

INTERNATIONAL TV TECHNICAL REVIEW

FEBRUARY 1964, VOL. 5, No. 2 · Two Shillings and Sixpence

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Bill Kelly, Chief Engineer

...ABC-TV

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Engineering Operations-TV

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Roy Fullen, Chief Engineer

...VIDEOTAPE CENTRE

"Unequaled as a picture source"

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Dan Collins, Chief Engineer



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ILFORD interviews JO JAGO



Ilford interviewed Jo Jago—for the last six years chief cameraman of World Wide Television Film Services Ltd. Jo has made commercials for all types of product in every kind of setting. In 1961 he won the Television Mail Award as Cameraman of the Year; in 1963 World Wide TV commercials won the Palme d'Or at Cannes for their overall standard and quality. Jo Jago relies on Ilford FP3.

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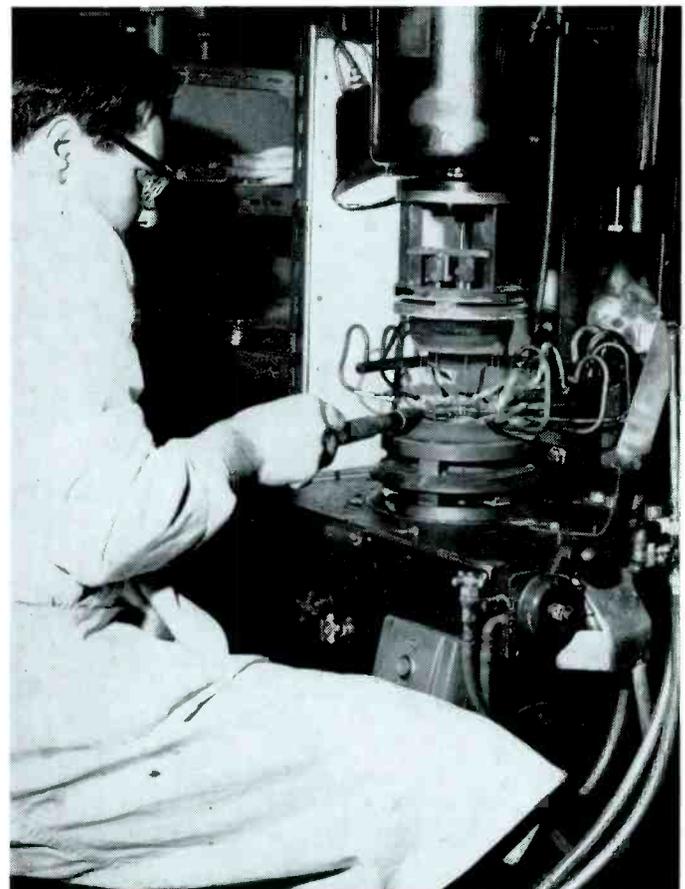
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USA: USSR: Venezuela: Yugoslavia.

Most widely used television camera tube in the United Kingdom—the 4½ in. image orthicon tube—is now being made in increasing quantities at the new Hayes valve factory of EMI Electronics Ltd. Indications from overseas users are that these tubes are thoroughly competitive with those supplied from Europe, Japan and the United States of America.

One advantage of EMI's image orthicon tube is that it maintains its high sensitivity throughout its life, so the camera operator can retain good depth of focus in the picture for many more hours of operating time.

A patented feature of the EMI tube eliminates the vertically-moving light and dark bars which otherwise might sometimes mar the picture.

Picture shows preparation of the glass-to-metal seal array on which the image section electrodes are subsequently mounted.



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TELEVISION IN THE UHF bands is a technique still comparatively new to engineers in many parts of the world.

As was pointed out in this journal as long ago as April, 1962, to limit frequency variation in the IV and V bands as in the Band III requires frequency stability three times as great. In fact, a stability factor of one in a million.

This is simple arithmetic (because the higher the frequency the bigger the numbers), but it is no easy problem to solve. As we also pointed out in that remote April, viewing a then-distant trend, these bands also demand coaxial cavity circuits which are very short yet of relatively large diameter. The high voltages required here call for insulating materials having very low dielectric constant and high thermal strength. And, moreover, for television transmission engineers must consider that 10-20 kW at frequencies as high as 800 Mc/s have to be supplied.

Of the two tubes capable of providing radiation of the order of 500kW namely—the transit-controlled klystron and the density-controlled tetrode, a number of Continental authorities decided on the tetrode.

UHF-TV progress in other directions, however, has seen expanding use of the TWT—the travelling wave tube.

The TWT was the war-time brain-child of Rudolph Kompfner, then with the British Admiralty, today a Doctor of Science at the Bell Laboratories.

As late as 1955 the Institute of Physics' Duddell Medal was presented to Dr Kompfner, recognising his invention of the TWT as a principle of the first rank in the history of electronics, thus putting it on the same historic level as the thermionic valve itself, the cathode-ray tube and the image-orthicon.

Many of us knew, during the war, of Kompfner's TWT work both at Birmingham University and at Oxford's Clarendon Laboratory.

As Mr C. R. Russell, MSc, of the M-O Valve Company, and Mr C. B. Smith, BSc, of the GEC Central Research Laboratories, Hirst Research Centre, said in their recent authoritative paper on the TWT, speaking of Kompfner's experiments: "In those original tubes a 1,400-volt 40-microamp beam was passed along the axis of a long, opened-out wire coil. The basic idea was to have the electrons in the beam interact with the electric fields of a radio-frequency wave which travelled along the spiral.

"To do this the wave and the beam must have similar velocities. Kompfner described his search for a structure which would slow down the wave, and was advised that

it was unlikely that a wire coil would carry frequencies much above a few tens of megacycles. However, this expert pessimism was happily disproved—the helix did work: as a matter of fact it works up to exceedingly high frequencies . . ."

Happily, too, for television engineers.

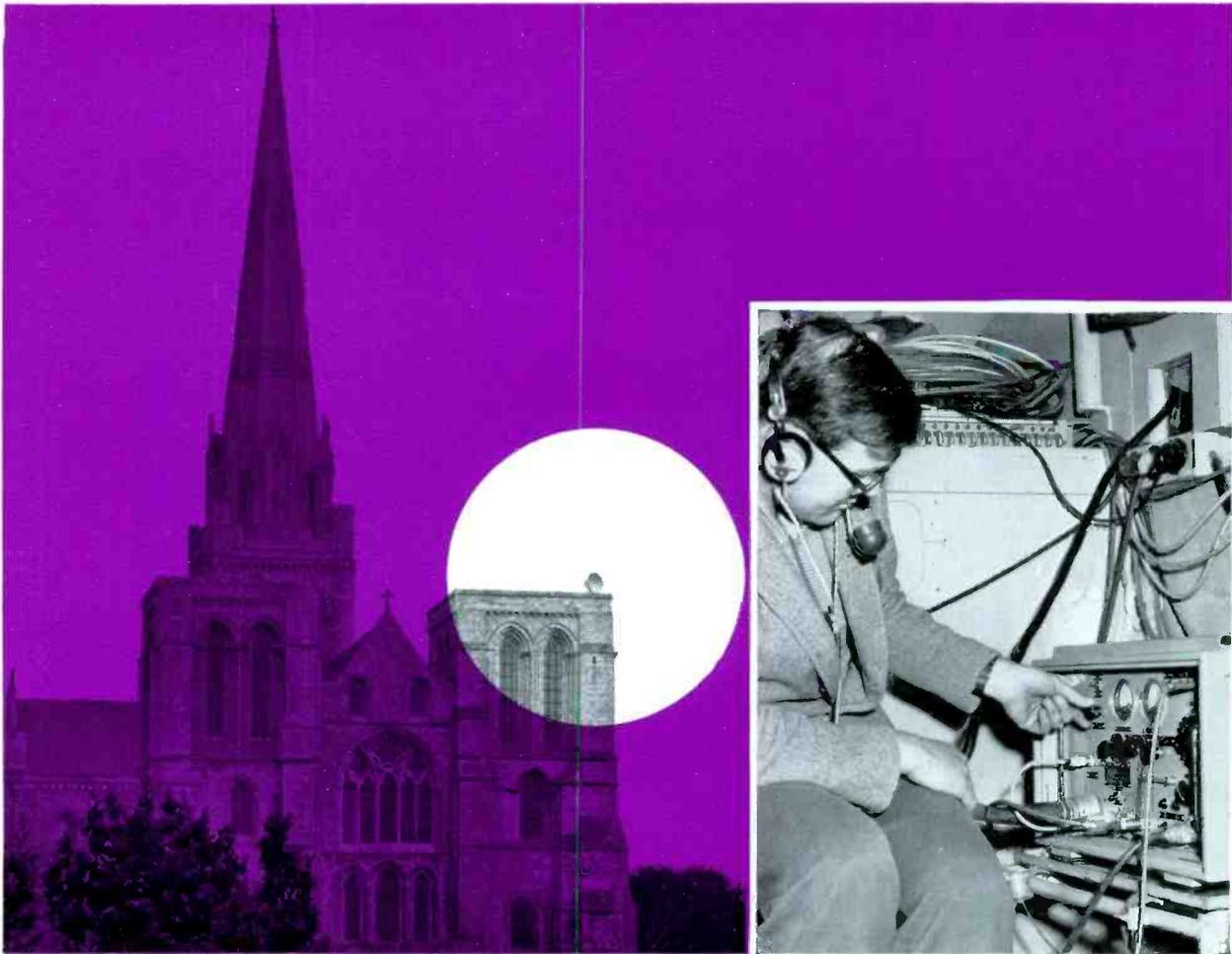
Among the many great international companies which helped to produce the travelling wave tube was English Electric. TWT's produced in their laboratories are now used extensively in microwave communication links for television programme and multi-channel telephony transmission. TWT's are used in the input stages of radar receivers for reducing first-stage noise in addition to preventing crystal overloading.

Nowadays, such is the trend to the TWT in UHF reception, that the English Electric range comprises packaged tubes with coaxial connections and non-packaged types for waveguide circuits. There are TWT's to suit all requirements in the 2, 4 and 6 Gc/s frequency bands, and there are even UHF power-output tubes delivering up to 15 watts of microwave power.

The trend, it seems, in UHF working is away from the conventional valve both at transmitting and receiving ends of the TV communication system. UHF transmitting systems give new scope for the klystron. It is historically interesting that Birmingham University, which first gave scope for Dr Kompfner to develop the TWT, also provided facilities for British pioneers including Professor J. T. Randall and Professor M. L. Oliphant to work on the world's first centimetric magnetron. Randall's cavity magnetron was the first high-power generator of centimetric waves in the world, and when this device was suggested for use in top-secret war-time radar, Winston Churchill himself for a long time personally insisted it must not be used in aircraft likely to be shot down over enemy territory.

Other radar equipment could automatically be destroyed by an impact fuse, but the magnetron in its tough, bomb-like casing, could not be so destroyed. And the secret was considered far too valuable. Of course at length, like all secrets, it did become international . . . and today other workers have produced the Heil tube, the reflex klystron and many more. Britain's own great contribution to this field is a modern four-cavity klystron amplifier for 10 kW television transmitters, with pulse klystrons suitable for radar applications working at 50 times that output power.

This, then, is the UHF trend.



TV CAN KEEP AN EYE ON EVERYTHING with the STC 7000 Mc/s portable outside broadcast link. The design is based on considerable experience gained since 1948 with STC portable television links supplied to the British Broadcasting Corporation and administrations in various parts of the world. The equipment comprises a number of easily portable units forming independent frequency-modulated transmit and receive terminals operating in the frequency range 6850 Mc/s to 7300 Mc/s. It is suitable for 405, 525 or 625 lines, monochrome or colour television picture transmission, and has C.C.I.R. approved i.f. of 70 Mc/s. Its highly efficient electrical screening allows working on the same masts as high-power television transmitters. It has built-in lining-up equipment, and high frequency stability without a.f.c. circuits. Its range of 30 to 40 miles can be extended by connecting a limited number of links in tandem. Write, 'phone or Telex for leaflet C/2039: Standard Telephones and Cables Limited, Transmission Systems Group, North Woolwich, London, E.16. Telephone ALBERT Dock 1401. Telex 21645.

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STC

THE AFFLUENT YEAR

a review of the financial position of many
British electronic companies by M. Duffy

MONTH BY MONTH during 1963, at fairly regular intervals, various firms in the public company sector of the electronic engineering business published their Annual Reports and Accounts. The general conclusion to be drawn therefrom is that most branches of the industry were in a prosperous condition for they nearly all announced higher trading profits, as will be seen from the table below. The financial years covered by these Reports and Accounts, however, ended between September of 1962 and June of 1963. They cannot, therefore, be taken as fully representative of business conditions for all of 1963.

Companies Reporting Higher Trading Profits

When Published	Name	For Financial Year Ending
March 1963	Marconi International Marine	December 1962
Do	Cambridge Instrument Co	Do
Do	Canadian Marconi	Do
April 1963	Associated Electric	Do
June 1963	Perdio Electric	February 1963
Do	Ultra Electric	March 1963
July 1963	Rediffusion	Do
Do	General Electric	Do
Do	Dubilier Condenser	Do
August 1963	Thorn Electrical Industries	March 1963
Do	Antiference Group	Do
Sept. 1963	Pye of Cambridge	Do
Do	Telefusion	April 1963
Do	Radio & Allied Holdings	March 1963
Do	Rank Radio & Television	June 1963
Do	Home Telerentals	March 1963
Oct. 1963	Decca	March 1963
Do	Plessey Co	June 1963
Nov. 1963	Electric & Musical Industries	Do

Companies Reporting Lower Trading Profits

Feb. 1963	Negretti & Zambra	September 1962
May 1963	Currys	January 1963
August 1963	Associated Television	March 1963

The report of Marconi International Marine Co Ltd, for the financial year ending December of 1962, which was issued in March of 1963, returned total revenue as £3,205,000 against £3,144,000 for 1961. The former figure was a new high level and the summit of a steadily firming trend which began more than a decade previously. Net Profit, after taxation, however, for 1962 was shown as £311,900 compared with £311,172, and the firming trend here began in 1959. The Chairman said that during the year the depressed conditions in the shipping and ship-building industries had persisted. There had appeared to

be signs of an improvement a year previously but this had not come about. They had, however, been able to increase overseas sales sufficiently to balance out the drop in home business. This was regarded as a not unsatisfactory result in what had been probably the most difficult trading year since the war.

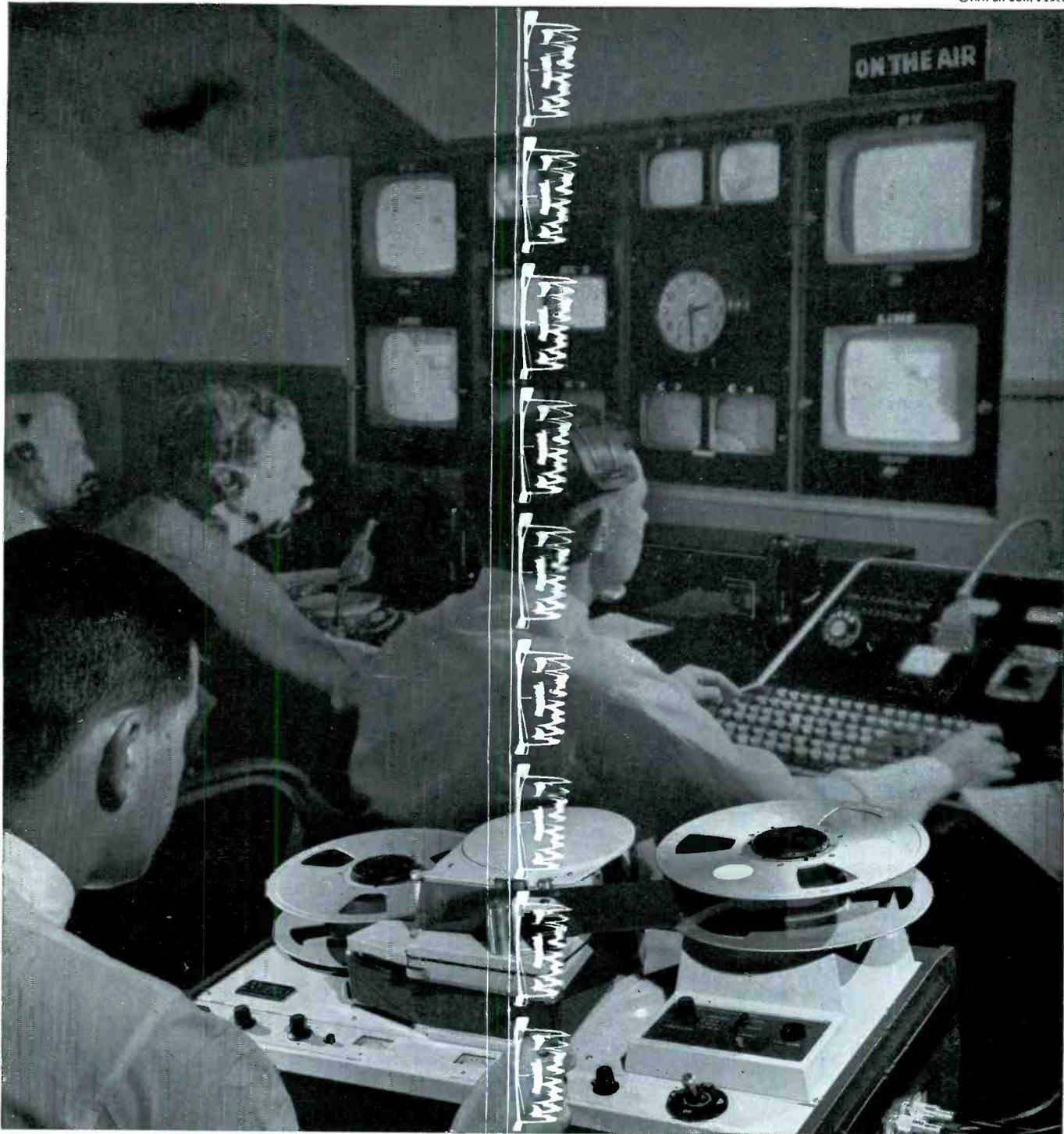
About the same time in March, Cambridge Instrument Co Ltd published its annual report, for the financial year ending December of 1962. This showed trading profit as £660,700 against £617,600. The former figure was a new high level and the summit of a steadily firming trend which began some years before. The Chairman's address relevant to business for 1962 included the information that the first stage of the major reconstruction of the Muswell Hill factory had been completed, that the second stage, costing about £125,000, was due to commence in a few weeks time. Other advice was that they had acquired a valuable site in Cambridge, together with the necessary planning and other permissions, so that when the time was opportune the company's production capacity could be significantly increased, that at Newcastle they had acquired a site for a new Sales and Service centre to replace their present inadequate accommodation.

Progress in Italy

It was also at the same time stated that their arrangements had progressed rapidly in Italy, that Cambridge Instruments (India) Ltd had been formed in conjunction with J. N. Marshall & Co Ltd. The manufacture of their instruments in Australia had started toward the end of 1962 and should build up during the current year. In France, their company was being expanded. A final point was that no worthwhile prediction could be made for 1963 because of the general uncertainty in trading conditions and the trend of demand.

Later in March of 1963, Canadian Marconi Co Ltd announced a trading profit, for the financial year ending December of 1962, as £4,978,000 against £2,027,000 for 1961 and £991,000 odd for 1960. The Chairman said that operations in 1962 had resulted in the highest level of both sales and earnings in the company's history. Their Television Station had shown an operating profit, before fixed charges, further, after providing for depreciation and interest expense, and also absorbing in full the balance of pre-production expenses amounting to \$351,110, the resultant deficit had been substantially below that of 1961, its initial year of broadcasting.

The company's investments in Associated Companies were stated to have declined during the year following



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amplifier, its signal meets broadcast specifications. The new Ampex VR-660 has two audio tracks. It records at 4.1 ips—or more than two and one half hours on a single 10½ inch reel. (60 cps versions travel at 3.7 and can handle up to five hours of tape.) It is extremely simple to operate . . . easy to maintain because it's fully transistorized . . . and it offers Ampex reliability. For more information, please write to Ampex G.B. Ltd., 72, Berkeley Avenue, Reading, Berkshire.

► *The Affluent Year*

the sale of their 50 per cent interest in Cornwall Broadcasting Company on terms that would fully recover their investment in and advances to that company. It was also stated that they had been able to increase their sales volume, particularly for highly engineered products for defence and civil use. Export was covered with the news that it had begun to play an important role in the company's affairs, further that the more realistic valuation of the Canadian dollar and the improvement in the export credit arrangements of the Canadian Government should materially assist future growth. A final point was that an attractive offer to purchase the assets of radio broadcasting stations CFCF and CFCF-FM was received just prior to the close of the year, and that this had been accepted.

Early in April the widely discussed report of Associated Electrical Industries Ltd showed trading profit, for the financial year ending December of 1962, as £17,900,000 against £15,700,000. The Telecommunications Division was stated to have continued to make steady progress, increasing both orders and deliveries. Good progress had also been made by Thorn-AEI Radio Valves & Tubes Ltd with which the company's interests in valves and tubes for the entertainment industry were merged in 1961.

More components

Early in June, Perdio Electronics Ltd returned trading profit, for the financial year ending February of 1963, as £247,600 against £155,300. The Chairman said that the Radio side of the business had held up reasonably well although profit margins had been under pressure. They had been making more components for themselves in an attempt to improve profitability. Other advice was that the new factory at Sunderland had been opened in November of 1962 but would not be in full production until January of 1964. In the meantime, there would be considerable non-recurring expenditure. A final point was that turnover during the first three months of the present year had exceeded that of the same period of 1962 by over 25 per cent, that it was hoped this improvement would be maintained especially in view of the range of new products planned for 1963. The current easing of financial restrictions was advised as having been a considerable help.

Later in June, Ultra Electric Holdings Ltd issued its report, for the financial year ending March of 1963, which showed trading profit as the sharp advance of £698,600 compared with only £6,219. The Chairman's speech for 1963 recalled his address of 1962 and the advice therein of the efforts being made by the Electronics company to overcome difficulties and the adverse trading position. The results for 1963 were stated to have reflected what had been achieved, turnover having been almost doubled. Profit margins were noticed with the news that on some products it had been narrow, also that a considerable part of the profit earned had been ploughed back into private venture expenditure. The trading profit remaining, however, was considered satisfactory. Telecommunications were noticed as being one of the areas of non-sponsored or private venture expenditure, whilst Britain's non-entry into the Common Market was not considered to have worsened their immediate prospects. In the same context it was stated that their investment in Europe, and the

other arrangements which they had made for their representation, should enable them to get a share in this market.

In July, the General Electric Company Ltd announced a trading profit, for the financial year ending March of 1963, as £11,740,000 against £10,355,000. About the same time, Rediffusion Ltd. returned a trading profit, for the financial year ending March of 1963, as £8,327,000 compared with £7,684,000. The former figure was a new high level and the summit of a steadily firming trend which began in 1957. The Chairman said that Redifon, their largest manufacturing subsidiary had maintained a high rate of turnover, but this had not been so large as during the previous year, that more than 67 per cent of its deliveries had been for Export, further that of its turnover in commercial communications equipment, 96 per cent had been for Export. Changing market conditions for Redifon had led to the extension of its Wandsworth factory and to the re-organisation of its existing operations. This had been with adverse effect on the results for the year under review, but should lead to greater profits for the next year. Other advice was that two subsidiaries of Redifon engaged in the specialised manufacture of plastics had diversified the range of their products, also that the merging of Redifon's industrial radio frequency heating activities with those of the Philips group had now been carried out, further that their Reditune Background Music Service had increased the number of its subscribers by nearly 50 per cent during the year.

Their Overseas interests were covered with the news that in Malta the number of subscribers to their wired sound network had diminished, mainly because of emigration and the advent of television, but that profit for the year was only slightly lower. In the Caribbean the profit from their operations once again had shown a reduction due to increased competition and costs. In Lagos and Western Nigeria their wired networks extended to nearly one hundred towns and villages and served 82,000 subscribers. Their other wired network in Orlando, near Johannesburg, had experienced a steady year, whilst the Liberian Broadcasting Corporation had made satisfactory progress.

Elsewhere overseas, the operations of their Ceylon company continued in difficult circumstances, although the number of subscribers had increased and small extensions of service had taken place. In Singapore, Kuala Lumpur and Penang, Rediffusion wired networks originated their own programmes which had been highly popular and productive of satisfactory results. The opening of a wired service in Ipoh was planned as soon as the necessary arrangements with the municipality could be completed.

Rising sales

In August, Thorn Electrical Industries Ltd announced a trading profit, for the financial year ending March of 1963, as £6,528,000 against £5,062,000. The former figure was a new high level and the summit of a steadily firming trend which began some years before. The Chairman said that with the imminence of the new 625 line BBC-2 programme the continued decline in the turnover of the television industry, to which he had referred the previous year, had been reversed and sales were rising again, that the comprehensive range of products which they offered

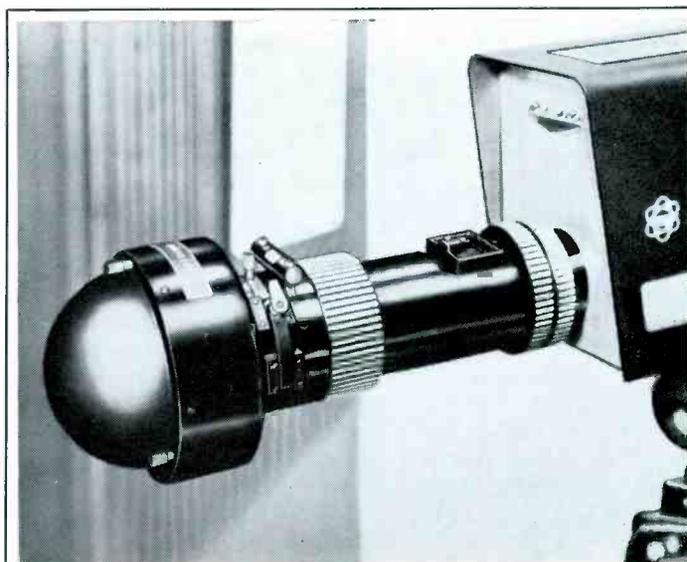
under their Ferguson, Ultra and British Radio Corporation trade-marks had again increased their share of the market. He also said that they were favourably placed to cater for the requirements of those who preferred to rent their receivers through their subsidiary company, Domestic Electric Rentals Ltd. It was also stated that their sales of transistor radios continued at a high level. Thorn-AEI Radio Valves & Tubes Ltd. was noticed with the advice that it had made very satisfactory progress in its first complete financial year. The complex problem of rationalisation had been completed and the production of tubes had been raised to a record level. Work was also proceeding on plans for the pilot production of colour television tubes to ensure that they obtained their share of that business when demand arose in this country. A final point was that every confidence was felt that their progress would be maintained.

Long-term outlook

Later in August, Antiference Group Ltd returned a net profit, after taxation, as £109,300, for the financial year ending March of 1963, compared with £88,700. The Chairman said that the long-term outlook remained promising as they had now a range of products with adequate sales potential, further that their factories and production equipment were up-to-date and efficient. The main selling season of many of their products was stated as still to come. But the results for the first quarter of the current year indicated that the immediate outlook was also satisfactory.

Early in September, Telefusion Ltd announced a trading profit, for the financial year ending April of 1963, as £1,712,000 against £1,529,000. The former figure was a new high level and the summit of a steadily firming trend which began in 1958 when the firm became a public company. The Chairman said that TV rental continued to be their main activity, that they were now operating from over one hundred branches in the UK. Ulster Telefusion Ltd. was stated to have had a good year but with a smaller percentage increase in subscribers than elsewhere in the UK. The introduction of new programmes was envisaged as leading to a substantial expansion in business in all their fields of operation—Rental, Relay and Manufacture.

About the same time, Pye of Cambridge Ltd issued its report, for the financial year ending March of 1963, with trading profit £4,418,500 against £2,696,000. The Chairman said that as from April of 1964 transmissions were scheduled to start of BBC-2 in UHF band on a line standard of 625, that this would trigger off a period which might well give the industry ten years of solid production, beginning with BBC-2, and followed by 'Pay-As-You-View' Television, National Education Television, Twenty-Four Hour Sound Broadcasting and Colour Television. In this context it was stressed that receiving sets must be equipped for 625-line working to be able to receive BBC-2, that the sets now in the field could not be converted to function at an economic cost apart from some of the sets bought fairly recently. It was calculated by statisticians that the resultant demand should raise sales for the whole industry to record heights, this being something of the order of



New Camera Tester

DESIGNED TO TEST TV camera and tube parameters quickly, the Spectra TV Optoliner, Model 1,000, threads into the lens mount of any Vidicon camera and enables the operator to check it for opto-mechanical alignment, sensitivity and full utilisation of the scanning area, eliminating the many variables of an external test pattern check.

A standard test pattern—SMPTE, EIA and RETMA patterns are available—locks into an Optoliner keyed slot. Accuracy of the mechanical alignment from the internal test pattern to the centre of the lens mount is 0.002 inch.

Even illumination without hot spots is provided by an exclusive Optoliner light intergrating sphere. Regulated power supply and individually calibrated external meter makes the internal light levels and colour temperature adjustable and reproducible. Accompanying test tools permit efficient quick checks of tube centreing and tilting.

The camera unit weighs 3 lbs, is 11 inches long with maximum diameter $4\frac{1}{4}$ inches.

double the level of the demand in the recent past. Export was noticed with the news that the figures for the group were up by over £2,000,000, that in radio and television their turnover in the Export market represented 70 per cent of the British industry's Export total. This was seen as only a beginning, a still bigger increase being anticipated over their whole range, from scientific instruments to television transmitters, in the forthcoming year.

Later in September, Home Telerentals Ltd returned a trading profit, for the financial year ending March of 1963, as £937,400 compared with £822,500, the former figure being a new high level. The Chairman said that the increase could be regarded as satisfactory having regard to the difficult trading experience in the retail trade during the year. The inclement weather in January and February seriously affected both Telehire and Martins. Other advice

► The Affluent Year

A simultaneous report issued in September was that for Rank Radio and Television Ltd, for the financial year ending June of 1963, with trading profit £982,900 against £414,800. The Chairman said that the re-organisation of their activities occasioned by the merger with Murphy Radio Ltd was completed during the year under review, the benefits being already evident. It was also stated that during the same review period the television industry's sales showed only a slight increase over those of the preceding year. Murphy products were stated to have held their share of the market, but Bush products significantly increased theirs. Other advice of the same time was that the current financial year had made an encouraging start, that the trade was likely to be competitive, but that production costs had been reduced by new techniques, further that the new models recently introduced were being well received. Another point made was that whilst it was too early to make any definite forecast, it was estimated, on the basis of information then available, that, in the absence of unforeseen circumstances, the profits for the current year would show a reasonable increase. Longer-term prospects were also covered with the expression of the view that Rank-Bush-Murphy Ltd should continue to enjoy a fair share of the traditional radio and television market, the latter standing to benefit from the impending conversion to 625 line transmission. Furthermore, development in the field of colour television had been pursued for some years and this should be adequately rewarded when the public demand for colour television equipment developed. Additionally, current developments of their specialised electronics division should, in time, contribute to profits.

New high level

Early in October, Decca Ltd announced a trading profit, for the financial year ending March of 1963, as £4,823,000 against £4,683,000. The former figure was a new high level and the summit of a steadily firming trend which began some years before. Their Radio and Television interests were noticed in the Chairman's speech with the advice that television sales had been lower, but that conditions had shown a marked improvement since the end of the year. The current year's business was stated to be developing well with an increased turnover for the first six months. The future was faced with optimism provided no unforeseen circumstances arose.

Another October report was that for the Plessey Co. for the financial year ending June of 1963, with trading profit the impressive total of £14,700,000 against £9,606,000, this being a new high level and the most pronounced increase for many years. The Chairman's speech recalled that it was just two years since the merger that brought together Plessey, A.T. & E. and Ericssons into the largest single manufacturing unit in the British telecommunications industry. Also stressed was the fact that it had put them in a leading position, technically and commercially, in the telecommunications, electronics and systems engineering industries: that it had cut out duplication and sometimes triplication of effort; that it had raised productivity: that it was utilising more efficiently their research, development and manufacturing resources. The year under review had been, at home, more a period

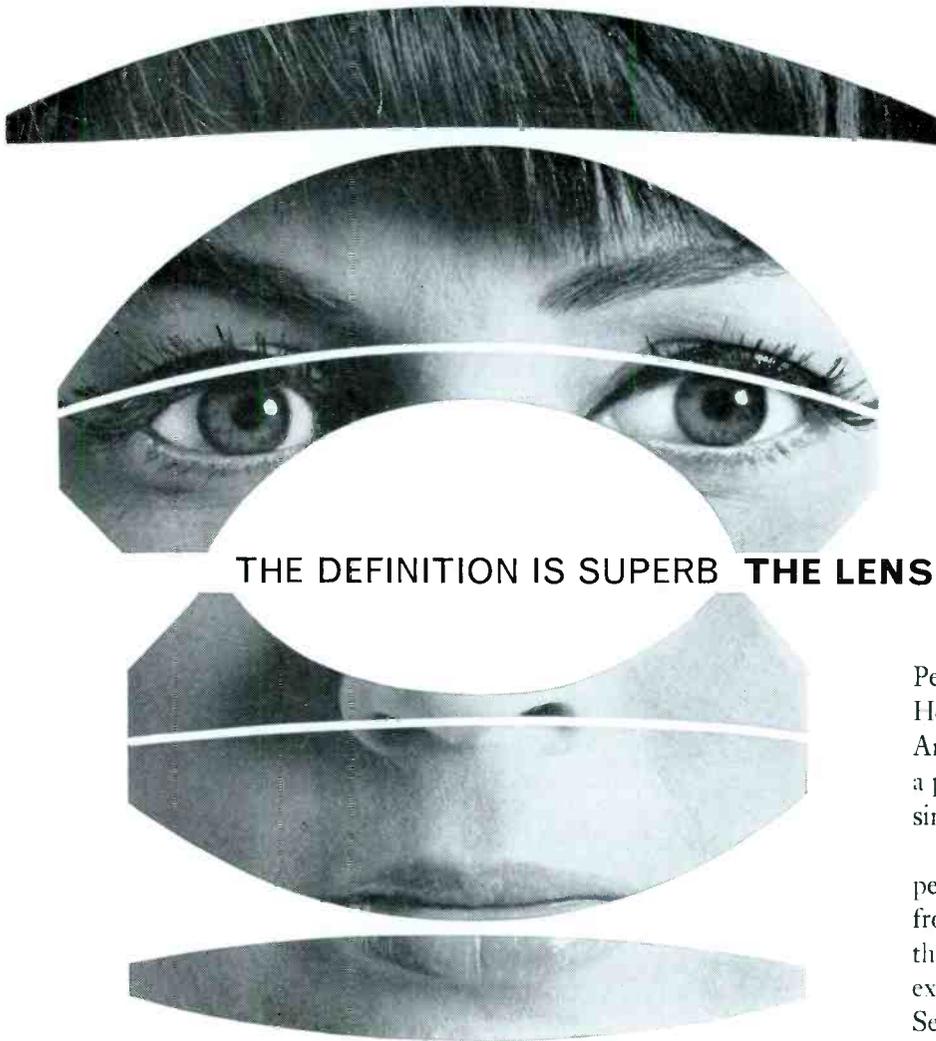
of consolidation than expansion. But it had produced record results with substantial improvement in both profit and volume. A final point was that they expected the present level of profits to be at least maintained in the coming year, that their overseas position was stronger than ever before, further that the major re-organisation of their interests abroad would undoubtedly provide new opportunities for increased trading, more revenue, and, it was hoped, higher profitability.

In November, Electric & Musical Industries Ltd announced a trading profit, for the financial year ending June of 1963, as £7,786,000 compared with £7,522,000 for 1962. This latter figure compared with £7,998,000 for 1961 which was a new high level and the summit of a steadily firming trend which began some years before. The Chairman's speech for the year ending June of 1963 included the information that during it their trading had taken place against a background of economic caution in the UK, with the Government endeavouring to stimulate greater activity in all fields of expenditure. Elsewhere, conditions had varied from the fairly buoyant consumer spending in the US, and in most countries in Europe, to sharp restrictions in India and serious economic situations in Argentina and Brazil.

The report of Negretti & Zambra Ltd, for the financial year ending September of 1962 was issued in February of 1963 and gave trading profit as £257,200 against £363,300. The Chairman named increased costs as having caused the profit reaction, that turnover had been maintained. In the current year, turnover was then advised as running at approximately the same level. Other news of the same time was that their subsidiary companies continued to expand their business in volume but not in profitability, with the exception of their South African company which had almost doubled its profit with only a small increase in turnover. Later in the year, i.e., in July, it was stated that they had acquired a controlling interest in Visual Engineers Ltd, specialists in the design and installation of visual control systems, based on closed-circuit television, for industrial and commercial use.

Another lower trading profit, for the financial year ending January of 1963, was announced in May of 1963 by Currys Ltd, i.e., £1,749,000 compared with £1,966,000 for 1962. The latter figure was a new high level and the summit of a steadily firming trend evident for the preceding two years. The coming year was noticed with the advice that cash receipts were envisaged as increasing because there would be a bigger flow of money from their debtors, so profits should increase accordingly. Higher sales were also anticipated. A final point, however, was that they were involved in ever increasing costs of operation despite every effort to economise. Higher rates in 1963 were mentioned in this context.

A third company to announce a lower trading profit in 1963 was Associated Television Ltd, for the eleven months ending March of 1963, it being stated in August that this figure was £3,892,000 compared with £5,524,000. The Chairman said that in deciding to change the year-end date to end-March the Board had recognised that this would mean the exclusion of profit deriving from one of the more remunerative months, that had trading results for April been included profit figures would have been substantially higher.



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● JOHN STREETS and AUBREY HARRIS

Project Engineer,
Amper Corporation,
Redwood City, Calif. USA

Head of Video Engineering,
Amper Electronics Ltd.,
Reading, England

A Portable Television

WHEN AMPEX INTRODUCED the VR-1000 Videotape* recorder in 1956, the recording of television signals on magnetic tape became a reality. Since that time, great strides have been made in the art and science of videotape recording, but because of the size, cost, and complexity of the equipment, these developments have been confined almost exclusively to the broadcasting industry. Now Ampex has introduced the VR-1500, a videotape recorder which brings videotape recording into the closed circuit television field for the first time. The VR-1500 is a small, compact portable recorder. Simple and economical to operate, it weighs only 96 pounds, it is completely self-contained, and can record up to five hours of continuous programme.

In order to record the wide bandwidth television signals, very high head-to-tape speeds are necessary. The head-to-tape speed of the VR-1500 is 640 ips. This could be accomplished by moving the tape at this speed past a stationary head, but serious mechanical difficulties would be encountered, to say nothing of the very limited playing time available on any reasonable size reel. Instead the required head-to-tape speed is obtained by mounting the recording heads on a drum and rotating this so the heads scan across the tape which itself is moving slowly.

In quadruplex Videotape recorders such as the Ampex VR-1000, four heads were mounted on a drum as shown in Figure 1. The drum rotates 14,400 rpm, and the heads scan across the tape which is cupped in a vacuum guide and held in contact with the drum. This geometry results in a head-to-tape speed of 1550 ips and the linear tape speed

is only 15 ips. In the VR-1500, only two heads are used. The tape is passed in a helix around the stationary upper and lower guides and the heads scan the tape at a shallow angle of approximately nine degrees. The geometry is arranged so that there is a slight overlap of information in the tracks recorded by the two heads. The tape which is two inches wide moves at 3.7 inches per second as the drum rotates at 30 rps. Each head records a complete field of a 60 field television signal regardless of the television line frequency.

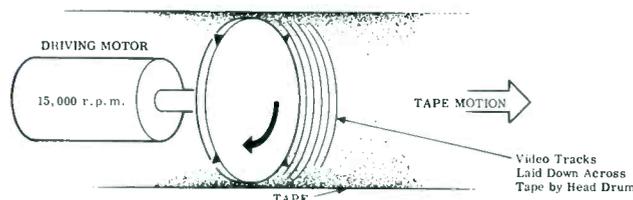
Five hours recording

The layout of the VR-1500 tape path is shown in Figure 3. Tape from the supply reel, which may be up to 12½ inches diameter permitting five hours continuous recording, passes first over the tension servo arm, over the video erase head and an entrance guide. This deflects the tape upwards at a nine degree angle and the tape wraps helically around the scanning assembly, and around the exit guide, which deflects the tape back to a path parallel with the incoming tape. The tape then passes over an auxiliary head stack containing control track and audio heads and through a capstan and pinch roller and onto the take-up reel. An important feature of the construction is that all mechanical elements in contact with, or guiding the tape, are an integral part of, or mounted directly onto, the lower part of the scanning assembly. This is a single casting and tape guiding is not affected by accumulative tolerances or top plate distortion.

The recorder is designed for easy servicing and all the external covers are removeable leaving the machine fully operational in skeleton form. All adjustments and points requiring service can be reached without inverting the machine. The entire mechanism can be serviced by simply removing the top skin over the tape deck. All circuitry is transistorised and constructed on cards which plug in at the front and rear of the machine.

A block diagram of the electronics is shown in Figure 4. The incoming video signal is fed to a modulator which converts it into a form which can best be recorded. The incoming video signal frequency modulates a high

*TM Ampex Corp.



Transverse Scanning of Video Tape. Tape is contoured to same radius as Head Drum. This system is used in present day quadruplex recorders.

Figure 1

Tape Recorder



Figure 2

frequency oscillator. At black level, the oscillator frequency is 53.4 mc; at white level, it is 54.7 mc. The output from this modulated oscillator, is mixed with a stable 50 mc signal. The resulting beat varies between 3.4 mc at black, 4.7 mc at white level and this is the signal which is recorded on tape. The incoming video signal is also fed to a sync stripper which separates vertical sync pulses to be used in the servo system controlling the head drum motor. The sync stripper operates from either standard broadcast or industrial-type video signals. The output from the modulator is amplified and then drives the video heads during the record process. In playback the low level signal from the video heads are amplified and fed through a limiter. An electronic switcher timed from a drum tachometer pulse is used to switch into the circuit only the head in contact with the tape. The output from the limiter is demodulated by a pulse counter type demodulator. The output is then a composite video signal essentially the same as that recorded. The VR-1500 has a bandwidth of better than 3 m/cs and a signal-to-noise ratio better than 38 db on interchanged tapes.

The rotating head drum is driven directly by a four pole induction motor through a rubber coupling. The instan-

taneous speed of the drum motor is controlled by the head drum servo, so that uniform tracks are laid down during record and so the heads will follow exactly the same path and stay on track during playback. During record, a 30 cps tachometer pulse is generated by the rotating head drum and the position of this is compared with a pulse derived from vertical sync in the incoming video signal. If they are not in phase, an error signal is generated and this changes the frequency of a 60 cycle oscillator. The output of this oscillator is amplified and drives the drum motor, directly controlling the drum speed to insure that the drum remains locked to the incoming video signal during record. At the same time the tachometer pulses are processed and recorded as a control track at the lower edge of the tape.

During playback these pulses are recovered and their phase compared with that of the drum tachometer pulses. Any error signal changes the frequency of the 60 cycle oscillator and also changes the drum speed so that the drum is rotating in the same relationship to the tape as it was during the record cycle. Thus the heads are properly positioned to recover the recorded information. It is important that the control track pulses are played back with no distortion of their timing information. This implies constant tape speed with very low flutter. This is achieved by using a hysteresis synchronous motor to drive the capstan, and the tape speed of 3.7 ips is locked to the AC power line frequency at all times.

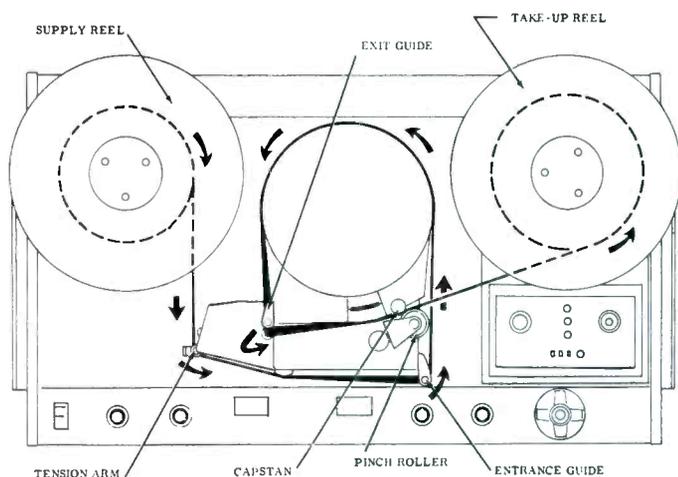


Figure 3

Carefully controlled

An essential feature of helical scan recorders is that the tension of the tape be carefully controlled, for the accuracy of timing information in the video signal is dependent upon maintaining accurate and stable tape dimensions. In the VR-1500, tape from the supply reel passes over a tape tension sensing arm before it enters the scanning assembly. This is the input to a high performance servo which

► Portable television tape recorder

regulates tape tension regardless of reel eccentricity, poor tape pack, or changes in tape radius as the amount of tape on the reel varies. Recordings on all VR-1500's are made to the same nominal value of tape tension. However, the magnetic tape is subject to changes in dimension due to changes in temperature and humidity. Therefore, when a tape previously recorded is played back at a later date under different environmental conditions, a control is provided to change the nominal level of tape tension. Tape elongation produces a skew or hook at the top of the picture. On a VR-1500 this is eliminated by a simple adjustment of the skew control on the front panel.

Provision is made for recording up to two audio tracks and these may be used, for example, for stereo recording or for recording dialogue in two separate languages or for adding an instructional commentary along with the programme audio. This particular feature is, of course, most useful in educational and instructional fields.

Operation of the VR-1500 is extremely simple and requires no more skill than the operation of any home audio recorder. The VR-1500 is fully transistorised, therefore, requires no warm-up time. Control of the machine is by a unique single control joy stick switch. This is moved to the left for rewind, to the right for fast forward, downwards for play, and upwards for record standby. When playing back, the tracking control is adjusted for maximum output as indicated on the adjacent meter and the skew control is adjusted to compensate for any tape dimension changes which may have taken place. The only other adjustment needed is a simple adjustment of the audio level. Recording is even simpler as the only adjustment required is that of the audio recording level. Two actions are required to initiate record, first record standby on the joy stick switch and then the record button is pressed thus eliminating the possibility of accidentally starting a recording.

Reference to any position on the tape is easily made by observation of the position indicator, a three digit counter,

mounted on the record panel. It is easily and instantaneously reset to zero by a simple pushbutton. These are the only operational adjustments required for day-to-day operation of the VR-1500 and it can easily be operated day in and day out without the necessity of highly trained technicians being in attendance.

All the VR-1500 control functions are relay controlled and any of the control features can be operated remotely. The machine controls are completely interlocked to prevent damage to either the recorder or to the tape. The joy stick switch may be moved from fast forward to play without hesitation and tape motion sensing circuits will not allow engagement of the pinch roller until the tape has actually come to rest. Dynamic braking of the reels is used for smooth and dependable tape handling and mechanical brakes are used only for parking in the event of power failure. These brakes are arranged to stop the transport with the tape always slightly slack. This prevents wear of the magnetic oxide of the tape by the rotating video heads during standby.

Because of the dramatic reduction in size, weight, cost and complexity represented by the VR-1500, not only are the present applications of videotape recording expanded a hundred-fold, but a whole new field of applications becomes practical. The VR-1500's ability to operate with a single reel of tape continuously over periods as long as five hours without the need for adjustment or attention makes it practical for all sorts of surveillance systems. The ability to transport the recorder easily to almost any location removes the necessity for complex distribution systems for either record or playback use. The simplicity of the machine eliminates the need for a full-fledged electronics engineer in constant attendance and allows competent operation of semi-skilled personnel.

The comparatively low cost of the VR-1500 makes the use of videotape recording economically feasible in any application which requires the recording, storage and high quality reproduction of picture and sound.

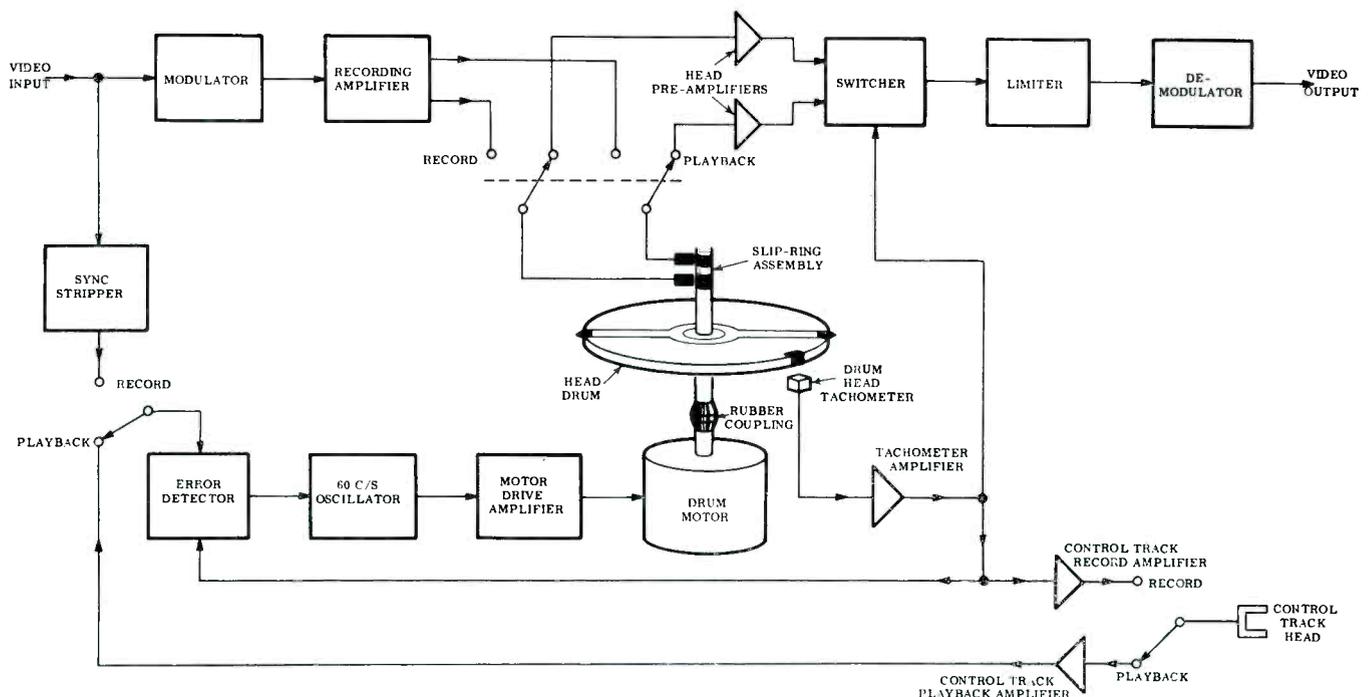
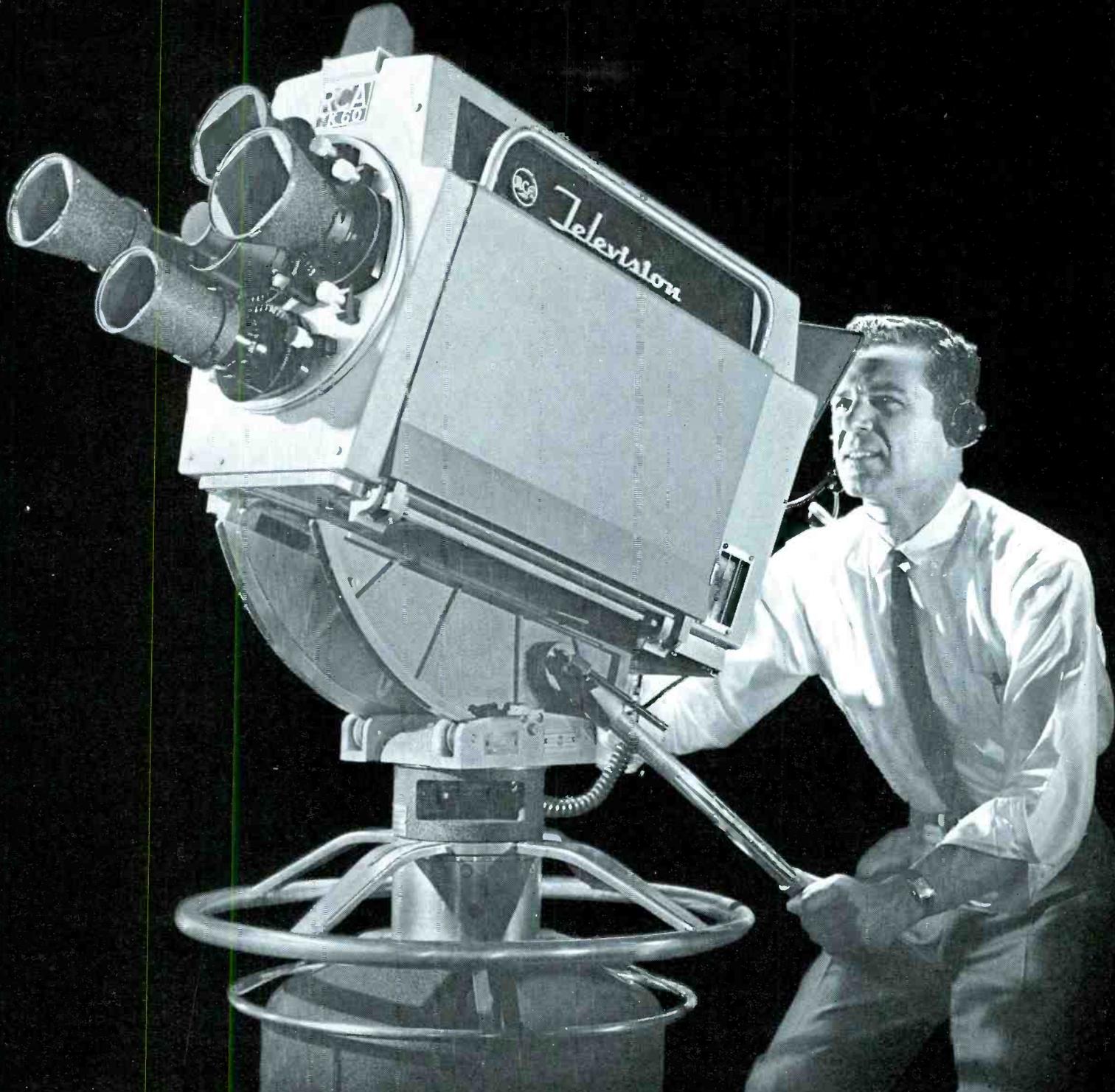


Figure 4

TV Camera of the Sixties!



Distinctive silhouette of "TK-60" television studio camera that's years ahead in performance.

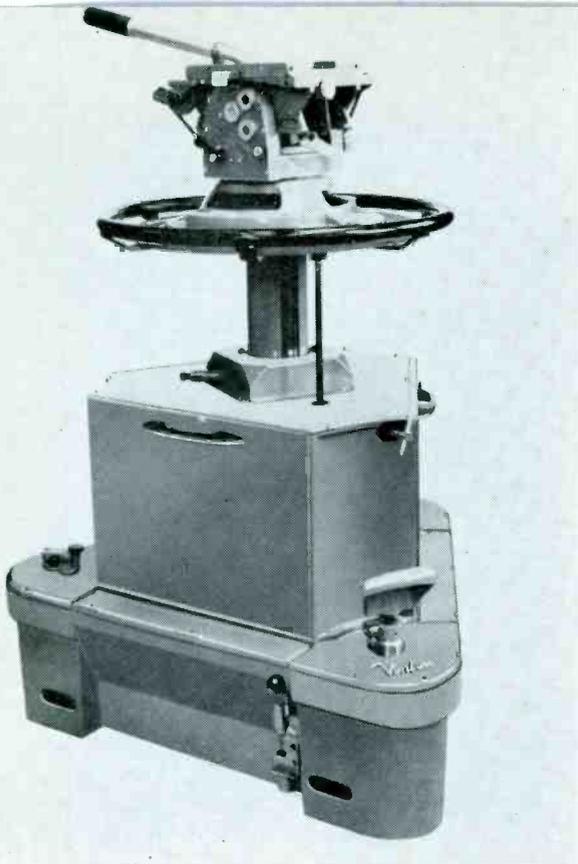
After five years of intensive development and two years of field testing, the TK-60 advanced studio TV camera is here! Big picture 4½" image orthicon pickup tube combines with stabilized circuits, ease of camera set-up, and simplicity of operation to make it every inch the TV Camera for the "sixties" Here's a great new monochrome camera that's sure to be a success with producers and station-men alike! The TK-60 produces pictures of sensationally new quality... over extended periods, without alignment delays. You can control contrast and mood as never before. You can produce tapes and live commercials that show the client's product in sparkling life-like detail, with effects not possible on any other camera. Where striking picture quality can mean stepped-up product sales, this is the camera that "says it" and "sells it" best! For more information on the RCA TK-60 Camera, write to Radio Corporation of America, Bureau de Controle, 13 Quai de L'île, Geneva, Switzerland; or RCA International Division, 30 Rockefeller Plaza, New York 20, N. Y., U.S.A.



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The new equipment which is suitable for both monochrome and colour cameras

THE NEW VINTEN spring balanced TV Camera Mounting meets a requirement for a pedestal which is suitable for both monochrome and colour television cameras of widely varying weights and at the same time is simple to operate and maintain.

Perfect balance of the camera over the full height range is obtained by using combinations of suitable strength springs and weights which are easily selected. Whilst the maximum load acceptable is as high as 520 lbs. (236 kgs) it is also possible to make suitable adjustments to enable the load to be balanced down to a minimum of 50 lbs. (22.9 kgs).

The operation of the Pedestal is similar to the well-known Vinten Hydro Pneumatic Pedestal in that steering is effected and the centre column is raised or lowered by means of a large centre steering wheel. For crabbing the three pairs of hard rubber tyred wheels are linked together by an endless chain. If desired, one pair of the wheels can be disconnected from the chain so that single wheel steering can be employed.

Facilities additional to the Vinten Hydro Pneumatic Pedestal:—

- (a) Maximum loads up to 520 lbs. can be carried.
- (b) The centre column can be locked in any of three positions by a spring loaded plunger which enables the column to be held firmly and safely in position when a camera is removed.
- (c) Friction can be applied to the centre column by application of an easily adjustable brake.
- (d) Three wheel jacks are provided to enable the whole equipment to be raised slightly off its wheels to ensure additional rigidity.
- (e) Each set of wheels are fitted with an eccentric height adjustment. When raised to full height the pedestal can safely be moved from studio to studio over uneven ground. When in the lowest position, about $\frac{1}{4}$ in. from the floor of the studio, the need for cable guards becomes unnecessary.

New Vinten spring balanced television camera pedestal

DATA

Maximum height from floor to Head Mounting Platform: 51.5 ins. (129.25 cms.) Minimum height from floor to Head Mounting Platform 32.5 ins. (81.25 cms.) Size of Base: Minimum—35.75 ins. (89 cms.), Maximum—39.75 ins. (99 cms.) Weights (Without Head): Minimum—496 lbs. (226 kgs.), Maximum—560 lbs. (255.8 kgs.) Loads (Without Head): Minimum 50 lbs. (22.9 kgs.), Maximum 521 lbs. (236 kgs.) **Note.**—Weight of Vinten Mark III Pan and Tilt Head—45 lbs. (20.5 kgs.)

The Pedestal is strongly built to withstand hard use and is finished in high gloss grey, the bright metal parts being plated.

Four-vidicon colour cameras

TWELVE TELEVISION STATIONS across the United States are beginning colour television broadcasting this season using a new four-vidicon colour film camera system developed by US General Electric.

A station in Nashville, Tennessee, was the first to go on the air with the US GE 4V system, with a colour telecast on September 8, 1963. Stations in eleven other major US cities will have received their colour systems by late autumn or early winter 1963.

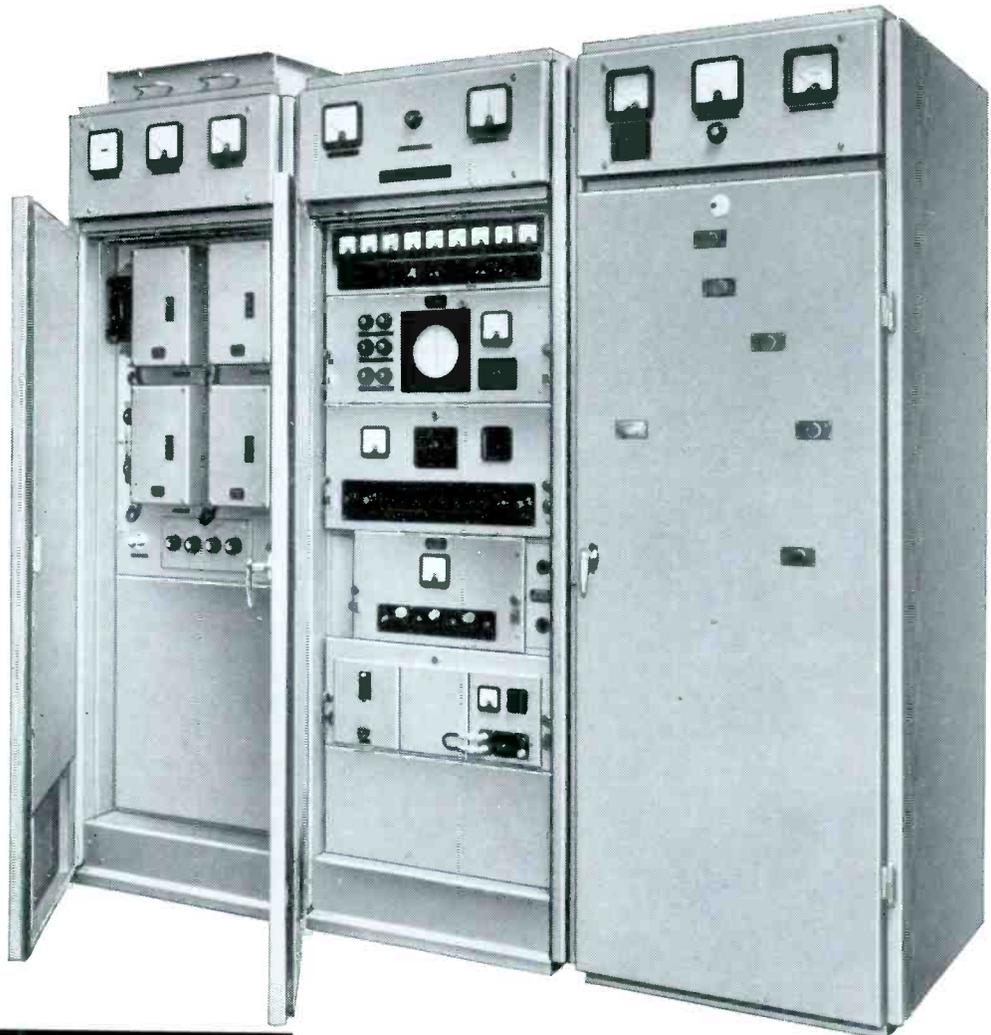
US General Electric introduced its new transistorised PE-24 four-vidicon colour system earlier this year at the 1963 US National Association of Broadcasters' Convention in Chicago, calling it 'the industry's first production unit of its type.' Since then, the system has met with 'overwhelming acceptance,' GE said.

The PE-24 is designed to enable stations and networks to take advantage of the fast-growing colour market with an economical, easily-operated unit producing high-quality pictures for both colour and monochrome reception.

The 4V design maintains sharpness and detail by means of a fourth vidicon which supplies all picture detail and luminance. The other three vidicons are used only to 'paint in' the colour information.

In systems using three vidicons only, all must be kept in near-perfect registration or picture fuzziness can result.

The PE-24, which employs transistorised plug-in modular boards throughout its camera circuits, continues a studio video and audio transistorisation programme which US



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- Compact Simple Design gives high reliability and easy maintenance.
- Suitable for Colour transmissions and 525 or 625 line standards.

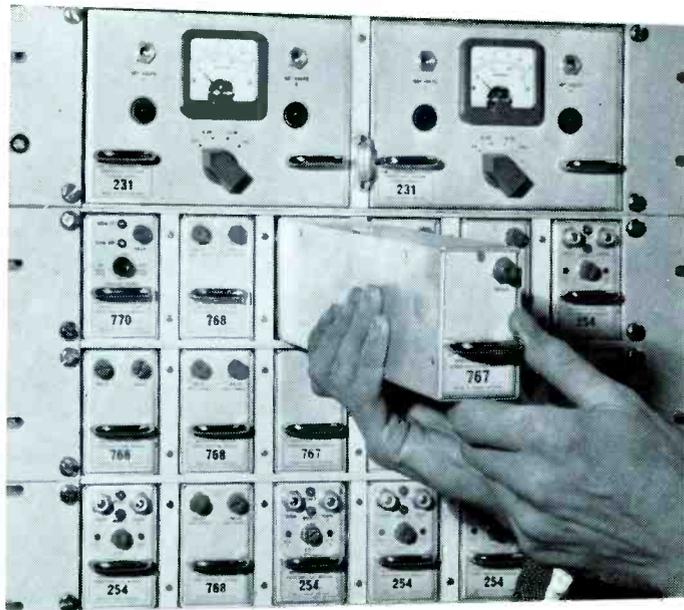


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► New Developments



Video switching equipment

COMPLETE FLEXIBILITY OF television studio system engineering is made possible by the new semi-conductor video switching system announced by EMI Electronics Ltd.

Relay and electro-mechanical switching equipment used until now in most TV studios has been inflexible in both size and facilities provided.

EMI's new system is of modular construction, so that facilities can be provided to meet individual requirements and further modules can be added as needs grow. The system comprises a series of plug-in modular units of standard size. Six units can be fitted in a mounting frame and accommodated in a 19-inch rack or EMI standard case. Frames can be bolted together to form any required size of switching matrix.

New design techniques have greatly reduced the rack space requirement and improved the performance. The high performance specification makes the new system suitable for use in all television system standards, for both monochrome and colour.

An important facility, when cutting from one shot to another, is the ability to switch during the vertical blanking interval, without "flashing" or streaking across TV screens. Other advantages are a high degree of inter-channel cross-talk isolation and the increased reliability which results from the exclusive use of semi-conductors.

GE began in 1958 with the introduction of a semiconductor sync generator and audio console.

In addition to Nashville, US cities with stations using the 4V system will include Philadelphia; Detroit; Minneapolis; Atlanta; Quincy, Illinois; Raleigh, North Carolina; Jacksonville and Daytona Beach, Florida; Albany, Schenectady, and Binghamton, New York.

Applications of cathode tubes

AN INCREASING NUMBER of applications of cathode ray tubes to radar, film scanning and read-out systems require the spot size to be reduced so that more detailed information can be accurately displayed on the face of the tube. Work at the Hirst Research Centre of The General Electric Company Limited, Wembley, Middlesex, has produced improvements in the design of the electron gun, together with advances in the deposition of small particle, fine-texture, fluorescent screens, thereby making it possible to obtain spot sizes less than 0.001 inch diameter. The spot size is sensibly independent of tube brightness and the fine-texture of the screen produces a low level of screen 'noise.'

The electron gun is a special triode gun, the components of which are made and assembled to within very small tolerances. Focussing and deflection of the beam are achieved by the usual electro-magnetic fields.

The small angle of the beam issuing from the electron gun allows the focussing field to be located at a greater distance from the gun, thus enabling the lens to operate at a small magnification ratio.

Care has to be taken when depositing the phosphor particles of about 1 micron in diameter to prevent agglomeration of the powder. Naturally the time necessary for settling these small phosphor particles is considerably longer than that required for settling the more conventional powders, whose particle size may be as great as 10 micron.

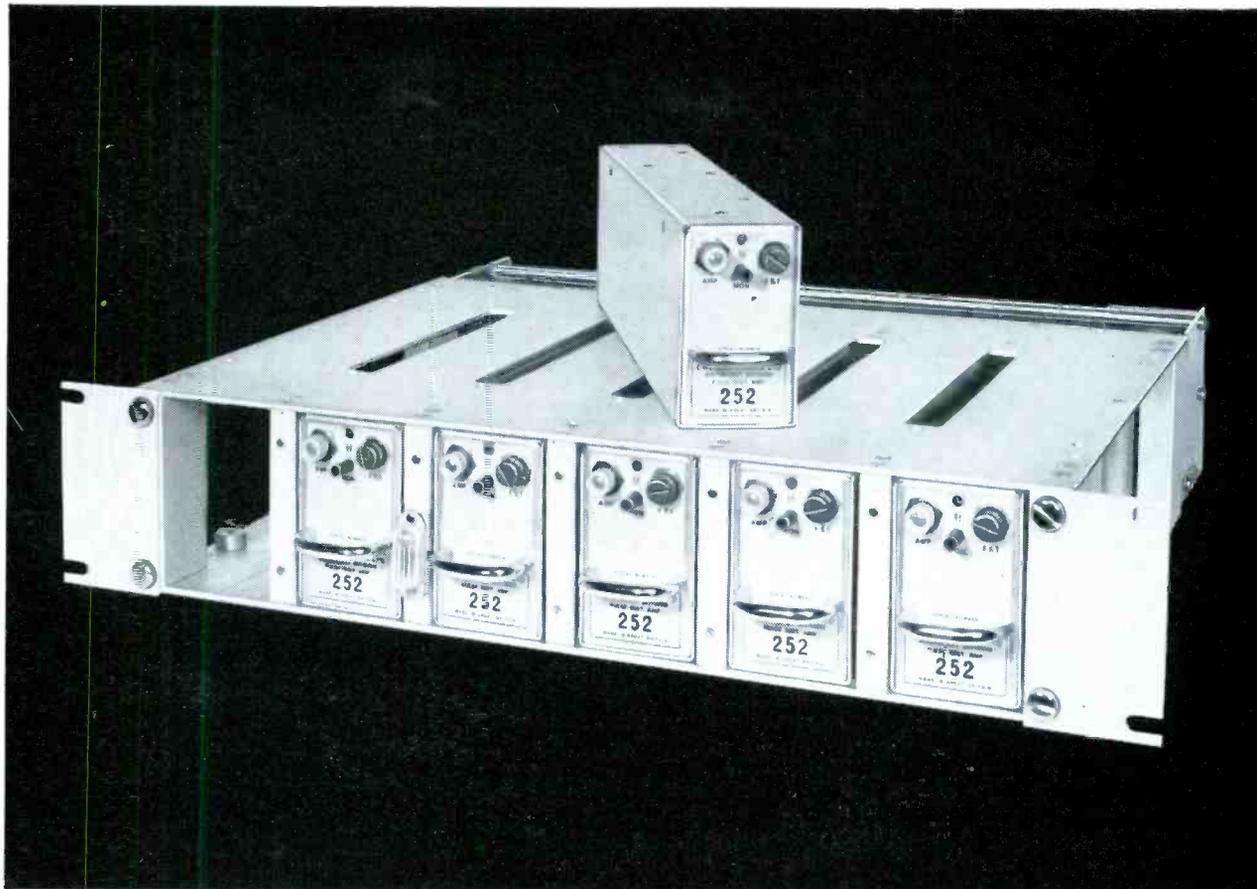
New UHF Voltmeter

AVELEY ELECTRIC LTD announce a new Selective UHF Voltmeter manufactured by Rohde and Schwarz for particular use in TV bands IV and V. The USVF is a tunable voltmeter for relative voltage measurements and is specially designed for television applications. The USVF can be tuned to any frequency up to plus or minus 8 M/cs from the picture carrier.

The instrument is a superheterodyne receiver of high selectivity at the intermediate frequencies of 70 M/cs, 30 M/cs, and 1.65 M/cs. An easy-to-read linear scale facilitates tuning; the meter is calibrated in terms of RMS and is fed from a peak responsive rectifier. Selectivity is greater than 20 db at plus or minus 7.5 Kc, and greater than 60 db at plus or minus 20 Kc: the accuracy of voltage indication is plus or minus 2% of f.s.d.



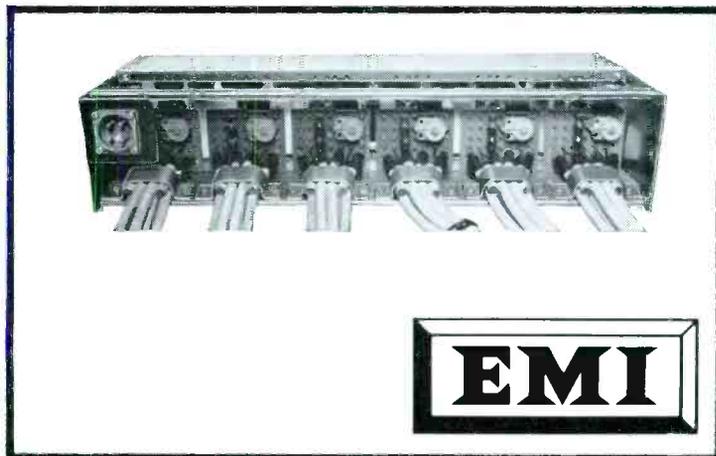
The new instrument



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SEMI-CONDUCTOR DISTRIBUTION AMPLIFIERS

VISION DISTRIBUTION AMPLIFIER TYPE 251
PULSE DISTRIBUTION AMPLIFIER TYPE 252



SPECIAL FEATURES

Vision Distribution Amplifier type 251 ■ Sync pulses can be added to any one or more of the outputs ■ Gain of 6dB is adjustable on front panel. Alternatively each position in the mounting frame can be fitted with a pre-set gain facility, enabling any particular amplifier to give a different gain performance when mounted in different positions. This enables amplifiers to be interchanged without gain adjustment ■ Unusually high gain stability over temperature range -10°C to $+50^{\circ}\text{C}$ ■ Fully compensated looped inputs ■ Only 4W power consumption ■ Full colour performance specification.

Pulse Distribution Amplifier type 252 ■ Accepts all television pulse waveforms of 2V or 4V amplitude ■ Incoming pulses are re-shaped and stabilized in amplitude ■ Only 4VA power consumption.

GENERAL FEATURES

- Four isolated outputs
- Semi-conductors used throughout
- Totally enclosed plug-in module with integral power supply
- Six units can be mounted side by side in a 19-inch (480mm) rack
- Only 3.5 inches (88.9mm) rack height required.

Further details will gladly be provided on request.

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Television (Patent Classification H4F)

943,542 December 4, 1963
Philips Electrical Industries Ltd, Abacus House, 33 Gutter Lane, London, E.C.2.

Television receivers (to overcome the effects of electrical noise by using one filter instead of two).

943,559 December 4, 1963
United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Penn, USA.

Apparatus for visually inspecting strip travelling at high speed (by projecting intermittent light pulses on the metal strip surface in conjunction with the use of closed circuit television).

943,621 December 4, 1963
Telefunken GmbH, Sickingenstrasse 71, Berlin, NW87, Germany

Pulse separating circuits (from a composite video signal in television receivers).

943,686 December 4, 1963
Philips Electrical Industries Ltd.

Arrangements for converting a colour television signal of a predetermined standard into a signal of a different standard.

944,247 December 11, 1963
General Electric Company, 1 River Road, Schenectady 5, New York, USA.

Light value systems and electrical signal transducer apparatus there for (projection system for television signals).

945,695 January 8, 1964
A. B. Dick Co, 5,700 West Touhy Avenue, Niles, Illinois, USA.

Facsimile scan combiner system.

945,802 January 8, 1964
Philips Electrical Industries Ltd.

Circuit arrangements in colour television receivers.

947,033 January 22, 1964
Philips Electrical Industries Ltd.

Circuit arrangements for separating two signals from a composite signal.

947,360 January 22, 1964
Decca Ltd, Decca House, 9 Albert Embankment, London, S.E.1 ((Alexander Robson).

Television receivers (dual line standards 405/625 lines).

948,003 January 29, 1964
Pye Ltd, Radio Works, St Andrews Road, Cambridge ((Donald Jackson).

Television cameras (of small size to be used for inspection purposes in confined areas, e.g., atomic reactors).

Recording etc. (G5R)

941,721 November 13, 1963
General Electric Co, Schenectady 5.

Apparatus for recording electric signals (an improvement of Patent No 902,397).

943,870 December 11, 1963
Ampex Corporation, 934 Charter St, Redwood City, Calif., USA.

Method and apparatus for reading out recorded signals (in thermoplastic recording).

946,267 January 8, 1964
Ampex Corporation.

Tape feeding apparatus (means for starting, driving and stopping tape in longitudinal motion).

947,556 January 22, 1964
Philips Electrical Industries.

Magnetic recording or playback of video-signals.

948,118 January 29, 1964
Loewe Opta Akt, 1-4 Teltowkanalstrasse, Berlin-Steglitz, Germany.

Driving device for magnetic recording and reproducing of high-frequency signals.

Cathode ray tube circuits (H4T)

943,775 December 4, 1963
Standard Telephones and Cables Ltd, Connaught House, 63 Aldwych, London, W.C.2.

Television circuit (for reducing the risk of damage to the screen of the picture tube of a television receiver).

945,145 December 23, 1963
Telefunken GmbH.

Circuits for protecting the luminescent coatings of cathode ray tubes.

947,503 January 22, 1964
Marconi Co Ltd, English Electric House, Strand, London, W.C.2.

Data displaying cathode ray tube arrangements.

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technical abstracts

These abstracts are indicative: that is, they are not intended to be a substitute for the original article but rather to point out which papers among the many appearing in the field may be of use in specific problems. Each abstract is arranged thus: author, title of article, name of journal, volume number, part number, page numbers and date of issue. The abstracts are arranged by subject based on the Universal Decimal Classification and numbered serially for ease of reference. International TV Technical Review cannot supply copies of the original articles which are abstracted here. We acknowledge the help of 'Radio & Television' in preparing abstracts from East European journals and of 'Japan Science Review' from Japanese journals.

Colour Television

1116 AXENTOV, Y. Y. and others. Determination of allowances for primary colours co-ordinates of TV sets.
Tekhnika Kino i Televideniza, no 5, 43-50, May 1963.
IN RUSSIAN.

The technique of determination of allowances for the co-ordinates of the primary colours of TV sets is given. Results are shown of the experiments with different kinds of primary colours contamination. Obtained allowances zones are compared to the existing temporary allowances for the co-ordinates of the primary colours of a TV set: diag, graphs, bibliog, refs.

1117 ABRAHAMS, I. C. Analysis of color errors in color television cameras.
Journal SMPTE, vol 72, no 8, 595-601, August 1963.
Presented at the Society's Convention, Atlantic City, N.J., April 1963.

Of the three major colour television systems: (a) three tubes, red, green and blue (b) as (a) but with a luminance tube instead of the green and (c) four tubes—red, green, blue and luminance, the latter two theoretically result in chromaticity and luminance errors in the reproduced picture. An analysis is made of the nature of these errors. Calculation is also made of the chromaticity shading which results from shading of the output of one of the three (or four) tubes. Experimental results are also described: diags, graphs, photos, bibliog, refs, discussion.

1118 BERTERD, E. P. Color television camera matching techniques.

Journal SMPTE, vol 72, no 8, 602-605, August 1963.
Presented at the Society's Convention, Atlantic City, N.J., April 1963.

The technique of matching colour cameras, colour tape recordings and in integrating various colour programme sources depends on the educated judgment of the engineer viewing a monitor. It is the elusive nature of the criteria of pleasing flesh tones that has made it difficult to develop a purely objective method of colour camera matching. Recent developments in camera design, reduction and better controls of operating variables and general tightening of tolerance will soon make it feasible: diags, photos, discussion.

1119 NOVAKOVSKY, S. V. and MARYINA, N. I. Experimental study of colour TV systems.
Tekhnika Kino i Televideniza, no 6, 49-53, June 1963.
IN RUSSIAN.

Results are given of experimental tests of the quality of matching colour TV systems with quadrature modulation of the subcarrier by different colour signals. The tests were carried out to obtain complete statistical data of image quality: diags, graphs, bibliog, refs.

Transmissions

1120 BANKS, A. J. Pulse distribution amplifier with new pulse re-forming technique.

Journal SMPTE, vol 72, no 12, 931-937, December 1963.
Presented at the Society's Convention, Atlantic City, N.J., April 1963.

A design philosophy for a pulse distribution amplifier is developed. It is concluded that the time between leading corners of the two transitions of a pulse should be preserved, and that pulse delay—measured at a level arbitrarily close to the base of the pulse—should be independent of input rise time. A technique for reforming pulses in the desired manner is presented. A solid-state, two-output pulse distribution amplifier incorporating this technique is described: diags, graphs, photos.

1121 MARKOVITCH, M. G. and ZUKKERMAN, I. I. Geometrical transformations of TV patterns.

Tekhnika Kino i Televideniza, no 6, 54-57, June 1963.
IN RUSSIAN.

Electronic optical methods of geometrical transformations of TV patterns are discussed, such as rotation and anisotropic expansion of the pattern with the help of electronic lenses. Such transformations may be used in systems of automatic image analysis: diags, graphs, photos, bibliog, refs.

1122 RYFTIN, Y. A. Quality of TV transmission.

Tekhnika Kino i Televideniza, no 6, 9-18, June 1963.
IN RUSSIAN.

The existing criteria are considered to be unsatisfactory and it is suggested that evaluation be made by comparison of TV transmission quality with the 'normal' one. The criterion of visual equivalence of systems through transient responses is introduced. A separate criterion is proposed for evaluating the quality of transverse transmission. It is concluded that systems are only securing about a quarter of their possible quality: diags, graphs, photos, bibliog, refs.

► Technical Abstracts

1123 SAPRYKIN, K. V. Resulting nonlinearity of TV system scanning.

Tekhnika Kino i Televideniza, no 6, 42-48, June 1963. IN RUSSIAN.

Equations were derived for calculating resulting non-linearity of scanings dependent on the nonlinearity of receiver and transmitter devices. Conditions were found for minimum and maximum distortions for the geometrical scale of the image: diags, graphs, bibliog, refs.

Cameras

1124 BOGDANOV, G. M. Underwater TV camera 'Videocontrol.'

Tekhnika Kino i Televideniza, no 5, 51-54, May 1963. IN RUSSIAN.

An underwater television camera is described which is designed for underwater observation at a depth down to 20 metres. The camera is operated from two control desks: diag, photos, bibliog, ref.

1125 BRAY, D. and HAYDEN-PIGG, G. E. Video circuits for transistor television cameras.

Journal SMPTE, vol 72, no 11, 853-859, November 1963. Presented at the Society's Convention, Atlantic City, N.J., April 1963.

It is desirable that the next generation of broadcast-quality television cameras use semiconductors exclusively. The latest user specifications for television cameras demand a high standard of performance and facilities which presents a particularly difficult problem with regard to the video processing chain. A general design approach is outlined and particular design solutions are given: diags, graphs, photo, bibliog, refs.

1127 GRAY, S.; MURRAY, P. C. and ZIEMELIS, O. J. Improved high resolution electron gun for television cameras.

Journal SMPTE, vol 72, no 10, 792-794, October 1963. Presented at the Society's Convention, Atlantic City, N.J., April 1963.

The resolution performance of a television camera is determined by the cascaded response of a number of stages, each of which is the optical equivalent of a low pass filter. The aperture presented by the scanning electron-beam is the common and important component in all cameras. By mechanically smoothing the oxide coating of the cathode, the intrinsic resolution capability of the beam, in an image-orthicon electron gun has been nearly doubled. Some experimental results are given: diags, photos, discussions.

1128 LIVINGSTON, W. C. Resolution capability of the image-orthicon camera tube under nonstandard scan conditions.

Journal SMPTE, vol 72, no 10, 771-786, October 1963.

The resolution properties of the image orthicon have been studied experimentally for nonstandard scanning rates applicable in scientific observation. Four ways of improving resolution are discussed. The 3in image orthicon has an amplitude response of 50% at 900 TV-lines and a limiting resolution of about 1,500 TV-lines. With increased illumination a limiting resolution of 3,000 TV-lines is attained: diags, graphs, photos, bibliog, refs.

1129 VENDE, Y. Y. and others. Miniature Vidicon PE 407.

Tekhnika Kino i Televideniza, no 5, 30-34, May 1963. IN RUSSIAN.

The main characteristics of a new 13.5 mm diameter vidicon are given: light characteristics and dependence of signal level on the signal plate voltage, light range of trimming less operation and its dependence on the ray current and signal plate voltage value of resolving power and aperture characteristics, changing of the tube parameters with changing of the target temperature, and characteristics of the tube under small-image resolution conditions: graphs, bibliog, refs.

Receivers

1130 BROWN, E. F. A new crispener circuit for television images.

Journal SMPTE, vol 72, no 11, 849-853, November 1963. Presented at the Society's Convention, Atlantic City, N.J., April 1963.

A new crispener circuit capable of both overemphasizing and increasing the steepness of the luminance transitions of a television image is described. The subjective definition is improved by a combination of both processes. Applications in outlining television images and reducing overshoot and ring due to sharp cutoff filter characteristics are also described and illustrated. It is shown that when the ring and overshoot in an image are reduced, the sharpness of the image is likewise reduced: diags, graphs, photos, bibliog, refs.

Recording

1131 BURT, A. D.; CLURMAN, S. P. and WU, T. T. Design of satellite tape recorders after Tiros 1.

Journal SMPTE, vol 72, no 10, 787-791, October 1963. Presented at the Society's Convention, Atlantic City, N.J., April 1963.

The videotape recorder developed for the Tiros Satellite was very successful but later satellite programmes have needed increased performance qualities and especially more reliability. Additional special characteristics, such as angular momentum compensation and dual-speed operation, have been required. All these are reflected in a series of different recorder designs developed for NIMBUS and OGO satellite programmes: diags, graphs, photos.

1132 LINGEMAN, J. Television production techniques with videotape recording.

Journal SMPTE, vol 72, no 8, 630-631, August 1963. Presented at the cctv meeting of the Canadian Section, February 1963.

The production of television commercials by videotape is discussed. Among the advantages are quality, immediate playback, speed, and lower cost: photo.

1133 SASIN, V. M. A new method of transverse-stroke recording of electrical signals on magnetic tape.

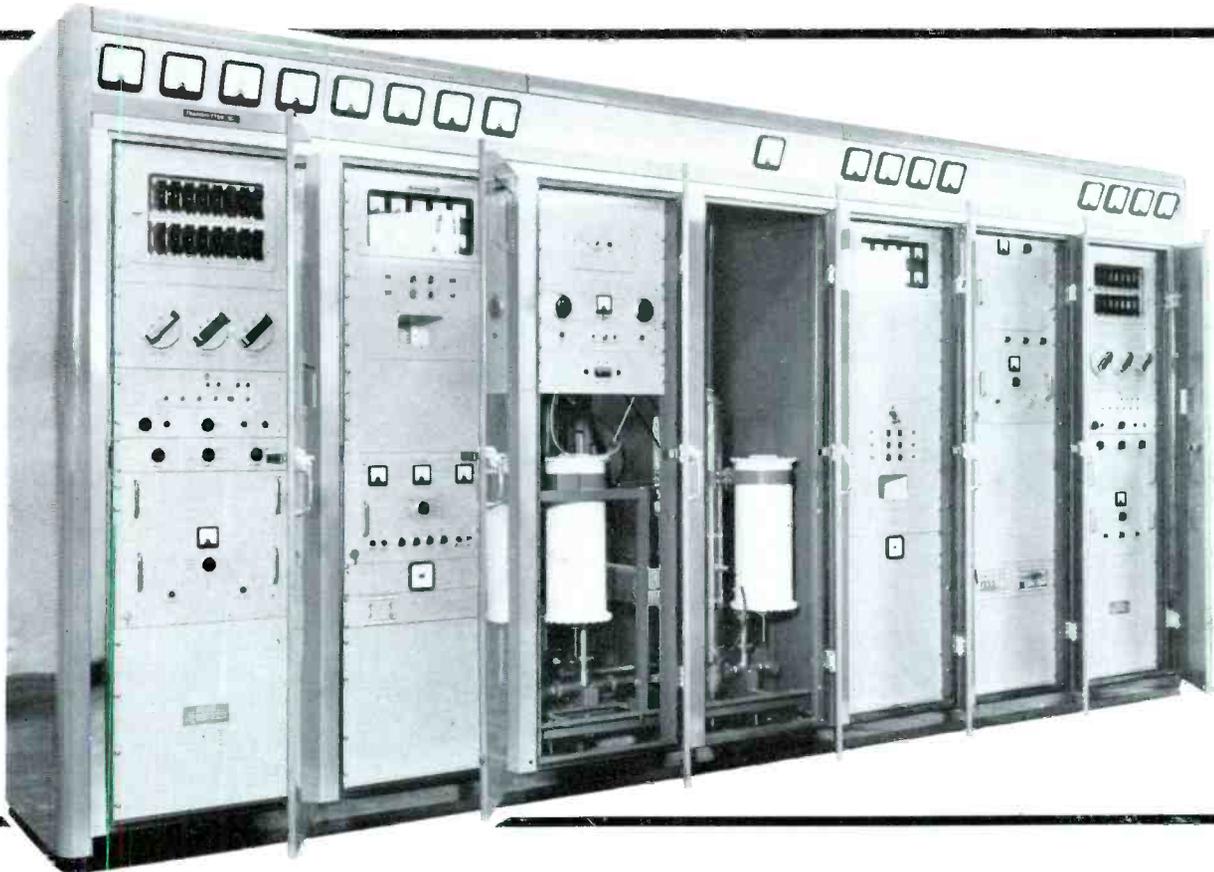
Journal SMPTE, vol 72, no 12, 958-959, December 1963.

A translation of a paper which appeared (in Russian) in *Tekhnika Kino i Televideniza*, no 3, 61-63, March, 1963. It is presented as an example of a possible solution to the head-wear problem. No experimental results with this system or information on the top frequencies which can be recorded and reproduced were given: diags, bibliog, refs.

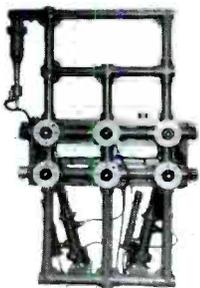


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