original one-valver.

I decided to take another look at my low-frequency transformer, which, for reasons that will become apparent before this week's article is over, I cannot name. Yet it is one of the best things of its kind, made by one of the most eminent firms in the radio game.

I happened to see someone else's three-valve circuit and noted that the designer was using what he called a parallel-fed transformer coupling, which seemed to be a combination of resistance capacity and transformer coupling.

I soon had the Fig. 4 circuit arrangement tagged on to my one-valve detector set. Here again the values were chosen more as a pious hope they might be right than from any intimate knowledge that they were. And once again I can't say even fairly drastic changes made much difference.

In this Fig. 4 arrangement the detector gets its high tension through the anode resistance, which I therefore kept fairly low to prevent too big a voltage drop. By using my H210 valve I realised the anode current would be low in any case, and that

therefore the drop through the resistance would be lower than with my D210.

Low-frequency signals are fed through the .01 microfarad coupling condenser to the transformer. I hope I have wired up this the right way. It must be one way, because the whole rig certainly worked fairly well—except that the threshold howl was exactly as bad as with the straightforward transformer arrangement.

It is at such moments, I imagine, that the experimenter quails. I did better than that. I just left the whole bag of tricks to cool down. Or maybe it was your scribe who cooled down. There was a lucid interval of some days before I went near the set again—and then I was armed with a little scrap of information that literally worked

a miracle. Bemoaning my troubles to a member of the "P.W." Research Staff, I gathered that certain good transformers did cause threshold howling—no matter what one did with the circuit. Mention was made of a "squegger" action that left me standing—but it was suggested I might try the effect of putting a resistance across the secondary winding.

Worked Like a Charm

Fig. 5 shows how this is done—and incidentally how I cured my spot of bother. I used a .5 megohm resistance—and it worked like a charm. I found much the same result could be achieved by putting a much lower value of resistance across the primary. Just for fun I took off the decoupling gadgets and still found things worked well.

At the moment I am getting the benefit of my extra valve without buckling my definitely loosened eardrums. One can imagine doctors confronted with bad cases of "distance it ch," shaking their heads and warning the "patients"

that, unless they desist, they will bring on "headphone ears" as well. For my part, I am at the moment what the Yanks would describe as sitting pretty.

B.B.C. DANCE ORCHESTRA

The B.B.C. announces that the present B.B.C. Dance Orchestra will be disbanded on August 7th next. The last transmission by the orchestra will be on July 17th, and the members will then receive their normal annual holidays.

As from August 8th, Mr. Henry Hall will assemble his own band which will be employed by the Corporation in a full-time capacity until September 25th, when Mr. Hall's resignation takes effect.

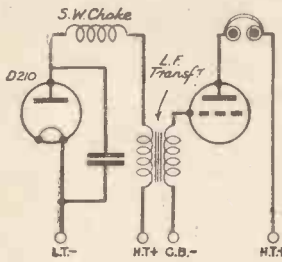


Fig. 1. The first L.F. circuit tried.

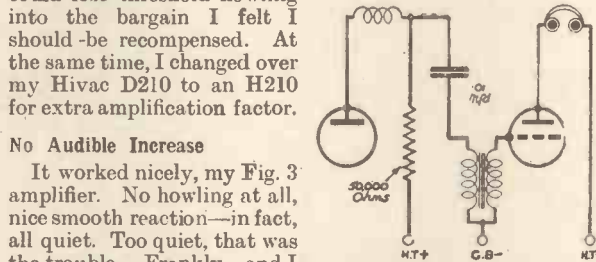


Fig. 4. Parallel feeding still left the threshold howl.

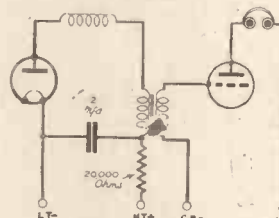


Fig. 2. Adding decoupling did not cure threshold howl.

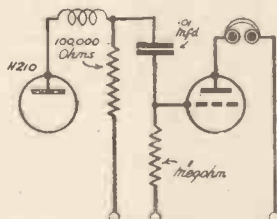


Fig. 3. This circuit seemed to give no amplification at all.

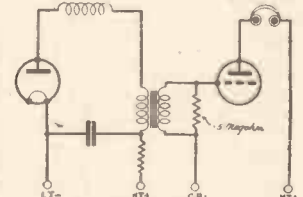


Fig. 5. The howl was finally cured with a shunting resistance.

THEIR VOICES SPEAK IN EIGHT MILLION HOMES

An Oxford accent is not an asset to an announcer—voices that are straightforward, very clear and accentless are the type that are required

THERE are men at Broadcasting House whose voices are known in every home.

But few of the multitude of listeners would be able to recognise any of them as announcers of the B.B.C. even though time has made a habit of returning aloud, in the cottage of the countryside, in the mansion of Mayfair, the midnight words of "Good-night," as they come, comfortably, through loudspeakers of radio sets, while the reverberating chimes of Big Ben fade into silence.

"Good-night, everybody—good-night."

There must be few folk who have never answered: "And good-night to you."

Detecting a Cold

Indeed, many listeners have become so acquainted with the voices of the announcers that they are able to detect at once if there is anything wrong with a particular voice; a cough, or a cold however slight, advertises itself immediately. It is not surprising, therefore, that from time to time small packages reach Broadcasting House addressed, perhaps: "To the announcer of the 9 o'clock Regional programme on Thursday night." Inside there may be cough tablets, cold cures—maybe just a good old-fashioned remedy for all ailments of the throat, and explicit instructions as to the dosage for a swift cure.

Announcers have their fan-mail too, and quite recently one of them received a white silk scarf from a woman listener who thought his voice was "just marvellous." Another, well known for the part he has taken in gardening talks, has received quantities of plants from amateur horticulturists.

To the B.B.C., however, these men who talk to the country every day of the year, are a vital liaison between Broadcasting House and the listening public. They are chosen for their work only after exhaustive tests, and their daily task demands a wide general knowledge, an alert mind and the ability to speak the King's English in a way that is intelligible and pleasant to every one of the King's people.

Oxford Accent No Asset

Whatever the Oxford accent may be, it is not an asset to an announcer; and, more than that, it would actually prevent anyone from obtaining a position as announcer. In the same way, as far as Broadcasting House is concerned, "Zürmerzet" or any other dialect would make a man unacceptable to the body of officials who appoint announcers.

Voices that are straightforward, very clear—and accentless—are the type that is wanted, and everyone who from time to time applies for a position on the An-

nouncers Staff, undergoes a stringent examination in one of the Talks Studios in Broadcasting House. This consists of news reading (have you ever tried reading aloud from newspapers?), of announcing programmes in English, and in French, German and Italian, and, finally, of unseen prose reading—something, for example from the works of H. G. Wells, Somerset Maugham, or Arnold Bennett, which affords opportunity for plenty of "expression." Assuming that five of fifty applicants pass one test, they will in all probability undergo another before the ultimate choice is made. Each test, lasting about seven minutes, is made under conditions of an actual broadcast, but instead of being transmitted to the public, the output of the microphone is conveyed via the Control Room, by special circuit, to another room in which the "Selection Committee" are listening.

Pronunciation Committee

One of the routine tasks of every announcer is to remember the pronunciations approved by the B.B.C. Spoken English Committee. Occasionally, however, world events suddenly demand frequent reference in news announcements to strange things and places. The Civil War in Spain is an example. What is the correct pronunciation of Oviedo, Bilbao, Huelva? Immediate inquiry is made of experts outside the organisation of the B.B.C. to answer such questions. Embassies, and people who, by reason of their official positions, can and do give willing assistance on these occasions, are consulted.

Theoretically, it is an easy matter to arrange the duty hours of announcers for the National and Regional programmes; in practice it is difficult and complicated. There is, of course, the comparatively minor problem of getting to and from Broadcasting House and the studios at Maida Vale. Now and again, a producer will ask for a particular announcer to announce his programme; and rehearsals for various productions take a considerable amount of an announcer's time. Two announcers must be on duty at midnight every week-day. Between the programmes, an announcer is frequently concerned with preparation of forthcoming announcements. Perhaps he is to announce a rather important Concert of Contemporary Music: this entails prior contact with the Music Department, and quite likely, a deal of investigation. Similarly, he may be announcing, and telling the story of some little-known opera: that may be the work of only four minutes; much more time



Miss Doris Gilmore, who has achieved fame as "Annie" in the popular Mr. Penny episodes.

is needed for research and study beforehand, to ensure that he may do it accurately.

This was a typical recent evening's programme for one announcer: Talk for Farmers; First of a new Series of Variety Programmes; Brahms Sonata; World Affairs; B.B.C. Orchestra.

Before that, he had been rehearsing half the morning for the evening Variety Show, and had announced a pianoforte recital at Maida Vale during the afternoon.

A. S. Hibberd has been chief announcer for over ten years; T. Lidell, L. F. Marson, R. MacDermot, F. Phillips, L. J. Gamlin and D. Grinnel-Milne are the other men whose voices you know so well.

A GOOD HALF-HOUR

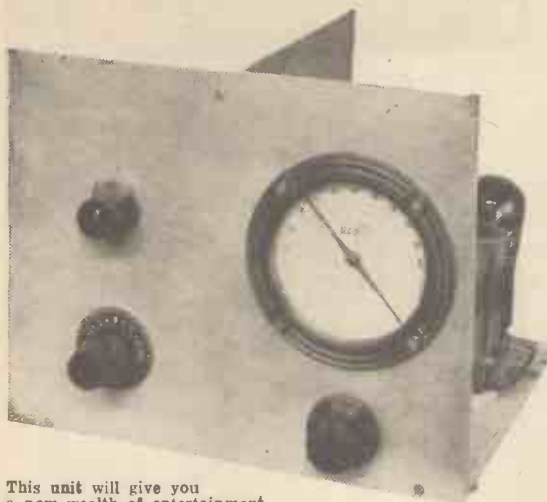
An interesting entry sent in for our short-wave competition.

IT is May 22nd, 1937, and I am early astir, 05.00 to be exact. Listening on the 20-Metre Amateur Band, I hear nothing extra special until 08.10, when, sitting alone in my little Den, coaxing and nursing the dials of my little Rig, I hear something really interesting, VE5EF right over in Vancouver; there he is up in the clear chatting away to VK2ABD in Australia, telling him all about his new antenna, how it had helped him with his DX, so much so that he had worked more DX than ever before. Then he tried to get W9MGT, hooked up to Australia for his first V K contact, and so they carried on.

Away Down South

Then comes 08.17, a touch on the Band Spread and I am down in Wyoming listening to W7CEO, calling CQ to any of you chaps over there in Europe—a few minutes here and the time is 08.21. I come across a weak carrier to find I am on to W6IFH, who is located farther south in "the land of the cowboys"—Arizona, who is talking to W9RUK, but oh so technically—just a small portion of this then I hold my breath—08.30, and I am listening K7FST in far distant Alaska, who is working with G5FY, sorry he can only give him QSA3—R34. Hope he will be better next time. He tells him that W6DXZ on "14168 kc." is anxious to contact "G"; would G5FY stand by for him, and so they carried on. 08.35, a last touch on the dial and lo, I am in sunny California with WGAL, who is complaining to VK2ABD about the "wretched QRM" from "K7FST"—wretched QRM indeed!—it was like a breath of heaven to W. G. May, 51, Clovelly Road, Southampton.

THE "REACTO" CONVERTER



This unit will give you a new wealth of entertainment.

A sensitive unit which, when joined to an existing broadcast set, instantly converts it into a highly-efficient all-wave design. The "Reacto" can be used with any superhet or set incorporating H.F. amplification, and in addition to covering the world's short-wave bands it can, with suitable coils, be employed for the reception of the television sound broadcasts.

Designed by the "P.W." Research Dept.

like to extend their listening range, and to be able to tune-in new stations and new forms of entertainment such as they can never expect to hear on the medium and long waves. In the majority of cases it is simply and solely a question of £ s. d.—the cost of exchanging that good friend the broadcast set for a new all-waver.

There is, fortunately, an alternative, and one which from the point of view of efficiency loses nothing on the all-waver. This alternative is to use a short-wave converter in conjunction with the existing broadcast receiver, the only essential factor being that the broadcast set must possess one or more stages of high-frequency amplification or have a superhet circuit.

The ordinary detector-and-L.F. type of receiver is no use with a converter, although it is perfectly satisfactory with an adaptor, which is another form of short-wave unit, but one which we are not concerned with here.

Now a short-wave converter coupled to a good broadcast set frequently gives better reception on the short waves than is obtainable on the short-wave side of some all-wave designs. The reason for this is that when used with a converter the broadcast set acts solely as an amplifier, and the designer of the converter is able to give full play to his ideas and ingenuity in producing a unit which, from the short-wave point of view, has 100 per cent. efficiency. He is not compelled to compromise.

This week we are describing a very successful unit for the battery set owner, and this will be followed in the near future by a unit of the all-mains type.

The "Reacto" Converter, as we have called this battery unit, has certain very definite advantages. For example, it can be permanently connected up to the broadcast set, thus converting the set to

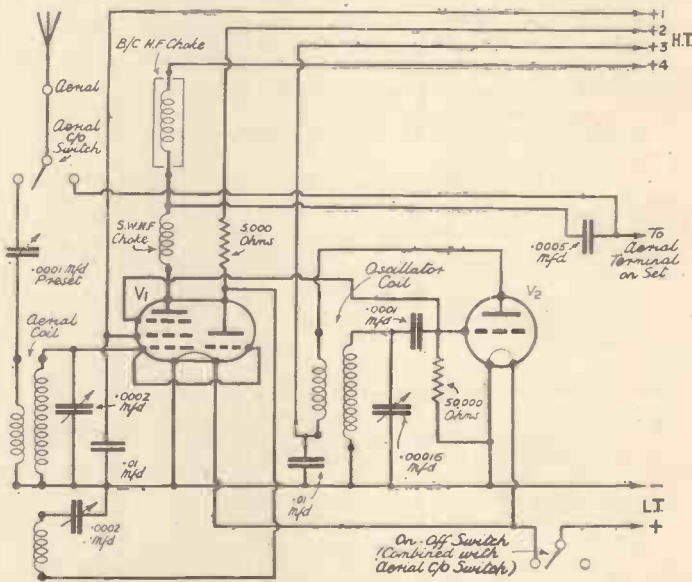
an all-waver in the literal sense. There is an aerial change-over switch and combined on-off switch on the unit which, when in the "off" position, automatically connects the aerial straight through to the aerial terminal of the broadcast receiver, cutting the unit out of circuit.

A Change-Over Scheme

When the switch is in the "on" position the unit is switched on and the aerial automatically connected to the aerial coil in the converter, and so the receiver is then ready for work on the short waves.

The circuit employed in the connector unit embodies a number of interesting features. We have, for example, used a separate oscillator valve, and the mixer V_1 is a triode pentode, the triode action being used as a separate reaction valve. This scheme ensures high sensitivity, and has a further benefit. Had we, say, decided

IT IS PERMANENTLY CONNECTED



One of the features of the "Reacto" Converter is the fact that you can leave it permanently connected to your set. The change-over switch automatically cuts the unit out of circuit when the set is required for ordinary broadcasting.

to use a triode pentode as a combined mixer-oscillator, then it would have been impracticable to tune down to the television sound wavelength of 7 metres. As it is, those who at any time wish to listen to the television sound transmissions may do so by purchasing a couple of B.T.S. 7-metre coils and inserting them in the two coil holders. On this wavelength the reaction side will be inoperative, but this is of little moment, since even without reaction the

(Continued overleaf.)

YOUR SHOPPING LIST

- 1 B.T.S. .00016-mfd. tuning condenser, type S.T.C. 316.
- 1 B.T.S. aeroplane slow-motion drive for above.
- 1 B.T.S. 2½-in. bracket with long slot.
- 1 Eddystone .0002-mfd. slow-motion condenser, type 957.
- 1 B.T.S. .0002-mfd. slow-motion reaction condenser, type R.C. 32.
- 1 Eddystone 6-pin coil holder, type 969.
- 2 B.T.S. 4-pin valve holders, type 4 C.H.
- 1 B.T.S. 9-pin valve holder, type U.H. 9.
- 2 T.C.C. .01-mfd. tubular condensers, type 250.
- 1 J.B. .0001-mfd. pre-set condenser.
- 1 T.C.C. .0005-mfd. fixed condenser, type S.
- 1 Dubilier .0001-mfd. fixed condenser, type 690 W.
- 1 Wearite H.F. choke, type H.F. J.
- 1 Wearite H.F. choke, type H.F. 3.
- 1 Bulgin D.P.C.O. switch, type S.98.
- 1 Dubilier 50,000-ohm 1-watt resistance.
- 1 Dubilier 5,000-ohm 1-watt resistance.
- 1 Belling & Lee terminal, type R, marked "A."
- 1 piece 18-gauge aluminium, 10" x 8" (for panel), Peto-Scott.
- 1 piece 18-gauge aluminium, 2½" x 2" (for valve holder bracket), Peto-Scott.
- 1 ebonite strip, 3" x 1½" x ¼", Peto-Scott.
- 1 piece 24-gauge aluminium, 8½" x 8", Peto-Scott.
- 1 "Metaplex" baseboard, 10" x 8" x ¼", Peto-Scott.
- 2 Clix accumulator spades.
- 4 Belling & Lee wander plugs.
- 8 ft. 18-gauge copper wire (Peto-Scott).
- 2 lengths 1½-m.m. sleeving (Peto-Scott).

VALVES

- V_1 Mazda T.P.22
- V_2 Marconi or Osram L.21

COILS

- 2 Eddystone 6-pin coils, types 6 LB and 6Y.
- 2 Eddystone 4-pin coils, types LB and Y.

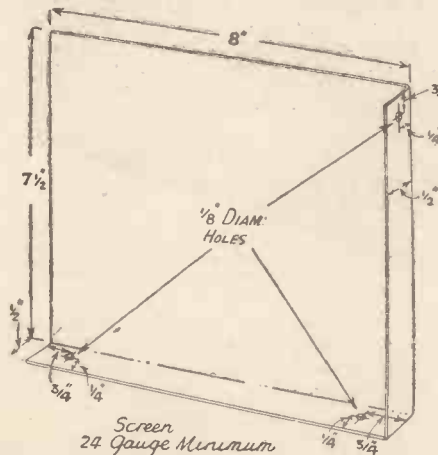
these existing sets are perfectly satisfactory designs, there is no reason to suppose that their owners will dispose of them yet. In fact, large numbers of them will remain in use for at least another year, and possibly two. But because these set owners do not possess all-wavers does not imply that they are not interested in the short waves. On the contrary, most of them would

THE "REACTO" CONVERTER

(Continued from previous page.)

unit forms a highly sensitive superhet frequency-changing arrangement.

A glance at the circuit will reveal to the more technical reader that the oscillations from the grid circuit of the oscillator valve V_2 are fed back on to the suppressor grid of the pentode section of V_1 . This is a



Here are the dimensions for the vertical screen. As can be seen from the wiring diagram, two components, viz. the B.C. H.F. choke and a .0005-mfd. condenser, are mounted on this screen. The hole positions for these can be found by placing the components on the screen and marking through their fixing holes.

method used to inject the oscillations into the mixer circuit—a simple and satisfactory scheme.

The triode section of V_1 can be regarded as separate from the rest of the valve, and you will see that it has its own anode fed through a 5,000-ohms resistance from

Turning now to the question of construction, you will notice that the triode-pentode together with the aerial coil, the reaction and aerial tuning condenser are separated by means of a vertical metal screen from the valve V_2 (the oscillator valve), the oscillator coil and the oscillator tuning condenser.

Layout Importance

The panel is aluminium, and the baseboard is of the metallised type. These are essential factors of the design, so don't make any modifications if you want to get really good results. On the short waves, it doesn't pay to take liberties with layout or wiring.

The triode pentode V_1 is mounted horizontally, the nine-pin valve holder being secured to a special fixing bracket of aluminium by means of two bolts. Dimensions for this bracket are given in a diagram.

The change-over switch and aerial terminal are mounted on a small strip of ebonite just behind the valve holder sockets for V_1 ; and in wiring up you will find matters somewhat simplified if you carry out as many of the V_1 connections as you can before screwing this strip of ebonite in position. And here is another point: solder your leads on to the change-over switch before you fix it into place on the ebonite strip.

You can leave the necessary lengths of connecting wire ready to be cut to length and joined to their respective terminals when the strip has been secured to the baseboard.



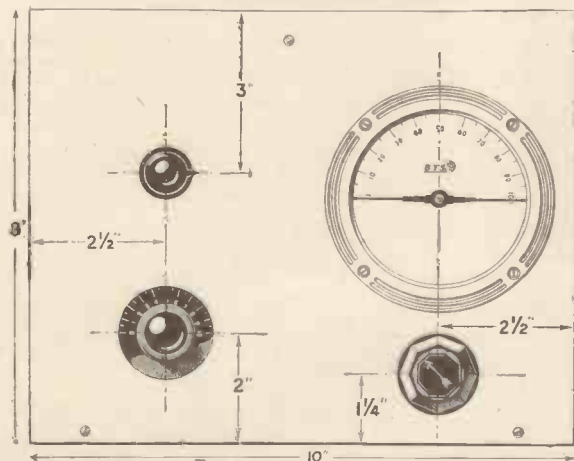
The oscillator stage is separated from the mixer and reaction stages by a vertical metal screen. The panel is of aluminium, while the baseboard is metallised.

valve holder which go direct from the valve holder pins to the securing bolts on the aluminium bracket. There is also a lead from the V_2 valve holder, the negative filament, down to the metallising on the baseboard, to which point is joined a flexible lead terminating in an L.T.—connecting spade.

Mounting the Tuning Condenser

The .00016 oscillator tuning condenser has a special slow-motion drive and the condenser itself is mounted in position

THE THREE CONTROLS



The three panel controls are as follows: bottom left, aerial tuning; top left, reaction; and, right, oscillator tuning.

H.T.2; its grid coupled to the grid of the pentode section so as to bring it across the tuned aerial circuit, and its reaction winding applying magnetic reaction to the aerial coil and controlled by a .0002-mfd. reaction condenser.

The coils used are the well-known Eddy-stone six- and four-pin types, and with the two specified the waverange is from about 13 to 55 metres, using, of course, the condenser values given in the list of components.

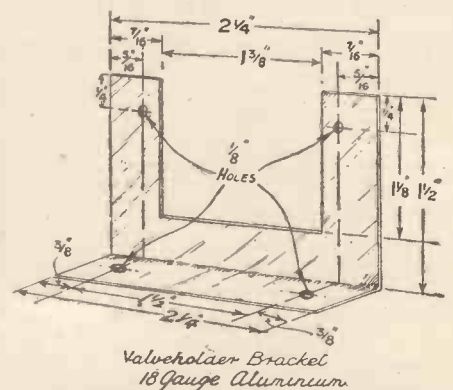
The preset condenser, which is situated between the switch on the ebonite strip and the vertical screen, is raised slightly (about $\frac{1}{4}$ in.) above the baseboard, so that it is well clear of the metallising and undesirable capacity effects to earth are minimised. All that you have to do is to make two little washers $\frac{1}{4}$ in., or slightly more, in thickness and place them between the condenser holding down screws and the baseboard. These washers can be of fibre, wood, or even of metal.

In wiring up the six-pin coil holder see that your arrangement of the various leads, particularly the lead going from the fixed vanes of the reaction condenser to its terminal on the coil holder, is such that there is room to insert and

remove the coil easily.

The remainder of the construction needs little explanation. The broadcast H.F. choke and the .0005 T.C.C. fixed condenser are, you will note, mounted on the vertical screen. To do this, all you have to do is to drill four holes through the screen, passing bolts through the securing holes on these two components.

You will notice that certain points are connected through the metallising. There are, for instance, two leads on the V_1



This bracket forms the mounting for the triode pentode, the 9-pin valve holder being bolted to the two $\frac{1}{4}$ -in. holes in the two arms of the bracket,

behind the drive, and, of course, coupled to it, by means of a B.T.S. bracket with long slot. This bracket enables the condenser to be adjusted accurately for height, so that its spindle is properly centred into the slot on the driving mechanism.

In operation the converter is quite straightforward and should present little difficulty, especially to those who have used a superhet and know something of its principles. But this knowledge is by no means vital, and the beginner need not have any qualms as to his ability to achieve successful reception.

The first thing to do is to place the valves and coils in position. This requires no

explanation, because the valves cannot be interchanged, one being of the nine-pin type and the other an ordinary four-pin variety. Likewise with the coils—in the case of the aerial coil you have a six-pin former and for the oscillator coil a four-pin former.

Looking at the front of panel, the oscillator tuning condenser with its big dial and special slow-motion drive is on the right. On the left you have the reaction condenser at the top, and below it the aerial tuning condenser. On the back are the aerial terminal, combined on-off change-over switch and seven flexible leads, these being the four H.T. + connections a lead which is joined to the aerial terminal of the broadcast set and the two leads which go to L.T. + and —.

The H.T. Neg. Connection

You will notice that there is no earth terminal on the converter, neither is there an H.T. — connection. The reason is that the existing earth connection and H.T. — on the set are sufficient, since they find connection with the unit via the batteries, assuming, of course, that you use the same H.T. battery for the unit as you do for the set. Actually, you can do this without placing a heavy additional drain on your battery, because the total current consumption of the unit is quite small, only a matter of three or four milliamps.

If you wish you can use a separate H.T. battery for the converter, in which case it will be necessary for you to connect the H.T. — on your new H.T. battery to the H.T. — terminal on your existing set.

Connect up the H.T. + leads as follows: Plug in H.T. + 1 at 60 to 70 volts; H.T. + 2 into about the same (incidentally, these two connections are not critical within a few volts); H.T. + 3 at 80 or 90

volts; and H.T. + 4 into the maximum voltage of your battery, preferably 120 or so.

Join the L.T. plus and minus spade connectors to the L.T. plus and minus terminal on your broadcast set so that you are supplying the converter from the accumulator which at present supplies the valves in your set. Remove the aerial lead from your set and join it to the aerial terminal on the converter. Join the special lead on the converter to the aerial terminal of the set.

Switch the converter over to the short-wave position, having previously made sure that your broadcast set is working normally. Now adjust the tuning of your broadcast set to a point on the top end of medium waves round about 550 metres. Place the reaction condenser moving vanes on the converter fully anti-clockwise, so that they are not engaged with the fixed vanes.

Now rotate the two tuning condensers on the converter and listen for a signal. Any sort of signal does as a preliminary, and you will probably pick up a lot of Morse. Actually, you are at present merely practising the operation so as to find out how to keep the oscillator condenser in correct relation with the aerial tuning condenser so that the unit is superhetering properly.

You can always recognise whether things are O.K. from the "live" feel of the unit.



How the mixer and reaction stages are arranged. Note the two components on the vertical screen.

You will probably get a slight background hiss and other little noises which form a contrast to the deadly silence denoting that the condensers are out of step.

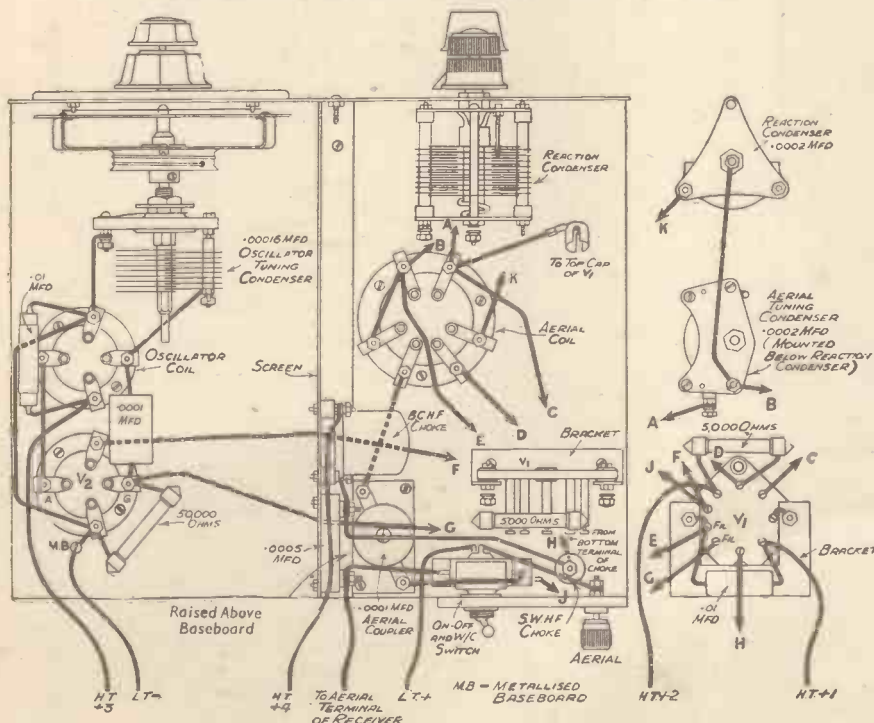
It is immaterial which coils you use to start with, so long as you use the same types throughout. For instance, if you use 6 LB in the six-pin coil holder, then you must use a four-pin LB in the other coil holder. The same applies to the 6 Y and the Y coil. These go together, so don't get them mixed.

Effect of Reaction Condenser

When you have got the set superhetering properly and have tuned-in a broadcast station on the short waves, try the effect of rotating the reaction condenser. You will find this very useful not only for increasing the volume but also for improving the selectivity and your ability to separate one station from another.

Go easy with the oscillator condenser; the tuning on this is very sharp, whereas the aerial condenser is fairly broad. It is for this reason we have fitted a special slow-motion drive to the oscillator condenser. Try the preset condenser in various positions; probably you will want it nearly all-out with a normal aerial. A. J. R.

DO YOUR WIRING FROM THIS PLAN



In order to make it easier to follow the wiring to the reaction and aerial tuning condenser, and the V1 valve holder separate sketches are shown alongside the main layout. The various leads are lettered to correspond with those on the main plan. The pre-set condenser is raised above the baseboard.

GANGED TUNING

IN spite of the fact that single-dial tuning together with its ganged condensers and matched dual-range coils has greatly simplified the operation of a receiver employing one or more high-frequency stages, there are quite a number of listeners, both old constructors and newcomers, who view the ganged set as something beyond their technical understanding so far as adjusting the condensers is concerned.

Actually, of course, the setting of the trimmers is quite a simple matter, and for purposes of adjustment this can be regarded as a method of tuning the receiver for maximum volume. In fact, these small trimmers which in practice are connected across each section of the multiple condenser, are really small variable condensers in themselves, the adjustment of which enables the various stray capacities existing across the tuned circuits to be equalised, or balanced, thus providing a suitable means of obtaining resonance.

RANDOM RADIO REFLECTIONS

By VICTOR KING

OLD HORN SPEAKERS ARE A BAD
ADVERTISEMENT FOR RADIO :: A
BRIGHT LAD IS "STINKER" ::
A PROBLEM PARENTS HAVE TO FACE

BLOW THAT HORN

I HEARD a part of the Coronation broadcast on a horn loudspeaker of, I should think, 1926 vintage. Not from choice. (The last time I engaged in a horn versus cone loudspeaker controversy there was no Nazi Germany. Work that out. Oh, yes, I was pro-cone!)

But to return to the Coronation broadcast. It happened this way: Coronation day presented an opportunity to visit some friends way up in the farthest



.....
"So listening became more of a burden than a pleasure."
.....

corner of Norfolk. And that meant six hours on the road for the two journeys.

Thus it was that I found myself taking a short rest—and a coffee—at a wayside café during the time the B.B.C. was doing some of its dodging round with "mikes." There was a radio receiver in action. I settled down comfortably to listen. But the wretched horn loudspeaker made the set sound as if it had a cold—in the way of some horn loudspeakers.

So listening became more of a burden than a pleasure.

I often wonder—and this experience made me wonder even more—why the B.B.C. doesn't take upon itself the duty of weighing in with a helping hand in the reception side of broadcasting. It's a good argument to say that having put excellent stuff (technically speaking) on the air their job is done.

But I think that they should at least unbend beneficently towards reception in public and semi-public places. After all, it is a jolly bad advertisement for their wares to have them popping out of, for example, old-time horn loudspeakers fixed in cafés.

Of course, there are B.B.C. committees and technical bodies hard at work inflicting radio on school-children. Anything to do with education—

By the way, my Coronation day outing brought me into contact with further proof of what I said in a paragraph a few weeks ago—that there are more opportunities for skilled mechanics and engineers than there are qualified men to take advantage of them.

"Very difficult to keep our skilled labour. Two of my best men just gone over

to So-and-So's," said my informant. He is himself a skilled engineer, of course, and one who likes his work so much that he takes

no count of hours. Result: at only 23 years of age he is in charge of a complete section of the factory with one hundred and fifty men under him and has just bought a new car. Nice going, laddie.

CURRENT GOES ROUND AND AROUND—

LET me tell you how I was caught out for an "onion" the other day. Allow me to humiliate myself in print. A small nephew—you've heard of him before in these notes—had a battered-looking American radio set given to him. It had been in use quite successfully for some years, I was told. But it wouldn't work on said small nephew's mains. Would I tell him what was wrong?

A quick inspection at once gave me something to talk about. "This wireless set, my lad," I said, "is suitable for mains of one hundred and ten volts, whereas your mains are two hundred and thirty volts. Why you haven't blown the whole thing up I don't know. I expect all the valves are gone, anyway. This just goes to show that fathers who let their little boys play about with the mains—" At which point I stopped discreetly. Cousin Bill is a quick-tempered bloke, and little boys delight in passing compliments on!

I took small boy and set back to my shack and hooked it (the set) on to a 110-volt supply. Very dim results.

"See! You've de-activated all the valves!" I said sternly, and washed my hands of the affair.

Later on I heard that the wretched infant was giving radio parties to all his pals with that set. On 230 volt mains! I gently "fished" for whys and wherefores and was airily informed that "Stinker" (a grubby little fellow scientist, aged eleven) had found and repaired a faulty joint.

But "faulty joints" don't line up with 110-volt sets working on 230-volt mains, I mused disgustedly to myself.

When the opportunity occurred I sniffed round the outfit for voltage-dropping resistances. None to be seen. Set working coolly and efficiently.

The next morning I tackled "Stinker" in the street. Very gently. Very airily. Hoping he wouldn't know what I was burning to find out.

"Where's the unwanted 120 volts in young Ted's set being taken up?" I



HARRY ROY and his band putting across a number [for Harry's latest film, "Rhythm Racketeer." It is a Rock film, made at Elstree under the direction of James Seymour.

asked. That will puzzle him; that will put me in the correct position of superiority, I thought. Not a bit of it.

"In the connecting lead, of course," said "Stinker" carelessly. "One of those leads with resistance wire in it, you know. They sell you just the right length to make the voltage O.K."

Of course! Was my face red?

CAREERS IN RADIO

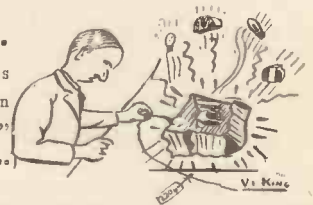
AS I have told you before, by virtue of my position as one of "P.W.'s" columnists, I am frequently asked for advice by young men wanting jobs or by their parents.

For example, here is a letter from a Mr. Hughes, of Fallowfield, Manchester:

"My son, aged seventeen, has recently left a secondary school, and the problem is to know what to do with him. He is a serious youth with an inquiring mind, always experimenting with electrical and mechanical things. Originally, we had thought he might go into the Air Force, but he was unable to pass the necessary medical examination. Do you think he might get a position on one of the wireless papers?"

.....

"A serious youth with an inquiring mind."
.....



He might, but I should think it unlikely. I recently put in a word for a young relative of mine with the Editor of "P.W." (and was told that there is a large file of applications for jobs on this particular wireless paper. It is a case of very infrequent vacancies and very frequent applicants.

At the same time the Editor informed me that he has in preparation a number of articles dealing with radio as a career which will shortly be published. These will, no doubt, answer my correspondent's further questions and incidentally lighten my post-bag considerably. I nearly added "I hope." But I don't, really. There could be only one thing worse for me than to be swamped by your letters, and that would be to receive none at all!

TELEVISION TOPICS—Collected by A. S. Clark

"TELEFRAMES"

Items of general interest

A POSSIBILITY

THE B.B.C. television service is to close down for three weeks on July 26th, but the Eiffel Tower television station should be working by then, although on only a part of its final peak power of 30 kilowatts.

The significance of this statement lies in the fact that the Eiffel Tower transmitter is to be capable of working on 405 lines. If this line-frequency is used and the wavelength is near enough to that used by Alexandra Palace, who knows, something may be obtainable on commercial sets over here.

Certainly, those with experimental outfits on which wavelength and other alterations can be made should stand a chance, at least, of something in the nature of an alternative programme. It all remains to be seen—in more ways than one!

It must be remembered that the Eiffel Tower aerial will be just on 1,000 feet above the ground. In this connection it is interesting to note that the transmission cable from transmitter to aerial will be around 1,300 feet long, will be 5 inches in diameter, and weigh about 12 tons.

The sound programme accompanying the vision will be sent out from one of the regular P.T.T. broadcasting stations, presumably on a medium wavelength.

"100% BROADWAY"

An all-Broadway presentation with films and music from many productions appropriate to Broadway will be televised in the afternoon programme on June 11th. The Albertina Rasch Girls from the Dorchester Hotel will appear and the compère will be David Burns, who made his first appearance at the Alexandra Palace as stooge to the comedian Lou Holtz.

SCOPHONY TELEVISION

It is anticipated that a competitive Scophony television receiver giving a picture six times larger than that of any on the market at the present time will make its appearance to the public in the late autumn of this year.

NOISES OFF

They certainly work under difficulties in the studio at Alexandra Palace, but these difficulties hardly justify the noises that are heard, coming from another part of the studio while the talker is being televised. Bangs, coughs, and so on have been so bad at times as to cause the speaker to look away from the camera to see what is happening.

It has certainly added emphasis to the actuality effect of the item being televised, but television is surely old enough now to do without such amateurisms.

A weekly feature which will keep the reader au fait with all the latest news and developments in television science. It will appeal alike to the newcomer to television and the advanced experimenter

NEW SCANNING SEQUENCE

A patent has been taken out for a system of scanning which should completely eliminate possibility of any line effect. Starting at the bottom left-hand corner of the picture, the spot moves upwards and to the right in a straight line, reaching the top a little to the right of half-way along. Here it moves downwards and to the right in a straight line, making a right-angle with the previous line.

When it strikes the right-hand side of the picture it moves off at a right-angle again. This process continues each time the spot reaches a side of the picture, until it finally finishes up a frame at the bottom right-hand corner.

This sounds very complicated, but try it with a pencil and piece of paper and you will soon see the idea.

ABOUT CATHODE-RAY SCREENS

THERE are a number of technical television terms associated entirely with the screen of the cathode-ray tube, some of the more common and important of which are explained in the following paragraphs.

Luminescence is the property possessed by a number of materials of giving off light without burning. The light may be of either a fluorescent or phosphorescent nature.

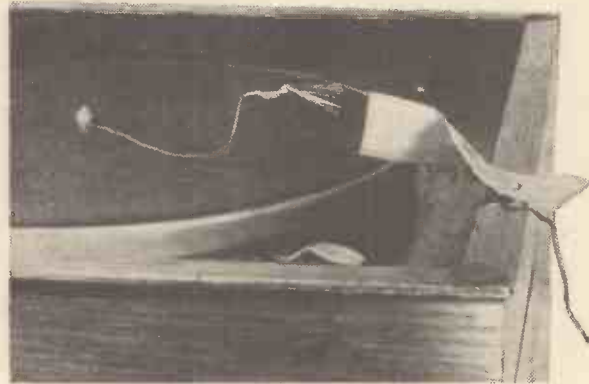
Fluorescence is the property by which a material will give off light under the action of certain rays, such as the cathode rays of the cathode-ray tube.

Phosphorescence, on the other hand, is the property of a material which causes it to continue for a period of time to give off light rays after being exposed to light. The length of the period of time may vary from a fraction of a second to very many weeks.

Screen lag is the term applied to the television screen to denote that the light given off does not cease immediately with the removal of the cathode-ray beam, but continues thereafter for a short space of time. It is unusual to find a fluorescent material which is not also phosphorescent to a certain extent. Consequently, when the screen material becomes luminescent under the rays, the light given off starts up the phosphorescent properties of the screen and causes the light to persist after the beam has passed on.

So long as the period of phosphorescence does not last too long, it can be an advantage in enabling the screen to give off more light and therefore to produce a brighter picture. In no case may the phosphorescence exceed the period of time between one picture and the next. Otherwise, the phosphorescent light will interfere with the light making up the next picture and so produce a blurring effect.

Screen burning describes what has taken place when dark spots or lines appear on the cathode-ray screen. They can be caused by the spot remaining stationary too long, or by its covering the same line course too often.



The wire brush makes contact with the metal strip each time the turntable revolves.

FOR INTERRUPTING LIGHT

A rough-and-ready but, none the less, efficient "hook-up" for the purpose of obtaining recurring light signals for television and photocell experiments is illustrated in the accompanying photograph.

Soldered, or otherwise firmly secured, to the turntable spindle of an old gramophone is a length of stout copper wire, its free end terminating in a metallic brush made by soldering to it a short bundle of fine copper strands taken from an odd piece of lighting flex. On the side of the gramophone cabinet or in some other suitable position is fixed a strip of copper, and this strip and the revolving copper "brush" on the turntable are so positioned and adjusted that the brush makes light contact with the end of the strip every time it revolves.

Leads from a battery or accumulator are taken to the metal strip and to the turntable brush, the connection to the latter being effected either through the gramophone motor (which constitutes the best method) or by means of a very light rubbing contact on the upper part of the turntable spindle.

In series in the circuit is connected a suitable lamp. When the gramophone motor is wound up and its brake released the effect will be that the lamp will light up momentarily at every contact of the turntable brush with the projecting metal strip. Since, also, the revolutions of a gramophone turntable may be regulated pretty accurately, it follows that by this simple means it will be possible for the television amateur to obtain a definite number of light signals per minute, which, in the majority of such experiments, is an exceedingly important and desirable requirement.

The number of flashes can be considerably increased by the use of two or three fixed contacts instead of one.

J. F. S.

SEEN ON THE AIR

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

L. MARS LAND GANDER

AFTER the Coronation procession, programmes have provided the inevitable anti-climax. Inevitable? Well, I suppose so. 'Tis true, 'tis pity, but pity 'tis 'tis true.

A graph of television progress, from the point of view of programmes, would be a picture of pinnacles and canyons, the greatest triumph succeeded by the deepest disappointment. Mine is happily the comparatively simple task of pointing the moral, not prescribing the remedy. But here I can do both.

Television must be kept on the plateau, so bring back the outside broadcasting vans and bring them back quickly. I know that the vans have been docked for adjustments and that the B.B.C. team is training. It is urgently necessary that the process should be speeded up and that television should go out of doors. As I write the sun is streaming through the windows, shouting of open spaces, of cricket, lawn tennis, the sea, and the river.

Essentially Sound Items

I looked at the afternoon television programme. It began with a violin recital, continued with a talk on physiology. Enthusiast as I am I did not switch on. These seem to me to be essentially sound items. I should be interested in listening to either on a winter's night, but not, I am afraid, to *seeing* either on a summer's afternoon.

Then there is this proposal for a three weeks' television holiday. This, Mr. Gerald Cock, may be exceedingly good for the apparatus, it will certainly be good for the hard-worked staff. But it is exceedingly bad policy. I argued the point with an eminent B.B.C. official who shall be nameless. He said that a close season was a fine thing. Broadcasting House should be shut down for a month. Give people a rest from broadcasting. There are better things than listening and looking in summer time. And so on.

This is rank defeatism. Broadcasting is a good thing, it is an essential service. If listeners can do without it for a month they could do without it for ever. Broadcasting (and the same argument applies to television) is not a seasonal sport and should not be treated as such. The seasonal sports appeal to various sections of the public; broadcasting to everybody. If the television apparatus needs overhaul, it is merely an argument for the installation of necessary duplicate gear. If the staff need a holiday, and I have repeatedly acknowledged that they work like niggers, then that is an argument for increasing staff.

The Television Exhibition

The matter appears to be settled for one year, but I have registered my protest. And now to more cheerful subjects.

The Television Exhibition at the Science

Museum, which opens for three months on June 11 will repair a deficiency. While Britain has led in the public development of television, she has lagged in the public exhibition of television apparatus.

For several years the Television section of the Berlin Radio Exhibition, and last year the television section of the Paris T.S.F. salon, have shown how poorly television was being served in Britain in the matter of "telling the world." Now thanks largely to the energetic efforts of Mr. G. R. M. Garratt, of the Science Museum, we shall have an exhibition which promises to eclipse those of Paris and Berlin.



G6AQ CALLING

Our popular contributor, Leslie W. Orton, with Mr. Arthur Bird (G6AQ), at Porthcawl during the May 17th Popular Wireless 40-metre cross-country tests.

This is an entirely non-commercial show in which both the B.B.C. and all the leading manufacturers are co-operating. Ten different makes of receiver will be demonstrated in separate cubicles. It is likely that several never shown to the public before will be seen. Here, by the way, is an important item. Times of admission which, please, keep for reference:

Monday to Wednesday, 10 till 6.
Thursday till Saturday, 10 till 8.
Sunday, 2.30 till 8.
August Bank Holiday, 10 to 8.

An interesting point is, that not only will the B.B.C. be transmitting special programmes to the exhibition, but also a Cossor film transmitter is being installed to give continuous demonstrations outside broadcasting hours. I hear that the intention is to keep all the working receivers to a single standard, that fixed by the Television Advisory Committee of 405 lines interlaced.

There will be a separate historical exhibit with a working model of the B.B.C. 30-line Baird apparatus, and other equipment showing early ideas. The whole scheme

is to popularise television as a home entertainment. Good luck to it!

I am most interested to see that America is, apparently, seriously tackling the question of big screen television. Dr. Zworykin, inventor of the iconoscope forerunner of the Emitron camera, has been describing a system of projecting pictures on to a screen measuring 18 in. by 24 in., by placing a lens in front of a powerful cathode-ray tube. There are other reports of a demonstration to the Institute of Radio Engineers of a projector gun which enlarges images a few inches in size to 8 ft. by 10 ft., or 2,600 times the original size. Another picture, described as flickerless, was enlarged to 5 ft. by 4 ft. It consisted of the head of a girl, said to be clear to people 100 ft. from the screen, the picture being of a greenish tint. I regret that no technical details are to hand.

One programme item during the week under review which deserves special notice was the first appearance of John Watt on the screen. He turned up in the unexpected uniform of a "White Coon" as co-pianist

with Doris Arnold. I did not recognise him until the *dénouement*, when he came into a close-up, complete with ruffle.

He was taking the place of Harry Pepper, who was ill. In the intervals of running to and from Alexandra Palace for two performances, and rehearsals beginning at midday on the day of his appearances, Mr. Watt produced "Monday at 7" at Broadcasting House.

Are Snippet Programmes Preferred?

By the way, the B.B.C. wishes to know whether viewers like the ten and fifteen-minute snippet programmes, or whether the time has come to give a full hour's show as, the other afternoon for the first time, with "On Your Toes" from the London Coliseum. Without awaiting the answer the B.B.C. is proceeding with another grand *opus*, a full-blooded production of "Hassan" on June 8. It will be notable for two reasons: the two main studios are to be worked together for the first time, and film backgrounds are to be used with flesh and blood performers on the screen at the same time.

QUESTIONS AND ANSWERS

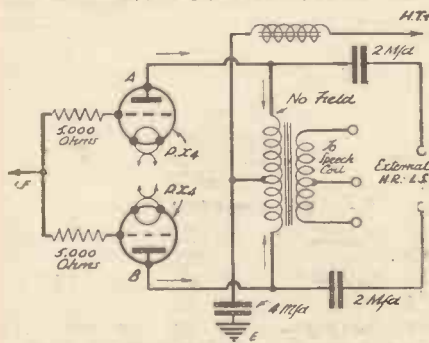
By K. D. ROGERS

EXPLAINING "PUSH-PULL" AND "PARALLEL" DIFFERENCES

A. J. G. (Whetstone).—*Can I use a push-pull output transformer to provide the anode load for two output valves connected as shown in the diagram, i.e. in parallel? It occurred to me that as the individual anode currents for the valves went through each section of the transformer in opposition, as it were, the opposing magnetic fields would cancel out and I should retain the full inductance of the transformer primary.*

I do not want to upset quality by this arrangement, for the set is designed for quality rather than anything else. I do not want to spoil it in the slightest degree.

You certainly would not spoil the quality in this arrangement, for the result of the circuit, assuming the two valves to be matched, would be dead silence. A bit of a shock, perhaps, but it happens this way.



This is the circuit of A. J. G.'s suggested "push-pull" output scheme.

You have got a normal push-pull output circuit. That means that the two outputs from the valves are to be sent through the transformer primary in opposite directions, so to speak. That is when valve A is acting under a positive grid swing and its anode current rises, the anode current rise (looked upon as a separate section of A.C.) flows through the transformer, as shown by the arrow.

When B valve receives a positive grid impulse and its anode current rises the rise will flow through the transformer in the direction of the lower arrow.

In push-pull the impulses do exactly the same thing, and they do it alternately so that the A push impulse comes first and then the B. For valve A gets a positive grid impulse, while valve B gets a negative one. Then the tables turn and A gets a negative impulse and B the positive one. That is done either by a separate phase-reversing valve or by a split secondary transformer.

The result in the output transformer primary is that we get a current in the direction of A "pushed" along by the valve A which is experiencing an anode current rise, and "pulled" along by valve B which is experiencing an anode current fall. The net result is a very strong current in the transformer, equal to twice the current from either valve. (I am talking about the A.C. component of the anode current, of course.)

On the next half cycle the reverse happens and B pushes while A pulls. But the result is two anode current changes in the same direction through the transformer primary, resulting in a large total current change.

What you have got in your circuit is the output part for push-pull and the input for parallel valves. You will get A pushing and B pushing at the same time. And you will get A pulling and B pulling at the same time a moment later. For you have both the grids connected together and receiving the input voltages in synchronism, or in phase. Thus you do not get push-pull but two simultaneous anode current changes in the same direction—a sort of "pull-pull" or anode current tug-of-war.

That would be O.K. if you did not oppose these currents in the transformer primary. But you do that and the result will be nullification, just as you get nullification of the field of the steady H.T. current to the valves. Therefore you will get no A.C. in the secondary. Valve A's output will wash out that of valve B and vice versa.

I am sorry to have to put a damper on your scheme but that is precisely what will happen, told in rather non-technical language.

But why use the valves in parallel? Why not use push-pull? It is O.K. for quality, and you will be able to use the transformer. Otherwise, you will, I fear, have to get an output transformer capable of taking the combined anode current of the valves.

You cannot split this and so retain maximum inductance as you had hoped unless you use push-pull. In parallel work you must have a transformer or output choke that will take the combined anode currents of the valves without saturation.

If it is a transformer it must also, as must the speaker transformer if a choke is used, be able to match the valves with the speaker. The load will be half that usually applied with one of the same valves.

MADE IT WORSE

L. K. G. (Bagshot).—*I saw in "P.W." for May 22nd a "Practical Pointer" which suggested that I should wipe my gramophone records with a cloth every time before I used them so that the dust on them would be removed. I did it, but found that afterwards the record had more dust on it than before. Why is this; and what's the use of wiping the disc if it is to make matters worse?*

Oh, thou of little faith. The "Practical Pointer" was quite sound, but I am afraid that you have not taken to heart the writing on the drawing itself. You have read only the words underneath. You are referring, of course, to the diagram on Page 249 of that issue.

You have wiped too vigorously. What has happened is that you have electrified the record in the same way as a fountain pen, a piece of ebonite or vulcanite, or a piece of glass can be charged with electricity by rubbing. In that condition you have made it attract dust from the atmosphere, and no matter how clean your house may be there is sure to be dust floating about. Ask your wife and see if I am not right.

That dust, some of it no doubt dust that you have only just wiped from the record is attracted to the disc and you are in a worse state than before.

The only way is to wipe the disc very gently indeed so as not to charge it. Then you can touch it on various points on the surface and discharge it if you like. But the gentle wipe ought to do the trick. And, after all, don't forget that you are not really trying to get rid of light and airy pieces of fluff, but of the heavier specks of grit that settle in the grooves and play havoc with the record surface. This grit will not be attracted back again if you wipe slowly and lightly. And don't forget the slowly.

You may get a little bit of fluff back again, but who minds a bit of fluff occasionally? After all, it will not wear the record. It's the grit that does the damage when it gets down in the grooves.

But please don't lose faith in us. We shan't lead you up the garden.

AGONY COLUMN

J. R. B. (Scarborough).—*You get some rather sticky questions in your page, and the answers make interesting reading. Here is another. I have an S.T.800. It passes all points in the "quick test" in the issue of May 15th last. But it will only get Prague on 25-34 metres, not another one. Prague is splendid. Long, medium, and short waves oscillate but not a station comes in.*

I need hardly add that the reader asks that dreadful word WHY. I must confess that I don't know, but I suspect—just suspect, mark you—that the coil is not all it should be in that particular set. I take it you hear absolutely nothing else in the way of stations. No comforting Droitwich on the long waves, and no Northern on the medium waves, nor their carriers. In other words, the coil and condenser combination is not functioning and you are getting no tuning.

It is possible that you are getting tuning on the short waves and that the set is insensitive there (due to the coil fault) and for some reason you can only get Prague. But you should get carriers of other stations unless you are getting no tuning down there.

In any case, I should, if possible, try another 800 coil in the set, and make sure that all the tuning circuit leads are above reproach. You may not have the condenser connections properly made and therefore have no tuning.

I may be quite wrong, but without the set I cannot diagnose the trouble straight off. Just suspect the coil and try another. Send the one you have back to the makers for overhaul and test if you like, but I prefer the borrowing method if possible, then the return of the coil if it is found to be "dud."

"YOU NEVER KNOW"

"In a recent 'P.W.' Dr. Roberts remarked in his column that 'the fascination of short-wave listening is that you don't know what you are going to pick up next.' That is very true," writes D. B. M. (Southampton), "for I find the same thing myself. But of one station I am certain, and that is the London Regional. It comes through faintly on my short-wave set all round the dial. Why is that?"

You do not say what type of set you are using, nor if the Regional station is tunable at all. But I am surprised that you get that sort of trouble at such a distance away from the transmitter.

Usually the fault occurs in fairly simple sets and is located in the reaction choke. If this tunes to the medium wave station or thereabouts you may experience the break-through you mention. But not usually at such a distance. It is comparatively common where the offending station is close to the receiver, but at Southampton I should have thought you would have been safe from such invasion.

However, suspect that choke. Get another and connect it in series with your present one (I am assuming a fairly simple type of set) or get another make of choke and try that in its place. You might like to procure a resistance instead of a choke and try that.

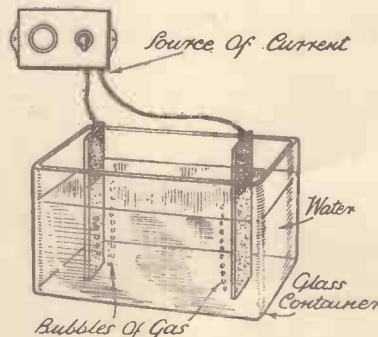
If the station is sharply tunable it is probably a harmonic that you hear, but your description of the trouble seems to denote pretty clearly that the choke is at fault.

S.O.S.

Here is another "S.O.S." Will anybody help Mr. H. C. Banks, 5 Priory Road, Barking, Essex? He wants blue print and details of the S.T.700. Will buy or borrow, as desired. Thanks. Don't forget to send a card first.

TECHNICALITIES EXPLAINED—No. 54

ELECTROLYSIS



This is the term given to the process of splitting up in chemical manner a solution by passing an electric current through it. The solution is then said to be an electrolyte. If you pass a current through water the water or electrolyte is split up into hydrogen and oxygen which bubble off in the form of gas at the electrodes through which the current enters and leaves the water. The hydrogen comes off at the electrode by which the electrons forming the electric current enter the water, or the negative pole.

Electro-plating is a form of electrolysis. In this case the metal to be plated is placed as one of the electrodes and a solution of some salt of the metal to be deposited is used as the electrolyte. Then when a current is passed the solution is split up and the metal is freed from its solution, being deposited on the electrode at one end of the circuit.

INTERNATIONAL CO-OPERATION HELPS INJURED MAN

(Continued from page 289.)

"A young man in the crowd outside Buckingham Palace succeeded in climbing into the B.B.C. outside broadcasting unit in the stand at Green Park and represented himself to be one of the observers. He broadcast a brief description of the scene in the ten o'clock programme."

It was an amazing series of coincidences that enabled the young man to get on the air. And the B.B.C., although leading the laugh against themselves, swear that such a thing can never happen again.

Something to Sing About

THE "Norwich Canaries" and other birds in East Anglia have been making a song for years because of the difficulties of receiving clear broadcasting in their part of the world. A glance at a map of B.B.C. stations will show that while other parts of the country are relatively well-peppered with stations, East Anglia has none. Instead, East Anglia has all the



North Sea shipping dash-dot-dashing past. True, the noises of the ships are almost drowned by the adjacent Dutch and neighbouring German stations—but what hope does London Regional stand with all those goings on?

But now the B.B.C. engineers are thinking about a nice relay station for Norwich. Discussing the site, one citizen said that if there was going to be another couple of years' delay, as rumoured, the only fit site would be Unthank Road.

Leonard Laughs

LEONARD HENRY has managed to get many happy memories into his book, "My Laugh Story" (Stanley Paul & Co., 2s. 6d.). Once at Savoy Hill he



made a comic attempt to play the bagpipe and as a climax an infuriated listener was supposed to puncture the bag. But how did one imitate the "whoosh" of the air rushing out, in those early days?

They decided to bring in a cylinder of compressed air, and turn on the tap at the critical moment.

'Twas done. But the laddie at the air tap was too enthusiastic, and he unloosed a tornado that tore through the studio, whirled the rugs off the floor, and sent the girls' skirts flying over their heads, giving Leonard the shock of his life!

You'll enjoy Leonard's Laugh Story.

Several Over the Eight

NOW that the Post Office has disclosed the licence figures for April it is clear that Britain, for some weeks, has had Several Over the Eight (Millions). The

total number of licences in force on April 30th was 8,177,677, representing a net increase of 50,041 licence-holders during the month, after allowing for expired licences and renewals.

This total compares with 7,642,668 at the end of April, 1936, giving an increase of 535,009 during the twelve months. At ten bob a nob this works out that over a quarter of million pounds extra was paid in by John Listener during the past year. Still going strong, Johnnie!

Coronation Congratulations

AS befits this progressive age, the honours list to commemorate the Coronation of King George VI. contained the names of several well-known figures in the radio world.

A barony was conferred on Colonel J. C. Denison-Pender, M.P., who is governor and managing director of Cable and Wireless (Holding), Ltd.

Knighthoods were conferred, among others, on Mr. L. Sterling, managing director of E.M.I., Ltd., and a director of Marconi-E.M.I. Television, Ltd.; and on our old friend Mr. E. T. Fisk, director of Amalgamated Wireless (Australasia), Ltd.

"MIKE" SLIPS AND QUIPS

During a Talk

You know, the papers are very one-sided; when a famous man dies, they make a big fuss, but it's a strange thing they never make a fuss when a famous man is born!

Commentator

My voice may sound a little liquid, but you can't blame me for that, as I'm talking through a wet microphone.

Advertising a Foam Bath in a Sponsored Programme

Then you have a rub down with a cup of tea.

During a Talk

A stitch in time saves nine. Especially is this so where your milk supply is concerned.

Air Race Commentator

The fastest among the ladies was Miss ---.

Announcing Sponsored Programmes.

Good news! F---'s shoe stale tarts to-morrow.

International Assistance

IT is a thousand pities that whole nations cannot get together for the common good as do the individual nationals. Take the recent case of the Edwardian, for example.

She is a Grimsby trawler, and she recently put into Lerwick with an injured French fisherman on board. He had broken his arm up on Bear Island, and as the Edwardian was making for home she gave him a 600-miles lift. But on the voyage his pain grew so acute that the little vessel sent out an SOS for medical advice. A Norwegian radio station which heard the call got into touch with a doctor, and soon the Frenchman on the English ship bound for Scotland was being treated with Scandinavian skill.

National boundary lines are no barriers to radio, nor to the spirit of goodwill. Why should they have such importance to the politician?

Conversation-Piece

WHAT the people of Buenos Aires find to say to the people of Tokio I do not pretend to guess, but evidently those two well-spaced cities have a lot to talk about, for they claim that the new radio-telephone circuit which now links them is the world's Number One Wireless "Hullo there."



This new telephone circuit is about 11,500 miles long, and if the Japanese seem to want it Buenos Aires will hook on land lines which will extend the circuit to other towns in the Argentine, to Uruguay or even to Paraguay.

It must be a great comfort to the average citizen of Tokio to know that he can now speak to somebody in Paraguay; provided, of course, that he has the necessary billion yen—and yen some.

Condensed News

BELIEVE it or not, the latest successful application of radio waves is to CHEESE. Many varieties, from ripe old gorgonzola to nutty, netty Gruyère, are much improved when a suitable frequency wave is passed through them.

Summer lightning is already putting radio stations out of action for short periods. The Radio-Toulouse aerial was recently brought down with a bang, and the evening programme had to be cancelled.

Impasse at West Wickham

A FRIEND of mine who prides himself on his talent for investigation (but does not know that it has earned him the nickname "Nosey"), recently visited

West Wickham, Kent, with a view to inspecting the Metropolitan Police wireless station there. Instead, an inspector inspected him, with an unwinking thoroughness that would have disconcerted a graven image.



The would-be investigator, unprepared for this official hauteur, hastily surveyed the site, but the inspector—with the air of a man who isn't going to let nobody pinch no wireless, not if he knows it—stared at the visitor with ill-disguised suspicion. It was what the Timbuctoodians would call an impasse.

I am afraid, therefore, that I can't tell you much about this station, except that it's on a goodly scale, with three transmitters and plenty of aeriels, apparently for shorts and ultra-shorts. Any guy who thinks that the police are just toying with radio should go and look at the West Wickham outfit.

MARCONI—THE MAN AND HIS WIRELESS

(Continued from page 293.)

enlivened the "ether" by making the waves more powerful, and he supplied a missing link in wireless—the receiving instrument.

Obviously, if the waves were to be utilised for signalling they would have to be converted into sound after having travelled through space. Maxwell had done nothing about that, neither had Hertz. The incoming impulses were high-frequency currents; vibrating many times in a second, so rapidly that the unaided human ear could not perceive them. A machine was needed to detect the waves; to rectify or change the signals into low-frequency currents capable of operating a device that would record them and put such mystic whispers of science within man's range of hearing. This called for even more ingenuity than flashing the sparks, the basic trick of which Hertz had revealed.

Marconi in his studies of electro-physics had learned that Edouard Branly, Professor of Physics at the Catholic University in Paris, had won distinction by studying the observation, first made by Calzecchi Onesti of Italy, that the conductive effect on metallic filings in a small glass tube, caused by an electric discharge in the vicinity, persisted after a comparatively long period, but quickly disappeared if subjected to mechanical shock. Sir Oliver Lodge called the device a "coherer." Marconi adopted it as a wireless detector. He erected an antenna at the receiving end, similar to the transmitter's elevated aerial, and connected the wire to the earth through the coherer.

As designed by Marconi it was a small, fragile-looking glass tube about the thickness of a thermometer and about two inches long. The silver plugs were so close together that a knife blade could scarcely pass between them; yet, in that narrow slit, electrical magic was performed. Fine nickel dust nestled in the slit. These particles enjoyed the strange property of being alternately conductors and non-conductors for the Hertzian waves. They were good conductors when welded into a continuous metal path by a passing current. They were poor conductors when they fell apart under the blow of a little tapper, such as is used to ring an electric door-bell. The tapper arrangement was known as a decoherer.

The practical operation is interesting: When the signals came down the antenna wire and struck the coherer the dust particles of metal cohered (hence the name); the tapper's tiny hammer hit against the glass tube. That blow decohered the metal particles, stopping the current flow from a local battery. Each successive impulse reaching the antenna produced the same phenomena of coherence and decoherence, hence the recording of dots and dashes on a Morse receiving instrument.

Marconi soon found the coherer was erratic. He realised it would have to be improved or a more sensitive device invented before wireless could hope to go very far and be dependable. He sought a modification of the Branly instrument to improve the sensitivity. First, he tried a smaller glass tube and shortened the slit in which the metallic filings were located. The mixture was changed by using finely

sifted particles, 95 per cent. nickel and 5 per cent. silver. Branly and others had concluded that copper, iron, brass, zinc and similar metals responded best to the sudden increase in conductivity. Marconi's new nickel-silver combination showed promise of being the most sensitive detector yet devised.

Now for a test across "long" distances—beyond the garden!

The receiving station was carried out to a hill 1,700 metres from the window of the wireless room of Villa Grifone, so the inventor might keep an eye on the entire "expanse" he hoped to cover. At the receiver he stationed Alfonso and told him to wave a flag should he see the coherer's hammer tap three dots, the Morse letter "S." Marconi touched the telegraph key and immediately his brother's flag waved.

Jubilant, but, nevertheless, mindful that wireless to be practical would have to pass through all obstacles such as mountains and buildings, Marconi moved the receiver to the opposite side of the hill beyond optical range. He instructed Alfonso to take a gun and shoot, if he heard the coherer tap out a cricket-like sound. Again Marconi touched the key, and instantly from beyond the hill, which was about three-quarters of a mile in thickness, came the "salvo"—the first salute to wireless! Giuseppe Marconi was summoned for a repeat performance, and when he walked back across the fields to the house he was entirely stripped of scepticism.

Right then and there Marconi was thoroughly convinced that no obstacle on the face of the earth or distance could stop his wireless.

"A problem is always simple—when solved," he once remarked in talking about his early experiments. "To radiate the electric waves was not easy; there seemed to be a thousand and one things in the way. But from the beginning I aimed at interfering with the radiation from the oscillator, breaking the emission up into long and short periods so that Morse dots and dashes could be transmitted. My first success with the radiation problem came in December 1895; and I continued to work all winter on it."

And so he did; but he took very good care not to whisper a word to anybody who knew anything about physics until his first patent was applied for in June 1896.

Monsieur Branly, in the course of a communication to the "Société Française de Physique" in 1896, made the following statement: "Although the experiment which I have always prospected as the main experiment of my study of radio conductors (battery element, iron filing tube, and galvanometer, making a circuit where the current passes after an electric spark has been flashed at a distance) is the image of wireless telegraphy, I have no pretence to have made this discovery, as I never thought of transmitting signals." (Bulletin de la Société Française de Physique, Résumé des Communications, séance du 16 décembre, 1896, p. 78 du volume de 1898.)

Later, in 1905, in the August number of the French magazine, "Je sais tout," Dr. Branly published an article on the "Marvels of Wireless Telegraphy," in which he said: "A young scientist, Mr. Marconi, conceived the idea that since it was possible to produce and transmit through space electric

(Continued overleaf.)

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MARCONI—THE MAN AND HIS WIRELESS

(Continued from previous page.)

waves, it might be also possible, perhaps, to pick them up at a distance and 'talk,' as diplomatists would say. Mr. Marconi deserves the credit of having devised ingenious apparatus for picking up these waves, and of having done so, in spite of the doubts and denials opposed to his daring idea, wireless telegraphy was born."

Distance—that was the goal. How to annihilate it—that was the problem.

Marconi utilised the idea of concentrating the waves into beams, like the flash from a lighthouse. He placed the discharge gap of the transmitter in the focal line of a cylindrical parabolic reflector. The detector was in the focus of a similar reflector. This was the alpha of the famous Marconi beam, the prelude of world-wide wireless which some day would flash powerful streams of energy in desired directions. All that, however, would transpire in the years to come, long after the early Marconi reflector patents expired. The inventor concentrated on the task at hand. He made the sparks snap with greater vigour; the signals were clearer and more consistent at the receiver.

But he did not rush to proclaim the genesis of wireless. Quietly he worked to strengthen the signals. Day after day the experiments were repeated with this new miracle called wireless, so named because no wires were used to link the sending and receiving stations.

The spark of a new era in communication had flashed. The scintilla was bewitching; Marconi saw no end to the dazzling beam that projected into the future.

From that day on, the workshop room in which wireless was nurtured and the home-made instruments fashioned by the hands of Guglielmo Marconi were guarded as a sanctuary by his devoted mother, until her death on June 3rd, 1920, at Harley House, in London. And on the spot where Alfonso waved the flag as a white ensign of scientific triumph that would spread the gospel of peace and goodwill among the nations of the earth, there happens to be erected a stone cross, which incidentally stood there long before Marconi was born, as a remembrance of a monastery once located on the spot; there the crusade of wireless began.

Bologna, the scene of it all, might well be described as the Middle Ages still alive. It is a town of beautiful churches, and to a visitor it seems quite the same to-day as it might have been had he walked into the town 500 years ago. Now, however, the automobiles in the narrow streets, never planned to accommodate motorised traffic, offer a unique contrast with the sidewalk archways designed to shade pedestrians from Italy's summer sun; the atmosphere throughout the town is one of leisure.

Bologna is on the map near the top of the Italian boot, slightly above the knee of the long peninsula that swings down from the Alps to dip its toe in the waters of the Mediterranean. Pronounced Bo-lon-ya, in the Middle Ages the town was called "La Dotta," meaning "The Learned," because of its university; "La Libera," because of the democratic institutions; and "La Grassa," because of the fertile soils and abounding wealth.

Twitching frogs' legs brought fame to the town, however, long before Marconi wireless. It was the home of Luigi Galvani, who, while experimenting with electricity flowing through the legs of a frog observed galvanic or "animal" electricity, which led to the invention of the voltaic cell or battery by Volta. But the eighteenth-century research pioneers never imagined that some day a son of Bologna would give wings to the perplexing electricity and send it fleeting around the world with messages, music and pictures.

Bologna is a town in which invention thrives!

NEXT WEEK'S GRAND INSTALMENT

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.

There is sure to be another huge demand for POPULAR WIRELESS in view of its exclusive Publication of Radio's greatest drama—an authorised life-story of Marconi. So you will be well advised to order your copy in advance and make sure of it.

Old-timers like to tell an interesting legend concerning the stalwart warriors of that community. The hero of the story is a butcher, described as "too fat to fight but keenly alert to the tortures of hunger." He believed in Napoleon's logic that "an army travels on its stomach." So as the defenders sallied forth against the Milanese, this ingenious butcher converted a notion into a clever idea. He chopped up beef, pork and veal and stuffed the seasoned mixture into the intestinal tubing of a pig. That was not all. He made his invention practical for soldiers on the march. He linked the sausage together so that long strings could be hung from the neck or wound around the waist. He tied this portable food supply into short lengths for convenient rations. As a popular idea it swept the world; appropriately, to this day, it is called bologna.

Up the lane-like streets of this historic town visitors go to see the old Marconi home, the Marescalchi Palace on the façade of which is a marble epigraph bearing this inscription:

Qui nacque
GUGLIELMO MARCONI
che su le onde della elettricità
primo lancio la parola
senza ausilio di cavi e di fili
da un emisfero a l'altro
a beneficio della umanità civile
a gloria della Patria

Il Comune decreto
P
MCMVII

(Here was born Guglielmo Marconi, who on the waves of electricity, first threw the human word without the aid of cables and wires from one hemisphere to the other, to the benefit of the civilized world, for the glory of the Fatherland.—By order of the Municipality 1907)

At Pontecchio, one finds Villa Grifone, high on a hill overlooking the village, the same to-day as when wireless first sputtered beneath its rafters and through the thick walls. It is a heavy structure, three stories high with green blinds on the windows to keep out the heat of the summer and the wintry blasts that sweep down from the Apennines. There is really no attic, in the English sense of the word, although fiction has pictured the boy Marconi toiling at his work bench under the shingles. That is not quite true.

The spacious, but now empty and neglected room on the third floor, used as the first Marconi laboratory, once served as a storage place for silk cocoons gathered on the surrounding farms and purchased by Marconi's father for profit. The chamber where Guglielmo slept as a boy may still be seen on the second floor, and from this room he could run up a back stairway to his workshop. From the windows he had a magnificent view of the Apennine ridges.

In the garden, facing the front entrance, there is a large water fountain that adds a note of distinction to the place. The atmosphere is as peaceful and quiet as it can be. One hears the birds singing, and only once in a while a train is heard rumbling by on the Bologna-Florence tracks. From the distance the bells of a small Pontecchio parish church echo across the extensive estate.

Easy access to the Marconi home is gained from the main road. The visitor drives up to the top of the hill where house No. 126 is located. It is an imposing property, obviously belonging to well-to-do people.

Now, during the summer the old home is rented to vacationers from the city. The rooms are typically Italian with stone floors and only one large fireplace in the drawing-room downstairs.

A marble commemorative tablet on the front wall of the house, facing the village of Pontecchio, is inscribed:

Onore al merito di Guglielmo Marconi il quale in questa casa facendo le prime prove ancora giovanetto col suo ingegno e collo studio invento il telegrafo senza filo nell'anno 1895 ammirato dall'Italia e dall'Europa.

(Honour to the achievement of Guglielmo Marconi who, still a young man, making the first tests in this house, with his genius and constant endeavour invented wireless telegraphy in the year 1895 admired by Italy and Europe.)

In this age only a few may be found in Bologna who remember Marconi as a
(Continued on next page.)

MARCONI—THE MAN AND HIS WIRELESS

(Continued from previous page.)

youngster, among them a farmer, Antonio Marchi who, as an attendant on the Pontecchio estate, helped Marconi to carry the apparatus to various parts of the garden during his first experiments. Now at the age of ninety-three he lives with his wife, age eighty-seven, in Calderara, Reno, near Bologna. He knew Guglielmo when the lad was fourteen, and remembers him as "a very solitary boy."

The patriarch never forgot how Guglielmo as a boy joked and teased him, because he could not understand a word of English, when he happened to be within range of conversation between Mrs. Marconi and her son. Signora Marconi, however, could speak Italian quite well. And her son, even in later life, is still familiar with the native Bologna dialect, although there have always been slight traces of English accent in his Italian. This is believed to

explain partly why he never associated much with other boys, besides being of solitary character by nature. Those who know him intimately—and they are very few—say he has never changed much in this respect.

Marchi, the old peasant, says that Marconi had few, if any, school companions—in fact, he never seemed to have any close friends in his boyhood years. Mostly he kept by himself and enjoyed riding horseback over the hilly country and visiting neighbours. The old farmer remembers that Guglielmo would also climb the plane trees and on several occasions was found asleep in them.

The boy, through manhood and fame, always had a warm spot in his heart for his old friend Marchi, who had done odd jobs to assist him put wireless in the air. As a mark of appreciation on the farmer's ninetieth birthday on July 15th, 1935, Marconi sent a gift of 1,000 lire in cash, also his autographed picture.

And as Bassanio spoke to Antonio, the inventor of wireless might have inscribed, "I did receive fair speechless messages."

(To be continued.)

TECHNICAL JOTTINGS

Some items of interest

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

I MENTIONED a week or two back a fine Paper on the design and manufacture of receiving valves which was published recently in the Journal of the Institution of Electrical Engineers, communicated from the Research Staff of the G.E.C., and I said that, as opportunity offered, I would give you a few further interesting tidbits of technical information from it. But as I said before, those of you who are seriously interested should consult the original Paper, which is far too long for me to attempt here to give a summary of it.

Distance From Anode to Cathode

An interesting point in regard to indirectly heated valves is that it is difficult to obtain a long cathode, and consequently it is necessary to make the clearance between the cathode and the anode small, so as to get the same effect as would otherwise be obtained with a greater clearance and a longer cathode. There is a limit to the value to which this clearance can be reduced, however, because as the anode surface is reduced the temperature rises, owing to radiation from the cathode, although the energy of the moving electrons falls owing to the lower impedance. If the temperature of the anode becomes in this way excessive, the anode will begin to emit electrons when the anode voltage is reversed, since with oxide-coated cathodes some barium will have been deposited on the anode during activation of the cathode. Apart from the effect of this reverse current on the output of the rectifier valve, the cathode surface will rapidly be destroyed by bombardment by high voltage electrons, and the valve will become "soft." To keep the temperature of the anode as low as possible, the surface is usually carbonised by a heat treatment in a hydrocarbon atmosphere, thus increasing its thermal emissivity.

Another method which has been employed to reduce the impedance is to introduce between the anode and cathode, and close to the cathode, an electrode in the form of a grid, which is connected to the anode. In this way the system as a whole behaves as a diode, with an effective anode diameter slightly greater than that of the grid. Most of the energy is dissipated, however, in the outer electrode, which may now be made relatively large.

Calculating Valve Characteristics

Many people think that the characteristics of ordinary small receiving valves can be calculated with accuracy from the dimensions and other features, but this is not the case. The difficulty in calculating accurately the characteristics (or conversely in determining the dimensions necessary to produce required characteristics) is due to such factors as end-effects, lack of axial symmetry of the electrode system and, in most valves, the phenomenon which arises from the fact that the electric field in the neighbourhood of the cathode surface is not uniform along its length. Formulae have, however, been worked out for plane and cylindrical electrode systems, which are useful in determining the effects of the various electrode dimensions and operating conditions on the characteristics of the valve. These formulae are based on certain assumptions and are only approximate.

Fine Wires for the Grid

The peculiarity just mentioned above, due to the non-uniformity of the electric field along the cathode surface, is present to some extent in nearly all receiving valves and is unfortunately most marked in the very type of valve, namely low-impedance valves, where its effect is most serious. The manufacture of an indirectly-heated-cathode power output triode is only possible by the use of extremely fine wires for the grid, together with a very small clearance between the grid and anode.

Maximum Efficiency

The maximum theoretical efficiency (that is, the ratio of output watts to

(Continued overleaf.)

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TECHNICAL JOTTINGS

(Continued from previous page.)

anode dissipation) of an ideal triode having zero impedance would be 50 per cent. In practice, owing to the limitations mentioned above, the maximum efficiency obtained, even with directly heated cathode valves, is only about 25 per cent. By using a pair of valves in push-pull it is possible to increase the efficiency, and lower-impedance valves together with low-load impedance can be employed. In this way an efficiency of up to 40 per cent. can sometimes be obtained. The efficiency can be further improved by allowing the grid potentials of the valves to become positive over part of each cycle.

Pumping Precautions Necessary

The fact that an electron current is flowing to the grid, however, introduces new problems in manufacture. Greater precautions are necessary in pumping the valve, to ensure that the grid is really gas-free; otherwise the gas will be liberated by electronic bombardment when the grid is positive and will "poison" the cathode. Furthermore, since the grid is hotter than

in a valve operating with no grid current, primary electrons may be emitted; although the input circuit of the valve is designed to deliver power to the grid circuits, a large increase in grid emission would be serious.

Improving the Vacuum

Many experimenters do not perhaps know that excessive grid current in a valve may be due to the vacuum not being sufficiently good. Measurements made on representative types of valves have shown that the maximum pressure which may exist without causing excessive grid current is of the order of 10^{-5} mm. of mercury. Although the pumps used for exhausting valves in mass production are not capable of reducing the pressure to less than 10^{-3} to 10^{-4} mm. of mercury, the average pressure in modern valves using efficient "getters" (such as barium) is about 10^{-7} , or in some cases as low as 10^{-8} mm. of mercury.

Types of Cathodes

In power output valves and in indirectly-heated-cathode valves, in which the grid cathode clearance is small, electron emission from the grid is difficult to prevent. Many attempts have been made to reduce grid emission by treatment of the surface of the grid wires, for example plating them with copper or silver. These metals can dissolve barium deposited on them, leaving a low barium concentration on the surface. Experiments have shown, however, that little difficulty would be experienced if barium metal alone were deposited on the clean grid surface, and that it would be possible for a grid contaminated in this way to operate at a temperature as high as 400°C . without risk of excessive emission. Barium oxide on the grid surface, however, may cause serious grid emission at temperatures as low as 320°C .

Manufacturing Difficulties

Although plating the grid with silver or copper is effective in reducing the average value of grid emission in any type of valve it is not a certain cure, and it has been found that in large-scale production a small percentage of valves with excessive grid current is produced. The only sure method at present known of preventing emission from the grid of a valve is to keep the grid temperature below 320°C ., and to do this when the grid wires may be nearer than 0.5 millimetre from a cathode at a temperature of 770°C . is not easy!

Choice of Condensers

Those readers who are comparative newcomers to radio are sometimes a little confused as to when a mica condenser and a paper condenser should be used for a certain purpose and the reason behind the correct choice.

It may be useful to explain very briefly the difference between these two types of condenser. Whilst I am on the subject, perhaps I may say that there are really three types of condenser used in radio receiving sets, namely, the mica-fixed condenser, the paper-fixed condenser, and the electrolytic condenser. If we add the air di-electric or mica di-electric variable condenser this brings in a fourth class. But I am referring more particularly to the fixed condensers.

The Electrolytic Type.

I do not think we need say much about the electrolytic condenser, because this is of a special type and mode of construction, and is simply intended to give a large electrostatic capacity within a small compass. It is polarised—that is to say, it is intended only for D.C. voltages applied to it one way, and cannot be used the other way round, nor can it consequently be used for alternating voltages.

There are types of electrolytic condensers which are reversible. This means that even if voltage is applied to them the wrong way round for long periods, their normal "condensing" properties will not be injured in any way.

Coming, then, to the two ordinary types of fixed condenser, the mica and the paper types, the difference between these is that the mica type is generally used for relatively small capacity condensers intended for high-frequency voltages. Since mica is a much better insulator than waxed paper you might think that mica would be used where relatively high voltages have to be dealt with. This, however, is not the reason for the choice between mica and paper in condensers for radio receivers, because, as a matter of fact, the voltages encountered are never so high that they cannot be dealt with satisfactorily by a well-made paper condenser. Mica is chosen for radio receiver condensers not so

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The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialties described may be the subjects of Letters Patent, and the amateur and the Trader would be well advised to obtain permission of the patentees to use the patents before doing so.

much for its high insulating quality as for its low-loss characteristics and also because it has a high specific inductive capacity. The latter feature reduces the size of the condenser for a given capacity, but the low-loss factor is probably the most important point in connection with the choice of mica for H.F. condensers.

So that, speaking broadly, you would choose a mica condenser for H.F. purposes in a receiver.

Paper Dielectric

The paper condenser is used where a much larger capacity is required but where the low-loss characteristic is not so important. Paper condensers are generally used for the low-frequency parts of the receiver. Where very large capacities are required, for example, for smoothing purposes, in the rectified output of the H.T. unit part of a mains receiver, electrolytic condensers are now popularly used. They have, as already mentioned, a very large capacity with a small compass and it so happens that their polarised feature does not render them unsuitable, since the voltages applied to them in this particular position are always polarised voltages.

FROM OUR READERS

(Continued from page 298.)

"surround" is the only type to employ. The benefit of the extreme range of frequencies the receiver reproduces is otherwise lost. The corresponding disadvantage of the limp "surround"—much lower sound output—can easily be counteracted by "turning up the wick" on the amplifier, and therefore does not matter. My own company's designers would never dream of recommending a "stiff surround" speaker for use with such a high quality receiver as this.

The overwhelming majority of constructors and listeners, however, prefer a set using a comparatively small number of medium-sized valves and striking a satisfactory compromise between great sensitivity to distant signals and high quality of reproduction at large volume. A speaker designer who offered an instrument with a limp cone "surround" for use with this class of set would simply not know his job; for the volume of sound on distant stations would be drastically reduced, and the speaker's increased response would be almost entirely at frequencies which the receiver could not reproduce. Such a course would be analogous to the use of wide section "comfort" tyres on a racing bicycle.

In passing, I would correct Mr. Duff's impression that the comparative stiffness of a popular loudspeaker's cone is due to the necessity for inexpensive manufacture. The effect of a limp "surround," were it desirable, could be obtained on even the cheapest loudspeaker either by "doping" the edge of the cone or by making a series of close diagonal cuts round it. The problem of the "commercial" speaker designer is to utilise every available method of increasing sound output—to do so not only in such a manner as to reduce objectionable resonances to a minimum, but also, if possible, to counteract any "humps" or "dips" in the receiver's output; and to balance his whole design so as to give the finest quality and volume obtainable from a sensitive and selective domestic receiver. If the limp cone "surround" had been consistent with this aim, believe me it would have been used before now, whatever the cost!

G. S. TAYLOR.

Whiteley Electrical Radio Co., Ltd.,
109, Kingsway, London, W.C.2.

SPLENDID SERVICE

The Editor, "Popular Wireless."

Dear Sir,—In answer to Mr. F. Ward's letter published in your May 22nd issue, I would like to recall the splendid service I received from Messrs. Whiteley Electrical Co.

I purchased one of their 365 chassis. After using this for about three weeks it ceased to work, so I returned it to them and they returned it to me in good order. After about another two weeks it again gave up the ghost, and on making a thorough test I found that the transformer winding had gone between terminals B and C. I wrote complaining to Messrs. W. B., and this was the reply I received:

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The Editor, "Popular Wireless."

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His recent article on "Moving DX" also provided me with an interesting five minutes.

I trust you will have more contributions of a like nature by this interesting and entertaining writer.

I am looking forward to your future series of "The Dial Revolves."

J. G. HARRIS.

"St. Malo," St. Cenyad Road,
Heath, Cardiff.



Up-to-the minute news concerning the radio industry

L OUDSPEAKERS installed in the public rooms of the G.W.R. Royal Hotel at Paddington Station are to take over the traditional duties of the page-boy, a call or message for any guest being put through to any of the public rooms in the hotel at a moment's notice. This verbal call system is a G.E.C. installation, and apart from the saving in time permits the page-boys to be released for other useful service. The speakers are unobtrusive both to the eye and to the ear.

NEW PHILCO SUPERHET

Philco's have released another model in their Empire range, this new receiver being the Empire Five all-wave superhet, priced at 11 guineas.

Designed for use on A.C. mains, the set features a new large-scale dial, having three-colour indication of the three wavebands.

The output is three watts and the power consumption 60 watts. Full A.V.C. and slow-motion tuning are fitted as well as connections for an external speaker and gramophone pick-up.

An A.C./D.C. version of the same receiver will be available shortly.

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There are twin stereophonic speakers, the output being three watts for the A.C. model and two watts for the universal model. The power consumption is 60 watts. The tuning control is of the two-speed type, and is provided with automatic change from one speed to the other.

The price of the A.C. mains version is 16½ guineas, and the A.C./D.C. model is 17 guineas. A floor stand to match costs two guineas extra.

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