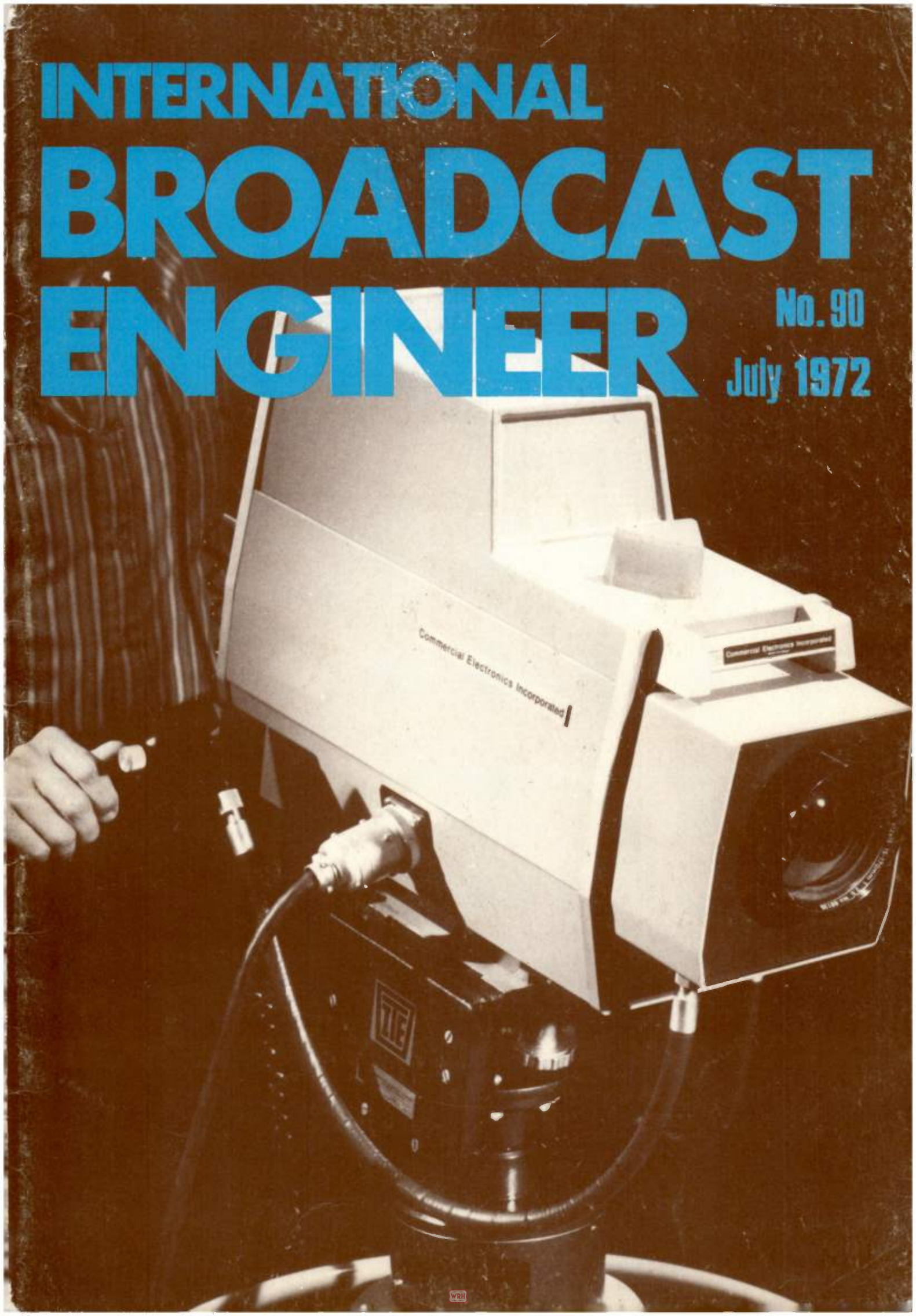
INTERNATIONAL BROADCAST ENGINEER

No. 90
July 1972



Continental Electronics...
specialists in high-power broadcasting

WORLD LEADERS IN HIGH POWER RADIO BROADCAST TRANSMITTING EQUIPMENT BOTH MEDIUM WAVE AND SHORT WAVE FROM 5,000 WATTS TO 1,000,000 WATTS

Continental has gained world-wide experience in the design, engineering, development, construction and installation of specialized broadcast systems and components. This equipment includes: specialized antenna systems, transmitter dummy loads, phasing and coupling equipment and combiners for a wide range of transmitter power levels.

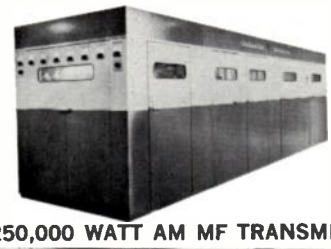
1,000,000 WATT AM MF TRANSMITTER

Continental designed and built the first super-power transmitter for the Voice of America. Delivering 1,000,000 watts of continuous power to the antenna, it was installed at Munich in 1953. Similar Continental 1,000,000 watt broadcast transmitters are installed in Okinawa, the Philippines, Thailand, Central America and Egypt.

1,000,000 WATT AM MF TRANSMITTER

Continental's newest 1,000,000 watt transmitter during construction, factory test early in 1968.

500,000 WATT AM MF TRANSMITTER



250,000 WATT AM MF TRANSMITTER

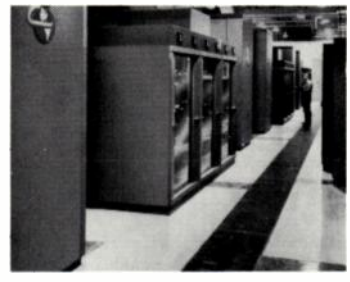
200,000 WATT AM MF TRANSMITTER

Two Continental 100,000 watt transmisters combined for 200,000 watt output.

100,000 WATT AM MF TRANSMITTER

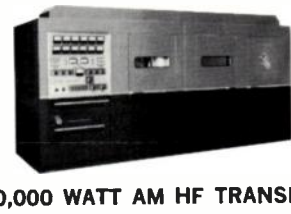
50,000 WATT AM MF TRANSMITTER

5,000/10,000 WATT AM MF TRANSMITTER

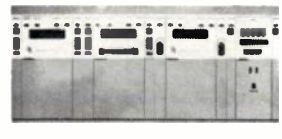


500,000 WATT AM HF TRANSMITTER

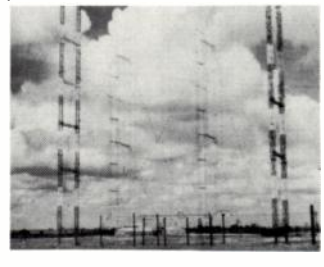
250,000 WATT AM HF TRANSMITTER



100,000 WATT AM HF TRANSMITTER



50,000 WATT AM HF TRANSMITTER



When you need high power broadcast equipment, come to the specialists! For information, write: E. L. King, International Sales, Continental Electronics Mfg. Co., Box 17040, Dallas, Texas 75217, U.S.A.

Continental Electronics Co.

MANUFACTURING CO. SUBSIDIARY OF RESALAB, INC.

MAILING ADDRESS: P.O. BOX 17040 DALLAS, TEXAS 75217

INTERNATIONAL BROADCAST ENGINEER

OUR COVER

Commercial Electronics (Mountain View, Calif) new low-cost colour camera, capable of operating on 500 feet of mini-cable, or 2,500 feet of standard TU-81.

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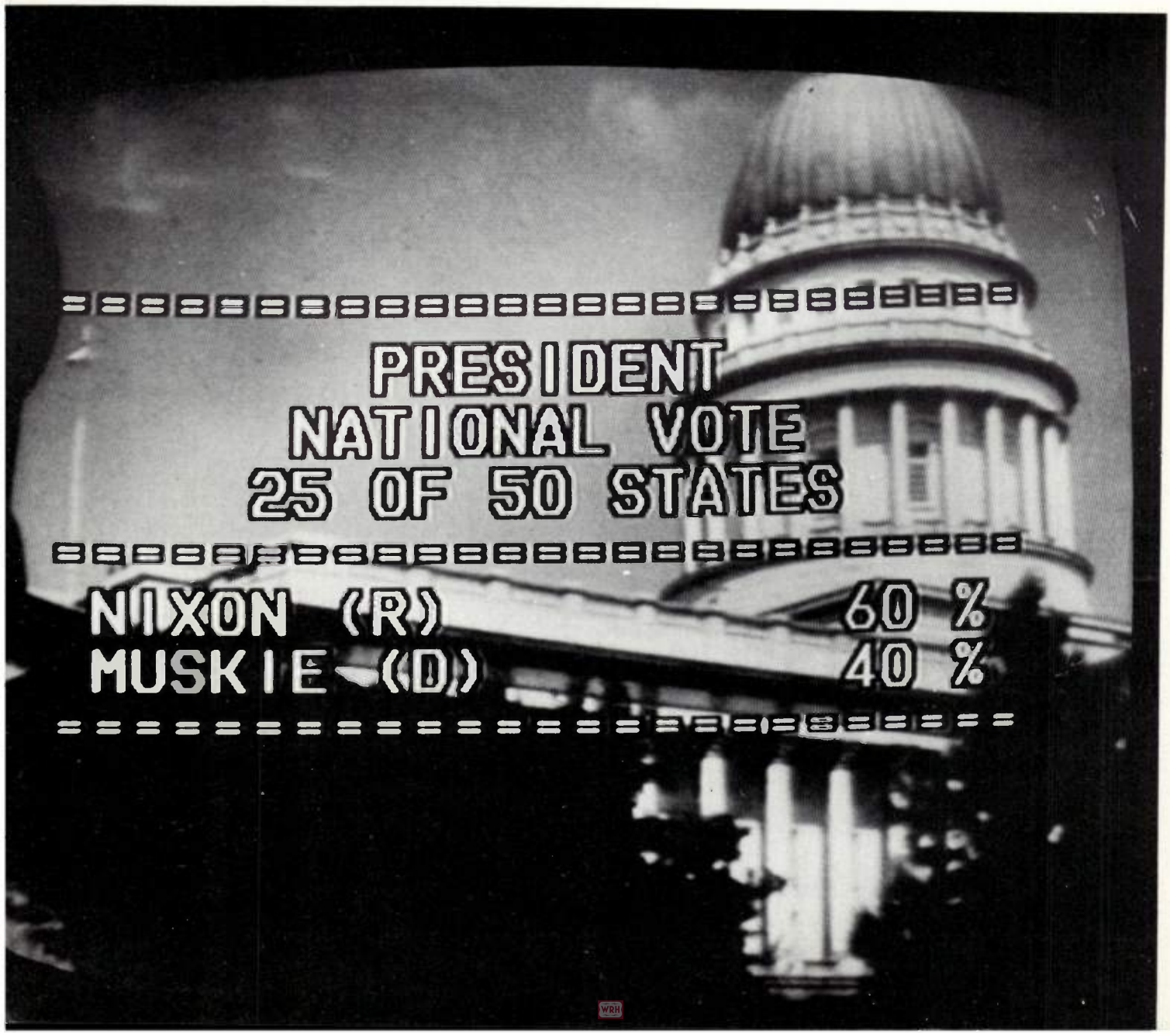
With their latest order, announced this month, HTV Cardiff Great Britain have brought the total of Marconi Mark VIII automatic colour television cameras in use in their Cardiff studios to nine. Here HTV's Managing Director Mr. A. Gorard (second from right), and Chief Engineer Mr. Tom Marshall (second from left), are examining a Mark VIII under test at Marconi's Chelmsford works with Mr. Derek Law (right) of Marconi's Broadcasting Division, and Mr. Cyril Teed (left) the Division's Manager.

CONTENTS

The article "Colourmetric efficiency of electronic signal correction in colour-television" by Dr. H.G. Wagner is the english version of a paper by the same author which appeared in Fernseh- und Kinotechnik, Vol. 25 (1971), p. 418-422, titled: Farbmetrische Wirksamkeit von RGB- und FBAS-Farbkorrekturen."

INTER – NATIONAL BUYER'S

BEST OF BOTH



Automatic Data Printer, ADP – 220 by Moseley Associates Inc.

GUIDE

WORLD'S FOR U.S. TECHNOLOGY

* Independent report by an *INTERNATIONAL BROADCAST ENGINEER* team on the foreign markets open to US radio-TV industry, and a Buyers' Guide to the North American products and technology currently available to the rest of the world.

FOR over a decade, North American know-how has been busy bringing NTSC colour-TV and FM broadcasting to almost every important area of the United States, and in conjunction with the FCC (but not always without acrimony) standards have been set for 525-line 60-field colour, for maximum frequency and kindred deviations in FM and AM, for regulation of remote-controlled stations, and for a score of other technical factors in US broadcasting, and cable-TV.

The North American continent has moved on from those old days of 1925, when the immortal David Sarnoff, then head of RCA, donned the mantle of a prophet and told the world: *"Very soon, every household radio will draw its power from a lamp or wall-socket."* He told the National Electric Light Association: "The day of the awkward radio battery is over."

In the 1930's he added: *"We may also dream of television in faithful colours."* And today, although Washington statisticians assure us that there are still 30-million Americans 'impoverished' because they earn less than $3,000 a year, 97% of all America's millions watch the 'boob tube,' and their lives are fashioned by what they see on the screen, mostly in NTSC colour.

While all this has been happening, broadcasting has been growing up in vast areas of the world outside the North American continent. It has developed along the lines of AM broadcasting, mostly. It has adopted 50 Hz power supplies, and in Great Britain and much of Western Continental Europe it has settled for PAL colour coding, not NTSC.

Telemation TED-1 (Television Event Display) using electronically-formed characters in a TV scene.

Of course this is no real barrier to US products being exported, since in our present solid-state era it is relatively simple to provide frequency-conscious supplies which can cope with 525 and 625-line standards (the French 819 lines and the pioneer BBC 405-line systems present no real market, however), and while there must be 50/60 field conversions, not all mains equipment is frequency-sensitive between 60 and 50 Hz. The matter of coping with 200, 240 and 250-volt supplies instead of 110 is something that the North American know-how has been dealing with successfully ever since Remington exported their first electric razor!

Now, at this juncture, the US broadcasting industry is beginning to key itself up to take its rightful share of world markets, for there are many facets where US technology (developed in the course of so many years of space exploration and of complex colour and FM broadcasting and communication) can *help* the world outside the North American continent.

It is not only a matter of opening new markets and making new profits for stockholders—important as this is. It is also a matter of bringing US experience and technology to bear on a world situation where (especially in the new-developing nations) there has been almost no real experience at all of what broadcasting involves. Whether it is manufacturing an antenna array for a city of skyscrapers, linking distant cities with cable-TV, coping with grave manpower problems by developing automated, auto-controlled electronics, catering for many millions with a vivid full-colour video service—in all these things and more, America can show the world.

Some techniques arise quite naturally from what the nation has achieved in the electronics of lunar landings and other major US triumphs. For example, Image Transform Inc., of North Hollywood, a fledgling company which opened its doors

for business only some six months ago, has developed a sensational tape-to-film transfer process of use in production centres throughout the world. It is currently being used to transform from videotape to wide-screen film the first Hollywood-based motion-picture done by this method. The film is *Santee,* a Western starring Glen Ford and Dana Wynter, with Gary Nelson directing. It is a co-production by Vagabond Productions and the Dallas-based AVC (American Video Cinema), and most of the work is in production in Santa Fe, Mexico.

Pentagon Industries Editor tri-master tape duplicator, for reel to cassette and cassette to cassette.

At first thought, this may seem a long way from US-TV (except that the night will surely dawn, a generation hence, when *Santee* will be screened as a midnight movie in a late-late show!) but in fact this Image Transform process is a brain-child from television, and could revolutionise production of videotape and film in every other TV-producing country.

It was Image Transform which processed the live video signals from space and from the moon during the Apollo-16 manned lunar spacecraft Mission, which resulted in picture clarity never before possible. This process differs from others in the tape-to-film conversion business in that instead of merely transferring, the incoming signal is literally taken apart electronically, cleaned up and put back together—resulting in film that is substantially better than the original videotape. We mention this process out of context in this Buyers' Guide, because it is a prime example of a technique which *only* the United States could have developed, as the result of the millions invested in the space and lunar programmes, and which is now available as a service or a product for the rest of the world.

What ARE the promised world markets? Twist the globe and span your fingers across the curved surface. Even where techniques might seem at the outset to be characteristically American, completely linked with the non-stop pattern of US radio and television, there are world markets. As an instance, there is RCA's TCR-100 automated system for reproducing short TV-programme segments from video tape cartridges. This is a top-priority system for US broadcasting, with its non-stop pattern and split-second timing, and where commercials are slotted in between programme segments in a way which is illegal in certain other countries such as Great Britain.

Yet more careful marketing thought shows that an automated cassette system has other operational advantages stemming from the need to automate TV station technical facilities. The cartridge system enables broadcasters to streamline station operation, and in countries where there is a shortage of skilled, trained station personnel, it is more reliable to do this by slipping in a selection of cartridges and then pressing a button, rather than going through the process of expensive training of more operatives.

As a result of RCA's clear-thinking on the export potential of this system. . .(It costs around $155,000 a time. Twenty are regularly on-air in the United States) now another 80 are on order from overseas. If RCA can find these world markets, so can many other US-based companies. The TCR-100 has already been sold in Australia, Great Britain, Mexico and Venezuela.

How was it done? The foreign purchases were made by Austarama-TV in Australia; by Color Television Consultants, Yorkshire TV and London Weekend TV in England; TV Independiente de Mexico SA, and by Corporacion Venezolana de Television SA (Venevision) in Venezuela.

As will be seen from the Buyers' Guide survey, some US companies have satellite companies in Europe, Australia, South Africa and the Orient. Some sell through agents, in the way that Gates Radio built up their world-wide export business through Rocke International. Others strive to market their products themselves—sometimes without always realising that 'English' is not the same thing to an American and to a Britisher, and that, for example, a newly-developed African nation may have a strong (although wrong) political anti-American bias. Sales-approaches, language problems and neglect of obvious technical differences must all be considered when markets outside the North American continent are being sought.

It is all too easy to copy the mistake made when a New York-based company decided to enter the European market. . . It planned to exhibit at the Montreux Exposition in Switzerland, where its products came into direct competition with those of Thomson-CSF (France) and Fernseh Gmbh (Germany), and did not enter for this year's International Broadcasting Convention in London, England, which has a stronger *world* appeal, whereas Montreux, in the heart of Switzerland, has a strong Continental European appeal. It is wiser for the US manufacturer to think in terms of world markets, not simple 'the European' market. The firm in question then produced a 'European catalog' with all the catalogue prices quoted in dollars, with standard mains packs shown only as 110 volts, and with NTSC references not helpful in PAL-coded areas. What unkind foreigners dismiss as 'Americanisms,' and business phrases such as 'All prices are FOB factory' set up a sales-resistance.

What the foreigner MUST know is how the equipment offered compares in (local) price, (local) delivery delay and (in local technical terms) with what he is currently being offered by British, French, German, Italian, Swedish and Japanese companies.

Streamlining its marketing for the admittedly great world opportunities for American technology, the parent company of Gates Radio, Harris-Intertype Corporation, has (as recently announced in this journal) completed a definitive agreement under which Harris will purchase General Electric's line of TV broadcast equipment. This deal cost Harris £5½-million in cash, and Mr. Laurence Cervone tells us that the GE lines include TV cameras, transmitters, antennas and studio equipment. Gates will transfer manufacture of the GE lines from Syracuse, NY, to Quincy, Ill. . .and it enables Harris and Gates to offer other countries a complete package-deal of equipment. Harris already includes space communications, mobile and fixed two-way radio, commercial and short-wave radio broadcasting equipment, microwave instruments and electronic news-gathering and editing systems.

Foreigners in newly-developing nations favour what they regard as a 'turn-key' project. The company provides them with a complete deal, perhaps using local labour under US guidance, but on schedule handing the government or local authority the key, so they only have to turn it, open the door, switch on and start broadcasting!

INTERNATIONAL BROADCAST ENGINEER is read in 193 countries throughout the world, and the following Guide serves as a good cross-section of what is available from experienced manufacturers in the United States.

STUDIO EQUIPMENT AND FACILITIES

The international Richmond Hill group is well placed to market throughout the world, the US company *Richmond Hill Laboratories Inc of 142 Central Avenue, Clark, NJ,* being a member of the group along with the parent company in Toronto, Canada, and Richmond Hill Laboratories Ltd. with a European office at PO Box 36, Reading, England.

Facilities they offer include vision mixing equipment (based on the successful VPM 2000-series), special effects, pattern weave generation, colour matte, chroma keying, Unipulse distribution and timing, and Datavision compact audio cassette recorders.

Outside the US and Canada, their pulse equipment covers 625/50/4.43 PAL, and a typical equipment example is the RHL model PSG-7 sync pulse generator for colour working. This is a basic colour sync gen with model PS-4 power supply, and it contains modules giving timer, pulse gates, counter, PAL frequency standard and PAL divider, timing mode selector and pulse outputs. Pulse amplitude is 2 volts p-p, sub-carrier amplitude 1 volt p-p.

RHL produce a wide range of test equipment. The video test sig genie modules used in the TSP and 1500 series as an example (widely used now throughout the United States) are also used for vertical-interval test signal purposes. RHL produce a line of specialized modules which can be combined with the test signal modules to form a variety of vertical-interval test and reference-signal packages. These specialized modules include vertical interval keyer, deleter adder, VIT automatic bypass, reference signal generator, gate control, timer control, scope trigger selector, keyer gates, automatic timer and video adder.

With the model 1517 vertical-interval test and reference signal system, this is housed in three 802 mounting frames and occupies only 10.5 in. of rack space. In addition to all the specialized modules just mentioned, it contains the following video test signals: window, staircase, sine-squared pulse, and multiburst.

On the audio side, *Pentagon Industries, 4751 North Olcott, Chicago, Ill,* offer several devices to speed tape-handling, an example being the Model C Editor tri-master tape duplicator. This is for reel to cassette, cassette to cassette, and cassette to cassette, and provides a quick solution to the problem confronted by anyone having to edit cassette material recorded 'live' on location. This Pentagon Editor provides a ¼-in. reel-to-reel copy (3¾ or 7½ i.p.s.) of the cassette contents in less than 3¾ minutes—a one-hour programme. The reel-to-reel copy can then be edited on any conventional tape deck. Once the reel has been edited, the Editor can provide three cassette copies of this master in less than 1¾ minutes, for a half-hour programme; it can also give three cassette copies from a cassette master if desired.

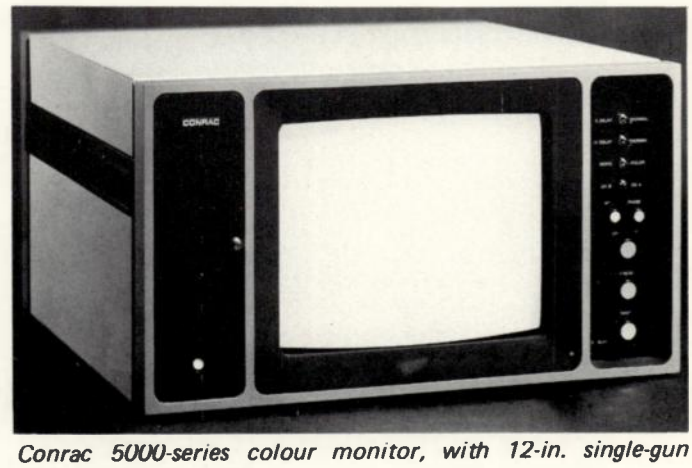
Marti Electronics Inc., a division of Marti Incorporated, have a very effective export programme from *P.O. Box 661, Cleburne, Texas.* They are a big name in Texas in audio amplifiers, including compressor-limiters, programme/line and monitor amplifiers, STL, and remote and telemetry accessories. We deal with the Marti studio-transmitter links and remote-control and telemetry in the Transmitters and Links section of this Guide.

Fidelipac is a division of *TelePro Industries Inc.,* and their new model 350 tape cartridge is likely to gain international acceptance after the success it is having in North America. It is offered for service in applications requiring extreme accuracy of tape guidance at the corner-post, and includes an adjustable corner-post using a cross-arm to guide the tape vertically. Access to the adjustment screw is through a hole in the cartridge cover, and this raises or lowers the arm as necessary.

Advantages of the Fidelipac 350 are most noticeable in stereo working, and phase differences can be minimized by simple adjustment using a 'scope arranged for a Lissajous display, on any cart machine. In monaural operation (which of course at present means the bulk of the export market to Fidelipac) the 350 can be adjusted to improve frequency response. It is available in any length up to 10½ minutes.

Moseley Associates Inc., Santa Barbara, California, were reviewed at some length in our issue covering the NAB Convention, when we placed emphasis not only on Moseley's digital remote equipment and aural studio-transmitter links, but their 160/450 MHz pickup line system, and an automatic digital transmitter logger.

On their new model ADP-220 automatic data printer, twenty operating parameters can be logged automatically with a minimum accuracy of 0.1 per cent. Several transmitters at different geographical locations may be logged from a central studio location. 'Alarming' of out-of-tolerance parameters and other failures result in entries being printed in red, and the sounding of an alarm by the companion Moseley unit the TAU-2 tolerance alarm. Of course this is a technique inspired by FCC rules in the United States, and it should have an equal appeal in other countries where a government control needs to be kept on transmitter performance and control.



Conrac 5000-series colour monitor, with 12-in. single-gun three-beam colour tube.

Because of the lead the United States has gained in use of audio tape cartridge systems, *Broadcast Electronics Inc., 8810 Brookville Road, Silver Spring, Maryland,* can help foreign broadcasters with their complete line of audio tape cartridge systems. They have a new mini-series multi-channel playback system, and some very practical audio consoles. The importance of the audio channel in TV broadcasting is not always as appreciated as it should be, and the new technology available from Broadcast Electronics could be of real service to oversea engineers planning to improve aural performance of their stations.

Bill Pegler and his technical colleagues of *Television Equipment Associates, Box 1391, Bayville, New York, N.Y.,* have a long practical experience of broadcasting in Europe,

and they act as agents for a fine range of broadcast-engineering equipment which foreign buyers may find most convenient to obtain through US channels.

For example, Television Equipment Associates are the exclusive American agents of Hermes/ATS, and at Bayville they handle the new tape-evaluator-cleaner, the Hermes-Magnetek B-601. It is designed for busy users of quad (2-in.) tape, and provides inspection capability to evaluate tapes prior to VTR use. There is a blade and tissue cleaning system (recommended in the US by NASA) along with a constant-tension device. It evaluates a one-hour tape in nine minutes, producing a double-pen graph recording in which one pen plots video dropouts and the other pen plots edge damage. Adjustable threshold provides tape-grading to differentiate the master from dub-stock. It has been found that dropouts on dirty tapes can be reduced by as much as 70%, with a marked improvement in VTR head-life—all of which saves money.

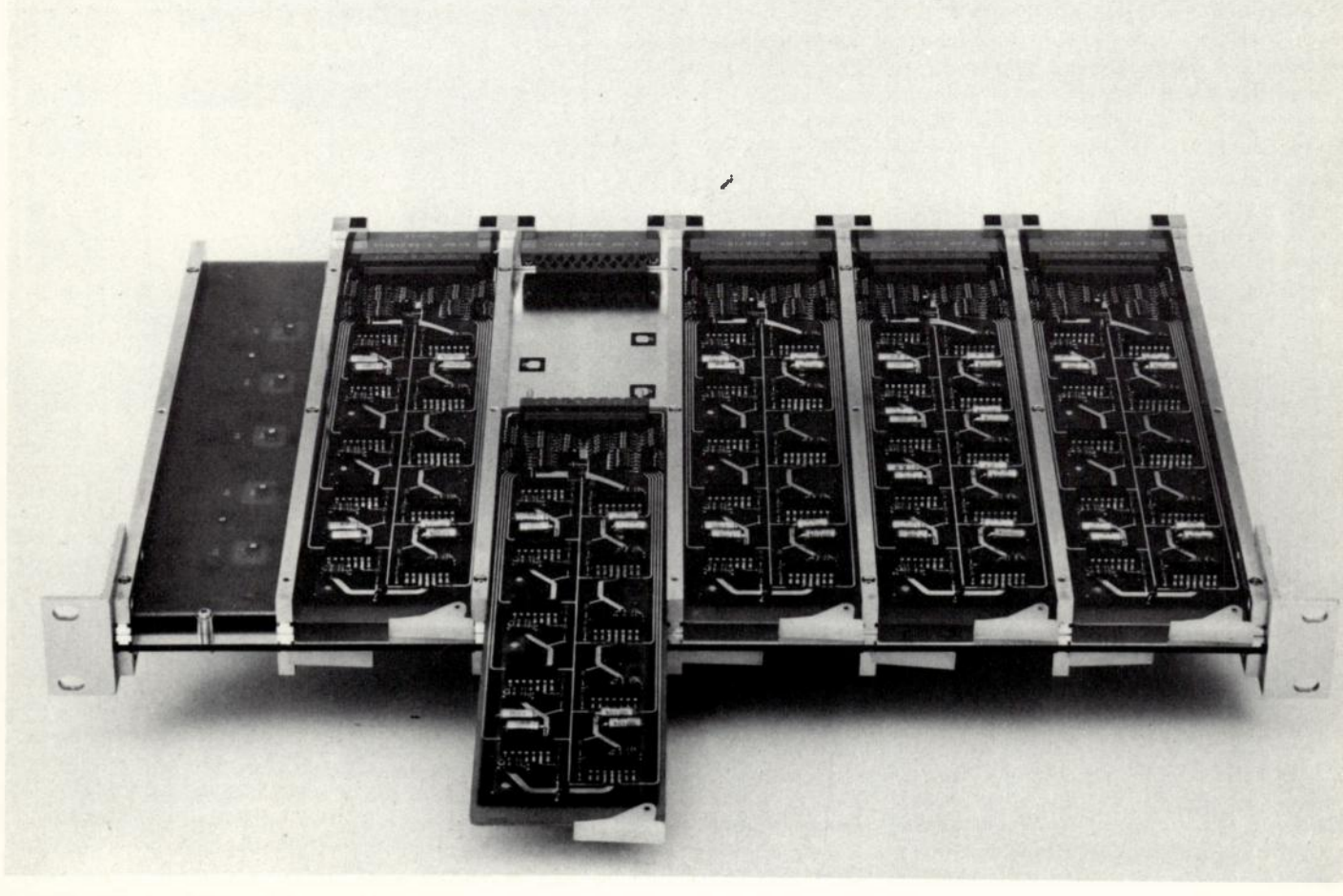
Another Television Equipment Associates facility most useful for stations broadcasting colour, is the IRT Comparator. In the United States this has become the standard for colour-balance at TV networks and Government agencies.

It provides a visual comparison so that operators can set colour CRT's to the recommended colour-temperature of D-65000°K. This is the recommended practice of the Society of Motion Picture and Television Engineers, and all nations outside the US tend to follow these SMPTE recommendations. This IRT Comparator is a small, battery-operated hand-held instrument. An operator observes either the white flag or a colour-bar or window signal through the ocular of the instrument, and adjusts the grey-scale balance at both 20 and 1 f/L, manipulating the monitor controls until the monitor matches the comparator white. Its compensating optics, which make the monitor and the comparator appear to be on the same plane for matching purposes. The visual technique accommodates minor phosphor/monitor variations.

With the American Presidential Election dominating world television screens, there has been international publicity for the TM (Telemation Inc) TED-1 display system. This can of course be used for any type of sports or other headline TV broadcasts. TED stands for Television Event Display, and it handles electronically the sort of display which otherwise involves large tot-boards or flap-boards. There is an electronic character generator, and a mini-computer, and for example to select a certain election page for display, the keyboard operator types the page number or 'calling name' on his keyboard. Next the page is selected directly on the 100-button select board, and then the line-advance key on the keyboard is used to display pages sequentially. The mini-computer can be programmed to handle automatically any event requiring instant display, such as weather reports, sports reports, or programme schedules.

This equipment is available direct from *Telemation Inc., P.O. Box 15068, Salt Lake City, Utah 84115.* Telemation also produce a series of digital colour encoders, producing PAL-M (or NTSC in the USA) signals from three- or four-tube live or film colour cameras. There are international versions for 625/50 PAL and 525/60 PAL-M, and the performance exceeds all CCIR EBU and governmental specifications.

Cohu Electronics Inc., Box 623, San Diego, California 92112, are known internationally for their wide range of closed-circuit cameras and systems, and now there is a 5000-series colour monitor, and a range of high-accuracy (0.001%) DC voltage-standards and similar test equipment. The model 355 solid-state DC voltage-standard is typical. Three decade ranges supply voltages from zero to over 1,100 volts, with seven-place precision. Output current to 50



Routing switcher (3600 Series) by The Grass Valley Group, giving multiple-audio-channel capability.

milliamps is available at any voltage setting. The shielding and insulation permit full output-voltage with either positive or negative terminal grounded (earthed).

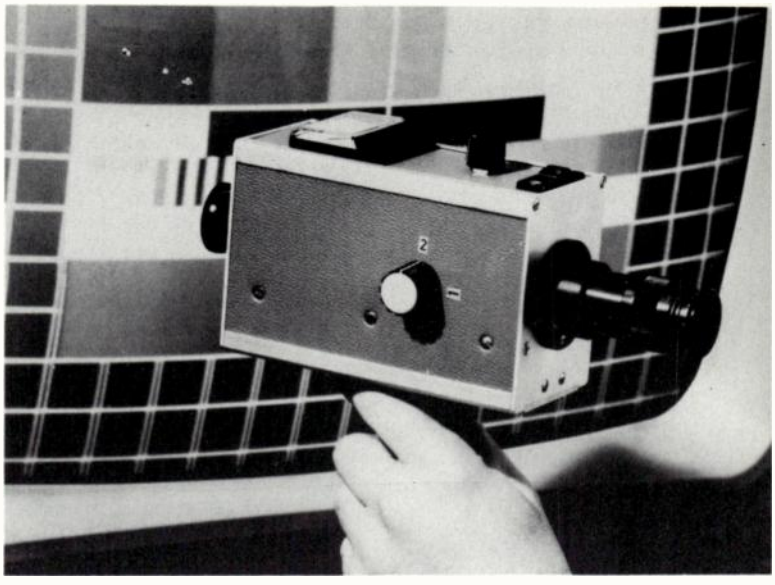
A well equipped station or overseas electronic manufacturing centre should find ample use for Cohu's series 510 digital voltmeter-ratiometer, for it is lightweight, low-price and compact. The measurement range is zero to ±999.9 volts DC, and DC/DC ratios from 0.0000 : 1 to ±999.9 : 1, and the polarity indication is automatic. Options include automatic ranging and bi-quanary-coded decimal or BCD electrical outputs. Equally interesting is Cohu's thermal transfer standard, designed for high-accuracy AC measurement using a DC voltage standard and a sensitive galvanometer. The voltage range is 0.5 volts to 1,100 volts in 19 ranges, and the frequency range 20-Hz to 50 kHz.

In this type of extremely accurate, rugged and relatively low-cost laboratory and test equipment, an American manufacturer such as Cohu can offer many foreign countries equipment which simply cannot be made locally.

As every oversea nation plans to go for colour-TV, a fundamental problem arises about colour monitors. Domestic receivers are an entirely separate question, and sometimes even a separate industry must be set up to provide them (as Australia and South Africa are now discovering)—but the professional engineers need colour monitors of highest quality, and generally these are not available locally.

In the United Kingdom, the distributors for *Conrac Division* products are *The Marconi Company, Chelmsford, Essex.* In other world zones, details of professional colour monitors may be obtained direct from the *Conrac Division*

Magnatek B-601 tape evaluator and cleaner, capable of evaluating a one-hour tape in nine minutes, producing a double-pen graph recording.



IRT colour-monitor balance comparator, by Television Equipment Associates.

(Conrac Corp), 600 North Rimsdale Avenue, Covina, California 91722. Conrac is the world's leading manufacturer of professional TV monitors, data terminals and CRT displays.

In the past, colour tubes have been extremely complex, but now Conrac in a new series of solid-state colour monitors had adopted a rugged and reliable 12-in. single-gun three-beam tube. These monitors are available for all codings, including RGB, NTSC, PAL-B and PAL-M, SECAM-50 and SECAM-60. This seems to cover every major oversea requirement. This new tube, in the Conrac 5000 series, features exceptionally bright and sharp picture presentation, good colorimetry and stability. There is a range of 'option packages' (to use the current US marketing term) meeting the needs of professional and industrial users, including educational and cable. The basic monitors are suitable for all such requirements working on modest budgets, enabling the engineering executives to move up slightly if additional signal-control is required. For example, a basic option package includes preset controls for contrast, brightness and chroma, two switch-selectable video input channels, and a continuously variable aperture correction. Adding to this, a 'professional option package' adds to these a colour/monochrome switch, underscan switch, horizontal and vertical delay switches, a tally light and a blue-signal output jack.

Certain major US companies have such a wide range of equipment that even what they persist in describing to oversea buyers as 'a short form catalog' is almost frightening in its scope and complexity. This applies, for example, to the important *Grass Valley Group, Inc., P.O. Box 1114, Grass Valley, California 95945.* Today this is a $3½-million concern, and in 1971 for the first time they exhibited at the Montreux Broadcasting Symposium.

Currently, foreign sales account for some 7% of total Grass Valley sales, and the subsidiary companies include Grass Valley International, Gravco Sales Inc, and Technical Arts Inc.

Grass Valley has entered into a sales distribution agreement covering Europe, Africa and the Middle East.

"In two countries where we have established local distribution," Mr. D.G.C. Hare, chairman of the Board, told us, "the response has been very gratifying. As a result of the efforts of our Canadian representatives *Applied Electronics Ltd.*, we delivered our first automated TV switching system in December, 1971... We entered into a representation agreement with *Australian Video Engineering, of Sydney,* and in

March this year we received a large order for a distribution switching system for one of the major television stations in Sydney."

So far as vision-mixing systems are concerned, GVG have a wide variety, the latest Grass Valley job being the model 1400-12 which is available in both PAL and SECAM (RGB switching) versions.

Although larger stations and networks can use electronic titling, there will probably never come a day when printed and hand-lettered TV titles are outdated. There is a brisk export potential for the Leteron Tapesigner, made by *Reynolds Printasign Co., 9830 San Fernando Rd., Pacoima, California 91331.*

The Tapesigner is a practical method of quickly die-cutting letters in sequence from continuous pressure-sensitive tape. Words and sentences separate from the tape and transfer to almost any surface in a single step. It does seem to us to be a long-awaited solution for television, where sharp, clean, opaque white letters are needed for TV titles. Type sizes range from 5/16ths in. to 1¼-in. high, and the tape comes in several colours, including a special opaque white for TV titles on a dark background.

TRANSMITTERS AND LINKS

Of course not all foreign countries have the same strict control that the FCC exercises over American broadcasters, but arising out of this rigid regulation North American manufacturers can offer other nations a variety of transmitter- and links-testing and verification systems.

As an example, *Telemet* (a Geotel company) *of 185 Dixon Avenue, Amityville, New York 11701,* market their VLT test signal package, an envelope delay test set (capable of measuring group delay in two ranges, 0.5 MHz to 25 MHz, and 25–250 MHz. Both modulators can be used simultaneously, and accuracies of ±4 nanoseconds can be achieved), and also the model 4501-AL broadcast demodulator.

This unit is used for measuring the characteristics of broadcast TV signals, including chrominance-luminance relative gain and delay, K-rating, burst amplitude, modulation depth, differential phase and gain, intercarrier frequency stability (using an external counter), and other distortions. The price of the VHF unit at the New York factory is $3,000.

Back in 1952, *Continental Electronics Mfg. Co.* (a subsidiary of Resalab Inc), of *P.O. Box 17040 Dallas, Texas 75217,* began development of a 500-kilowatt HF broadcast transmitter, and today six of these are in operation at the Voice of America's Greenville, North Carolina facility. These HF transmitters are the world's most powerful, and from experience gained in the development of such super-power Tx, Continental has manufactured a complete product-line of AM broadcast transmitters.

Looking through the Continental list, one gets the impression that the famous company's title should really be 'Inter-Continental,' for there are 10 kW transmitters in Venezuela, Guinea and Ecuador, 100 kW units at Dacca for Radio Pakistan, at Rawalpindi, Iraq (for Radio Baghdad), at Lourenco Marques for the Radio Club Mozambique, and at scores of other sites. Oversea authorities planning a station network will find it well worth while contacting Continental in Dallas, not only for transmitters but for radiation systems; for example, there is a portable antenna system which has a radiation resistance per element equal to that of a tower three times its height.

Typical of companies with overseas representation is *Bird Electronic Corporation, 30303 Aurora Road, Cleveland (Solon) Ohio, 44139,* which is represented in Great Britain by *Bird Electronic Ltd., 33a High Street, Ruislip, Middlesex.*

They have a range of transmitter accessories, RF wattmeters and other test equipment, indispensible when setting up new transmitters. For example, they have what is termed the '50-kW miniature giant,' a new high-power load resistor. Instead of a 1,000-lb terminating resistor built into station plans and occupying permanent floor-space, the Bird model 8762 line termination is simply connected to the line wherever needed. At a weight of only 13 pounds it is light enough just to bolt to the end of the line in any position, where it looks like an 18-in. extension of a 3-in. transmission line. This new RF load maintains its low voltage-standing-wave ratio (VSWR) of 1.1 all the way to 500 MHz. We are told that the elimination of a heat-transfer tank (through direct water-cooling of the inside of the tubular load resistor) cuts the water requirements in half to 10 gals. per minute. There are other Bird RF terminations, for 15 and 25 kW.

In the North American continent, TV signals have to be sent over vast distances, and the RF specialists *Acrodyne Industries Inc of 21 Commerce Drive, Montgomeryville Industrial Center, Montgomeryville, Pa. 18936* realise that their long experience with state-of-the-art solid-state translators is likely to benefit other nations where the same tough geographical conditions apply. Indeed, as we are told by Acrodyne's marketing manager Jesse D. Maxenchs: "Designing a solid-state TV translator offers the engineering team many options which are not available or economically feasible in a vacuum-tube (valve) configuration. . ."

An example is the Acrodyne model T-110 10-watt TV translator, giving excellent multi-hop colour performance, with separate automatic-gain-control on visual and aural carriers, and of course 100% solid-state. Output frequency stability is better than 0.01%. The output channel is any VHF channel

New high-speed cassette-to-cassette duplication system by Ampex Corporation, available throughout the world from Ampex International, Reading, England.

Cohu DC voltage calibrator, a test instrument of extreme accuracy, suitable for the broadcasting station and the laboratory.

which does not coincide with it or is adjacent to the input channel. Spurious output is 50 dB below sync power for transmissions 3 MHz above or below channel edges. The standard equipment is for 115-volt 60 Hz supplies, but this should raise little objection in many locations, for these translators can also be DC-powered.

With their wide range of digital remote-control equipment and aural studio-transmitter link devices, *Moseley Associates Inc., of Santa Barbara, Calif.,* can help foreign broadcasters needing transmitter links in almost any configuration.

The PCL 202, 303 and 404 aural studio-transmitter links (STL) are designed to provide continuous programme feeds; they are monaural STL's, enabling the transmittal of monaural audio or stereo programme audio in the dual configuration. The PCL-303/C is a composite STL which transmits the complete stereophonic waveform on a single RF carrier. With self-contained power supplies, these systems operate from a 120-240 VAC 50-60 Hz power source, Multiplex capability allows the addition of two subcarriers to any of these links for secondary programme feeds, 'order' wire or other services. Versions are available for use in the 200-240, 300-340, 450-470 and 890-960 MHz spectrums.

For keeping a check on transmissions, a new medium-wave AM digital frequency monitor has been introduced by *Gates* Division of *Harris-Intertype Corporation, 123 Hampshire Street, Quincy, Ill. 62301.* This is just one of the many transmitter facilities available from Gates, and as all are FCC-type-accepted they should be suitable for official approval overseas.

These new Gates monitors accept as input any standard AM frequency and then will indicate the deviation from an assigned frequency. The input may be a modulated RF signal of 0.2 – 10 volts RMS, and unlike other designs there is no loss of indication when the sample RF is modulated above 95%. A unique Gates circuit 'remembers' the last valid measurement until the modulation of the RF input is less than 95% for a normal one-second counting period. A most useful device for official frequency control.

Towards the end of 1971 we were invited by *RCA Government and Commercial Systems, Moorestown, N.J. 08057* to witness what RCA called their 'milestone antenna'– the hundredth travelling-wave aerial. This, 71 feet tall and weighing more than six tons, was placed atop WCAU-TV, Philadelphia, on the station's broadcasting tower in the City's Roxborough 'antenna farm' area.

This is just one of a series, for RCA produce a variety of antennas for the world's broadcast industry, at a 134-acre building and test site at Gibbsboro, N.J., near Damden. The facility includes giant turntables on which the multi-ton antennas are performance-tested. The travelling-wave antenna developed by RCA emits energy through a series of vertical slots cut in its cylindrical shape. The size and shape of these slots produce the signal pattern prescribed to cover the TV station's viewing area. Overseas broadcasters will find the years of practical experience by RCA at Gibbsboro invaluable, for ultimately the performance of any broadcast transmitter depends upon the antenna array.

CONSULTANT SERVICES

After so many years' experience in broadcasting, many of the major companies such as RCA offer a complete planning and consultancy service. Other experts in the North American continent do not manufacture anything, but can make their services available overseas. An example is *Imero Fiorentino Associates, Inc.,* of New York and Hollywood. Overseas engineers may find it most convenient to contact them at *10*

West 66th Street, New York, N.Y. 10023.

Services offered include studio/production systems, design of lighting, rigging, scenery-handling and A/V systems. One can have consultancy on facility planning. space allocation, cost control, project co-ordination and equipment acquisition (buying and rental). Fiorentino Associates can provide a full 'turn-key' installation, and will follow through with on-site training for personnel who are to operate the facility. Training seminars are given by their own technical staff.

This company is internationally known also as production lighting consultants for the past twelve years, and they have a team of ten full-time lighting directors. Design credits for major stations and facilities include the University of Wisconsin and of California, and in connection with installations for A.T. & T., IBM, General Telephone & Electronics, and the Little Theatre, New York City.

FILM & OPTICALS

Abtography is truly a new dimension in colour video, since it enables a cameraman to use an Abto camera loaded with conventional black-and-white film. This, when projected through an Abto projector (as in a telecine for colour-TV), gives pictures in true colour! The reason is simply that the monochrome print contains indelible colour information. The Abto system can save up to 50% on film cost and processing.

Thomas P. Einstein of Abto Inc., 1926 Broadway, New York, N.Y. 10023, stresses that it is important for overseas readers to appreciate that the Abto colour system is a completely optical process, and that the necessary adaptations can be done with a wide variety of 16-mm. motion-picture cameras, and of course equally with 2 X 2 slide cameras and projectors. These adaptations do not affect the compatibility of the cameras and projectors to work with normal colour or black/white film.

In the camera an Abto encoder is used, this being a single piece of glass with three gratings superimpositioned and rotated with respect one to the other. Each grating is made up of transparent lines of colour, thereby simultaneously encoding the colour information contained in the original scene. The Abto decoder uses the unique principle known as Fraunhofer diffraction, spatially to separate the three encoded images containing the recorded colour information. In television, a standard three-tube colour television chain handles film and slide cameras equipped for Abtography.

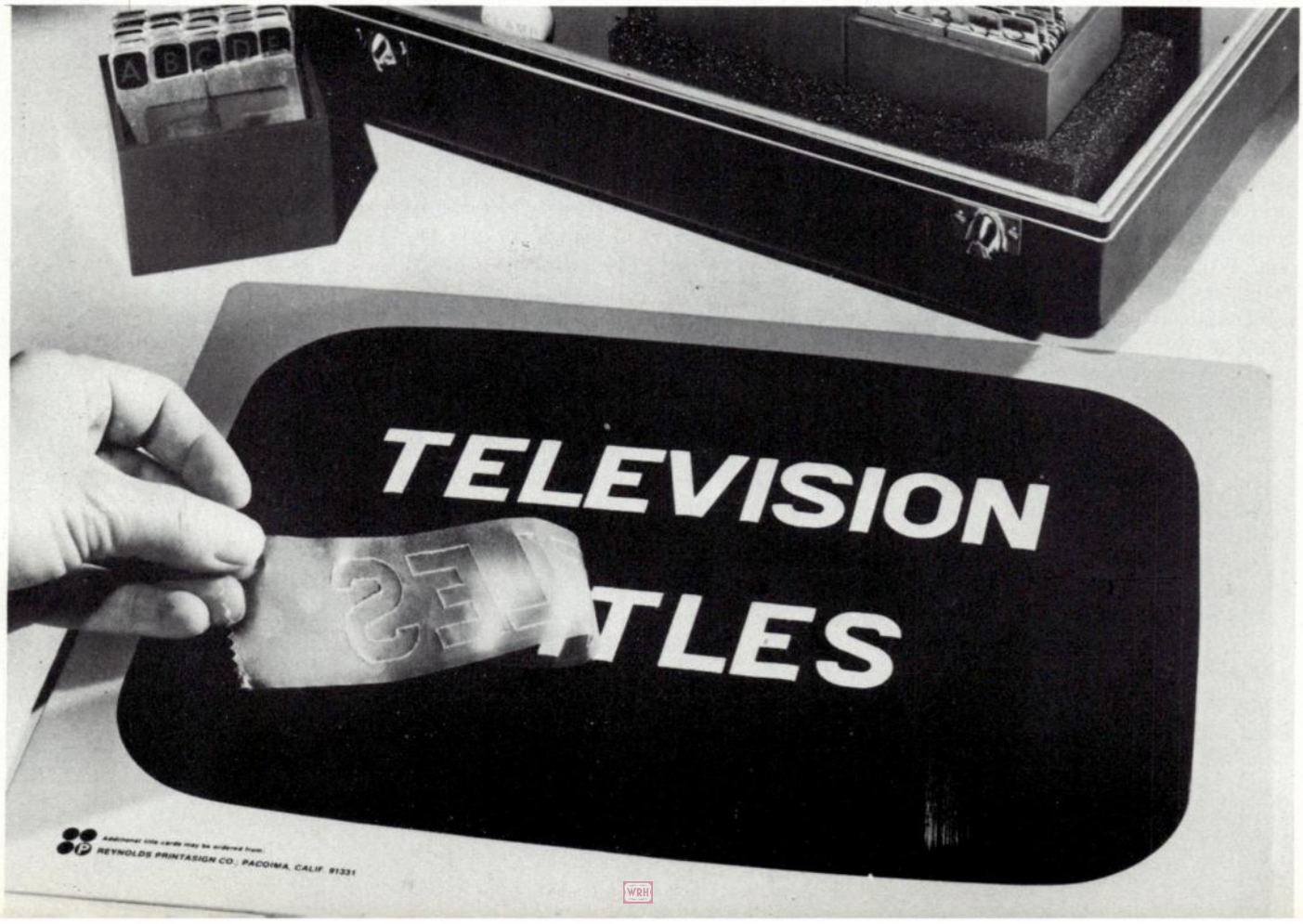
Most colour film cameras made by RCA, IVC, Philips, Shibaden and other manufacturers can be used with this system, which is a real film money-saver.

Teledyne Camera Systems, 131 North Fifth Avenue, Arcadia, California 91006 is another major US manufacturer with a British representation, in this case *Telford Products Ltd., Wadsworth Road, Greenford, Middlesex,* so according to global area foreign enquiries can go to Mr. F. A. Rogers at Arcadia, California, or to Mr. D. Chandler in England.

Equipment available includes the DBM-64B 16-mm video film recording camera with advanced loop servo control, and the CTR-2 colour telefilm recorder which gives a reliable and high-quality colour-tape to film transfer. In certain countries the whole scope of TV broadcasting could be widened with a machine such as the CTR-2, giving clear and colour-balanced 16-mm film from tape masters. We recall that in 1967 Teledyne introduced an advanced monochrome system, and now there is the colour version. The camera uses compressed air to pull-down and stabilize film in less time that the TV vertical blanking period. This results in full-frame recording without mid-field splice or shutter bar. The best international equipment is included in the camera chain, such as CBS Labs Mk. II image-enhancer, Conrac professional colour monitor, Tektronic 528 waveform monitor, and a Rank decoder. The output is colour film to SMPTE-recommended standards.

(To be continued)

Leteron Tapesigner by Reynolds Printasign. There is a special opaque white tape for TV titles.



The TCR-100.

You will never know what you can do with video tape until you own it.

One thing you will quickly discover is how easily it solves many of your problems.

For example, this unique video tape machine uses snap-in cartridges to record up to 22 three-minute messages; such as, station logos, film previews, sports introductions, advertisements, publicity spots and other brief announcements.

And it can play them back in automatic sequence. At the touch of a button.

So now you have an easy, efficient way to present station breaks—and replay them several times a day. Also, you can book events with minimum notice and change your schedule at the last minute. Without confusion. With just one man, one button. Your staff and reel-to-reel VTRs and telecine chains can be reassigned to make new program tapes, edit old ones or perform other tasks. Productivity increases, station operating cost decreases.

The Tape Cartridge Recorder is useful in program production, too, for editing short episodes into longer tapes.

And it can be set up to come on the air automatically and to cue or be cued by telecine projectors, VTRs and other studio or remote feeds.

Additional TCR-100 benefits are new, long-life Alfecon II headwheels, PAL or NTSC standards compatibility and availability either as a self-contained tape center (with an integral signal processing unit) or combined in a system with a RCA TR-60 or TR-70 VTR.

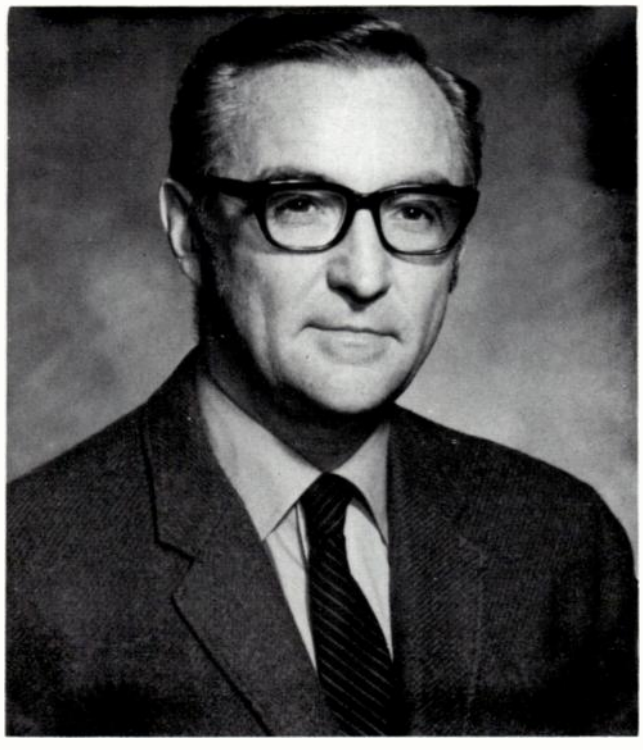
With the TCR-100, you receive field-proven performance, since it has been in service for over a year. More than 15 units are already installed in U.S. stations. Their reliability has been confirmed by more than 350,000 successful plays. In fact, the machine's daily performance is so dependable that some U.S. stations rely on it to deliver all of their commercials and station break material. Maybe you should as well. See your RCA Salesman for all of the facts.

RCA

RCA Ltd., 21001 N. Service Road, Ste. Anne de Bellevue, 810 Quebec, Canada/RCA Jersey Limited, 24 Rue des Pres. Trading Estate, Longueville Road, Jersey, Channel Islands/RCA International Ltd., 1927 Prince's Building, Chater Road, Hong Kong/RCA Limited, 11 Khartoum Road, North Ryde, N.S.W., Australia 2113/RCA International Marketing, S.A., 2-4 Rue du Lièvre, Geneva, Switzerland/RCA S.A. de C.V., Avenida Cuitlahuac 2519, Mexico 16, D.F. Mexico/RCA International Ltd., Calle Paroissien 3960, Buenos Aires, Argentina.

THE SPARTA

OR TOM



by paul gregg, manager sparta electronic corporation transmitter products division

Paul Gregg got an early start in broadcast electronics, with his first radio job at the age of 17. At that ripe age he was already a graduate of a radio-TV institute in the Midwest. After USAF service during WWII as a radar specialist, Paul moved to the San Francisco Bay area, where he worked as radio Chief Engineer for two stations for eleven years. After moving to broadcast equipment sales, he co-founded Bauer Electronic Corporation in 1960. As the article relates, he went to Granger Associates and finally to Sparta in 1971. A member of both AES and IEEE, Paul has traveled in his profession to every continent except South America.

STORY:

SWIFT REVISITED

Garages and back yards are the legendary starting point for American inventions in the Tom Swift and Horatio Alger tradition. But in truth not too many such humble beginnings result these days in the success with which the system is credited. One such real life story can be told here, however. This story actually had its start at a garage workbench in Sacramento, California. The factors that hatched it all were: a TV engineer I knew who had long nourished the idea of an inexpensive tape cartridge system, a strike which idled that engineer just long enough, and a very real need for his brainchild in the broadcast industry. The TV engineer was William J. Overhauser. The strike occurred in 1959. The brainchild was the Model SE-10/11, first manufactured and marketed that same year under the name of 'Sierra Electronic Enterprises'.

The fledgling firm moved to rented industrial quarters the following year, and its phenonenal growth was under way. In short order (1962) it was incorporated as Sparta Electronic Corporation; moved (1965) to its own building; became a division of Computer Electronic Corporation in 1967; began serious development in 1969 of the Automation Division under the direction of Spartamation inventor Dave Evans; and acquired Bauer Electronic Manufacturing Company in 1971, expanding the broadcast equipment line to include transmitters.

Sparta is subdivided into two separate and distinct manufacturing divisions, each with its own management, staff, and production responsibility. The Audio Products department, with Dave Evans as Manager, produces a complete line of audio studio and remote broadcast equipment: turntables, consoles, tape cartridge modular systems, amplifiers and all accessories. It also includes all of Spartamation systems production and development.

Transmitter Products now include the building of both AM transmitters (250 to 25,000 Watts) and FM transmitters (250 to 40,000 Watts).

An addition to the large plant in southeastern Sacramento is currently taking shape, which will house subsidiary portions of the manufacturing processes such as machine, cabinetry and paint shops. The addition will make room in the main plant for the rapidly expanding transmitter research, assembly and testing areas.

. . .OUT OF THE GARAGE. . .

From the original 'Spot-O-Matic' tape cartridge machines to the present Sparta complete audio equipment line is a long way by anyone's reckoning. At the beginning it was a matter of building one unit, demonstrating it at a radio station, selling it, and returning to the plant to invest the profit in building two more. This geometric progression could hardly continue indefinitely, but it was a wonderful way to get Sparta 'off the ground'. The underlying principle was to build reliable, straightforward, and therefore simple equipment. . .and Sparta rapidly got the edge on those few companies making competing equipment.

Sierra Electronic Enterprises became Sparta during this early developmental period as a direct outgrowth of this philosophy; 'Spartan' seemed to typify the type of equipment which the four people who then comprised the company thought was necessary in order for them to fill a niche in broadcasting. 'Spot-O-Matic' became 'Sparta-Matic' in an easy alliterative transition, and the company began to look about for another product to make that was not available elsewhere.

A small production room console was settled upon as the next project; simple, but at once flexible, and reasonably priced in order to appeal to the small and medium market radio station. Sierra became Sparta just as the Model A-10 4-mixer console was born, and the thinking paid off as it found a ready market.

The A-10 next developed into a complete remote broadcast facility, mounted on a cus om desk with removable legs, together with two turntables. The present Sparta remote broadcast control units still bear a marked resemblance to that original one.

FM broadcasting was burgeoning at that period, and shared a problem with most new industries; availability of capital for an untried business. Overhauser and company decided that what was needed by FMers was a stereo console the financially wobbly stations could afford, and the remodeled A-10 became the FM workhorse. The *first* purchaser of the stereo version took it back from the factory with him on the airliner to Reno, Nevada, where it promptly became his studio's main console!

The success of both the earliest Sparta consoles was due in large part to the consistent point of view from which their development was considered; that the *broadcasters's* use and finances should determine the ultimate design. When Sparta could not produce the necessary expert opinion from its own ranks, they went directly to operating radio stations and discussed what was needed. Frequently these conversations resulted in changes to existing equipment, or even to new designs. The 4-channel capability of the early consoles, for instance, reflected engineers' complaints that they had to

over-equip. For production room use a suitable quality board was not available with fewer than eight channels, which meant that much of its capacity was wasted. The smaller console fitted the times, since the live commercial was then losing favor. Over the years Sparta has maintained close contact with operating stations, and the constant feedback into the development departments has kept the company alive to changing needs of the most modern broadcast techniques.

The obvious direction after initial success in consoles, was to go to a larger board for control room main use. All the knowledge gained in early development went into a new 8-mixer console, produced at about the time the company moved to its present plant in 1965. Its 8-channel stereo version came into being the following year.

The industry was rapidly becoming transistor conscious. The consoles Sparta had developed were all-transistor, but cartridge equipment was not. The all-transistor successor to the SE-10/11 had plug-in transistor electronics, plug-in mechanics, and configurations adaptable to rack mount, table-top or cabinet enclosure. Sparta's own direct drive then improved the machine and a specifically table-top one followed shortly.

Everything had gone Sparta's way. Every piece of equipment had worked well, there had been no product failures, and market acceptance had been outstanding. With confidence in their progress to that point, the small company's officers counted on a rosy future for their efforts in such items as turntable preamps, a small remote mixer and related studio products. They were not disappointed.

With the new 8-mixer board to show at NAB, Sparta decided to show it off especially. After consulting an industrial designer they had a cabinetry shop produce a complete set of furniture to display their studio audio products. The initial idea was not to market the furniture itself, but NAB interest in the complete packaging concept was so good that the decision was made to produce the 'Showcase' as a modular custom studio complete with equipment. Station owners who had gone through the arduous process of working with a local cabinetmaker to customize their stations appreciated the Showcase engineering, which aimed at operator efficiency and comfort, as well as durable good looks. The station could select from control console desk styles, cabinets which exactly matched Sparta cartridge playbacks, turntable returns and cartridge hutches. The several pieces were, and still are, available separately or as complete studio installations.

Pictured above is the complete "Showcase" SPARTA studio control center. The cabinetry and all equipment in the picture are made in the Sacramento, California factory. In the right foreground are two Sparta turntables, in their own custom cabinet. The 8-channel console (A-20, monaural) is shown in Showcase mounting with hood, containing the cue speaker and digital clock. At the left are the Utility Return and Cartridge Hutch, with Sparta Model 800-C Record/Playback system. Sparta offers the option of choosing from among three Showcase complete studio furnishing arrangements with equipment, or choosing equipment and cabinetry on a piece-by-piece basis to suit the needs of the individual station.

Assembler EDITH GRAHAM wires the fore-panel of an AS40B 8-channel stereo console on the Sparta production lines. Most of the exacting handwork is done by women.

"Simplicity", says Bill Overhauser, "is a natural by-product of engineering for reliability and low cost. Once we decided on a direction for Sparta, our equipment was bound to follow the pattern it has. It's as true of the Transmitter and Spartamation products as it is of Audio, which is exactly why we've followed the pattern of growth through acquisition that we have." Sparta equipment today may be a far cry in appearance and electronics from the original, but under the surface, the family resemblance is striking. "We had no long-range plan at the beginning," admits Overhauser, "we were just people with the knowledge and interest in the industry who thought we saw needs and trends, and wanted a chance to fill them. . .to find a niche which a small company could occupy with specialized products".

The company's relationship with Vega Electronics and with Jampro Antenna Company, both also subsidiaries of Computer Equipment Corporation, reflects this specialized nature. Both are also specialty companies and their mutually co-operative relationships go back prior to acquisition of the three by C.E.C. Jampro president Peter Onnigian and Overhauser had worked together in Sacramento TV long before they found themselves heads of related companies. Overhauser had also worked closely with Bauer when I was marketing transmitters. We even went to the annual NAB shows with co-operative Audio/Transmitter displays, but never thought that we would one day be one company. The 1961 NAB show was our first such venture together, and provides a fond memory for Bill and I. Don Michel of Anna, Illinois purchased and took to his radio station the entire Sierra Electronics tape cartridge system which was on display. That equipment is still going strong at WRAJ AM-FM in Anna, and Don has no plans to replace it in the foreseeable future! Remember that Sierra Electronics had another year to go before becoming Sparta, and Bill's garage workbench venture was but two years old at the time.

The C.E.C. acquisition of Sparta in December of 1967 is directly related to Sparta's buying of Bauer four years later.

Up to that point Sparta was a company of small capital assets, but great potential. A disproportionate amount of earnings returned to plant in an effort to grow quickly enough to stay abreast of the rapidly changing broadcast industry. With C.E.C. financial backing after the sale, Sparta has been put in a position of business strength that enables them to not only occupy their own self-determined product-demand niche, but reach out into the general marketplace and assume a more wide ranging and competitive posture.

. . .OUT OF A BOX. . .

I was a broadcast products salesman in Northern California 12 years ago, when two friends and I joined forces with Fritz Bauer, and another Tom Swiftian story bore fruit.

Fritz was another engineer, like Bill Overhauser, whose vision could only be satisfactorily translated into a product. Fritz' dream was of putting an absolutely top quality AM transmitter within the reach of every broadcaster. This we succeeded in doing in 1960, by presenting the Bauer Model 707 1,000 Watt AM Transmitter (now Sparta's factory-ready Model 701) as a kit to be assembled by the purchasing station. To call it an overnight sensation is accurate in one way, but also misleading; the 707 sold over 400 copies in ten years, making it far and away the most successful transmitter in broadcast history. . .but Fritz put 40 years of experience into the design!

I had a busy seven years as VP in charge of sales for Bauer Electronic Corporation: I oversaw the shipment of 707's to every part of the world. . .most of which are still in operation.

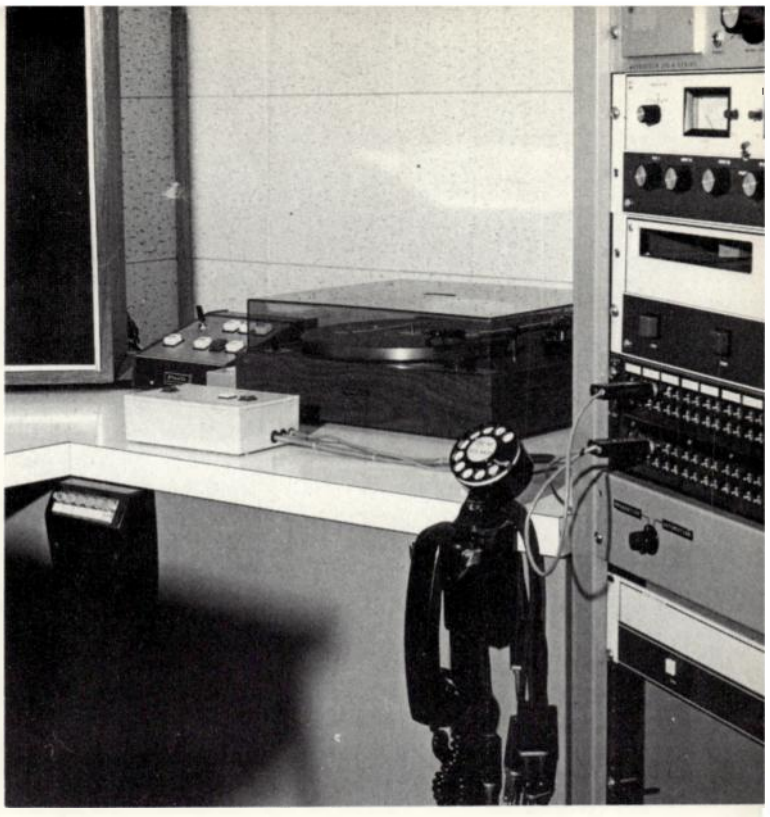
Our innovation—offering a high class AM transmitter as a kit—lowered the price of the beautifully-designed 707 to within the reach of many American stations which at that time were upping power to 1 kw daytime from 250 watts, following an FCC ruling for Class IV stations.

For the four years preceding Fritz' retirement I served Granger Associates as sales manager for transmitter products, still very much involved in Bauer transmitter concepts. When Fritz retired and sold his entire interest to Sparta I was invited to join in the venture, and moved to Sacramento at the same time the name Sparta/Bauer Transmitters became a reality.

Under this new ownership the R & D for transmitters has remained wedded to the Fritz Bauer designs where they could not be improved upon, but departed freely from them where state-of-the-art demands new approaches.

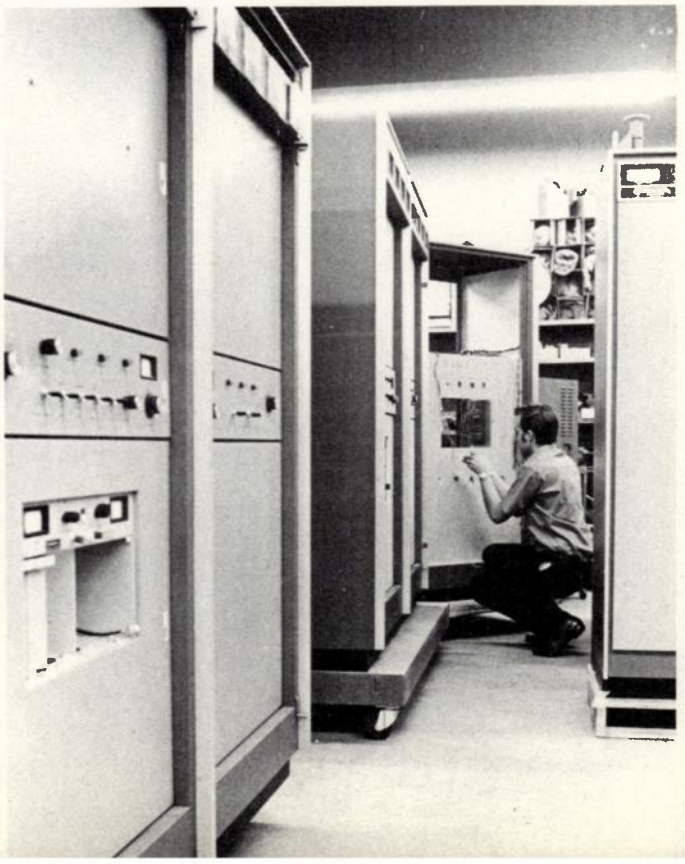
The Bauer designs were famous for simultaneous full-meter display of all important functions, variable vacuum capacitor for final plate tuning, circuit simplicity, builtin dummy antenna, and oil-filled modulation transformers. Sparta has added a 'Tally Light' system, which indicates to the engineer where an overload did cause an outage, even though the transmitter has automatically reset and recovered. The F.M. transmitters have 'Stripline' final amplifiers, and use direct-carrier modulation through the solid-state Model 660 Exciter, adaptable in modular fashion to S.C.A. and Stereo. The 660 can also serve as a 10-Watt educational station transmitter, a 15-Watt standby, or as an F.M.-band S.T.L. The 'Stripline' eliminates panel controlled moving contacts, and produces optimum performance without continual fine adjustments.

Our engineering direction is toward a wholly reliable transmitter, no matter what its power, which will perform exactingly with minimal adjustment and attention. Circuitry is kept simple, and space for ease of maintenance is designed in deliberately. Tubes of greater capacity than necessary are the rule in final sections, giving authorized power without strain. The Bauer name and business interest are now entirely Sparta's, but the engineering idea with which Fritz began over



This partial view of the KZST production room shows (lowest in the rack) the SPARTA 25 Hz Oscillator-Filter (allowing reel transports to be programmed by the 1052 Controller), and just above the jack panel the 600-CRP Record/Playback with its Record Amplifier for producing commercials on cartridge. Next to the turntable, left of center, are SPARTA Remote Control sets for the reel-to-reel machine (not visible) and the 600-CRP. The production room operator has positive control of all recording equipment at his fingertips. The control board is at left, out of the picture, with the operator facing away from the camera towards the left. A second turntable is available on the matching left-hand wing of the console desk.

DICK NOTEMAN, Sparta Transmitter Production Leadman, works on a Model 660 FM Exciter Installation in a 603A5 Transmitter. The 660 is seen in the foreground, mounted in the model 620 20kw FM transmitter.



40 years ago was so basically sound that it remains an integral part of our thinking under the Sparta roof.

. . .FROM THE LIVING ROOM. . .

Spartamation (automation) really got into high gear at Sparta in 1969. Dave Evans, Audio Products Manager, had begun in 1960 with construction of a completely custom system for KXOA-FM. It was one of the first stations in the USA to decide to separate its FM from AM programming, and asked Sparta to come up with an automation system for that purpose. Dave had in his days at Idaho State College assisted in the all-student construction of a TV facility, and had been engineer and systems engineer in TV since. One of his nagging ideas was about automation: why should a radio announcer spend so much time pressing the same button daily, weekly and monthly? He jumped at the chance to create the KXOA-FM system, and then in 1963 began experimenting—not in his garage, but his living room—with a random-select system which would search reel-to-reel tape for a coded commercial. The idea, controlled from punched cards *à la* data processing, proved less successful than similar ideas utilizing tape cartridges, so Dave dropped his work and, still in his living room, turned to control devices. His viewpoint, the Spartamation approach, was to consider automation as a creative programming tool, rather than a simple mechanization of operator duties.

The Model 726 Program Controller grew out of Dave's first efforts, and proved so reliable that Sparta decided in 1969 to set up an Automation Division with Dave at its head, and market individual components for field construction into systems. Radio stations around the nation, however, insisted on buying entire systems, so the marketing objective had to be changed to full-fledged entry into the field. Dave states his concern with automation development as twofold; making the radio station *sound better* (the programming viewpoint), and making the equipment as dependable as possible. Both of these points, of course, could stand as Sparta's entire credo, and are company-wide in their application.

Dave says of his living-room-cum-laboratory days, "I had not only the biggest home hi-fi set in the country (the prototypes were mounted in 82" racks) but the only one with commercials." During the two years that it was *the* conversation piece for all the Evans family visitors, its sheer size proved valuable once: David returned home to find that an attempt had been made to steal the entire system, but the would-be thief couldn't get it out the door!

. . .AND BACK TO THE GARAGE. . .

The man who started it all is still involved in every facet of the present multi-million-dollar Sparta enterprise. As President, not sole designer! And he still tinkers in his garage, too. Bill Overhauser these days tunes and cares for a Lola Can-Am road race car. He enjoys the racing tour under the marque of W.O.R.Ld. (William Overhauser Racing Ltd.) A far cry from designing electronic broadcast equipment, you say? But perhaps one day you'll be reading another success story: 'The Sparta sports racing car beat out the less reliable competition at Laguna Seca last Sunday. . .". Overhauser's driver would HAVE to be named Tom Swift!

In final checkout each electronic component and assembled unit is tested for its exact characteristics, which information is furnished to the buyer. RICHARD McGEE, Technician, checks output of an A15B 5-channel monaural console.

WORLD SURVEY OF COLOUR-TV

By Jan Bergeron

BRAZIL, the most extensive State of Latin America, has set herself yet another economic problem by starting a colour-TV service over a tiny fraction of her 3¼-million square miles, and there will be a potential market there over the next seven years at least for TV-broadcast capital equipment. The United States is probably so deeply involved in packaged taped and film programme material that there is perhaps little left for the rest of the television world.

All the same, it is time broadcast engineers took a fresh look at the colour-TV scene around the world, because that scene is changing rapidly.

Some facts stay fixed. Bandwidth of the grand original NTSC remains at 3.6 MHz for luminance, 600 KHz for chrominance, while for SECAM (as in France, and modified for Soviet Russia and some satellite countries) the bandwidth is 5.5 MHz luminance, 800 KHz chrominance.

There is also that strange animal, now spreading around the world, known as 'British PAL'. This is the modified form of Phase Alternation Line which the United Kingdom opted for in 1966 after several years of experimentation by the British Broadcasting Corporation. On the UK PAL system the luminance bandwidth is 5.5 MHz, and the chrominance width ± 1.0 MHz.

The PAL subcarrier.frequency, as adopted by many nations now around the world, is precisely 4,433,618 ± 1 Hz, but engineers are usually content to regard this as 4.43 MHz. The NTSC subcarrier frequency is 3.58 MHz. On SECAM (and Soviet variant) it is 4.40625 MHz for D'_r lines, and 4.250 MHz for D'_b lines undeviated.

As for picture scanning standards around the world, France originated the 819-line standard, but accepts 625-line 50 fields for colour. The United States and Japan work on 525-line 60 fields, while the United Kingdom is still unique in clinging to a 405-line 50 field system as well as a UHF 625-line 50 fields system. As we shall see in due course, Great Britain's Independent Television System now has a colour network, in addition to that on BBC-1 and BBC-2, and from the middle of 1969 all programmes (including all of the ITV service except from the Channel Islands) were originated and distributed on the 625-line standard, electronic converters being located at the main VHF transmitter sites to convert this to 405-line modulation for the VHF network.

All around the world the question of fields is related to the local power-mains frequency, since it is obviously convenient to run the time-base circuits at local AC periodicity. One has become so accustomed to regarding the US standard as 60 cycles per second (hence 60 TV fields) and the UK standard as 50 c.p.s. that it is overlooked how complex is this question of cycles and fields around the world—a matter of even greater importance with colour television.

In the early days of electric power transmission, the Continent led Great Britain into more general use of AC supplies, although London had a few low-voltage (circa 150 volts) supplies until after the Second World War. The UK and Continental European standard was 50 cycles for lighting, and 25 c.p.s. for general power transmission. Some European countries had a 40 c.p.s. lighting supply, and as early as 1880 the electrical-power company of Granz in Budapest initiated a 42-cycle standard, since in their opinion this was the lowest frequency at which arc-lamps could be run without showing flicker. Previously all arc-lighting had been from DC supplies.

Carbon-filament bulbs could be run as low as 22 cycles, and in the pre-1914 days there were railway power supplies in various ranges from 133 down to 15 cycles. The United States continued the use of DC power lines, however, and when three-phase supplies became essential standardized on a lighting frequency of 60 c.p.s. It is a great pity that a world standard was not accepted, and currently it is being said that the US would consider changing to 50 c.p.s. Much professional colour equipment now is not particularly frequency sensitive, being usually 50/60 c.p.s., but it is generally agreed that a 60-field colour service has some technical merits.

It is also generally acknowledged that the world's first colour television was conducted on a closed-circuit in Great Britain—in August, 1928. This mechanical-disc system is dealt with in the UK section of this survey, but as the Radio Corporation of America also had a mechanically-scanned colour system operating experimentally at Camden, N.J. by 1930, and as the United States was the birthplace of NTSC electronically-scanned colour (which is the basis both of PAL and SECAM), it is appropriate to deal first with USA colour-TV.

While US—colour is of course dominated by the three great networks, ABC (American Broadcasting Company), CBS (Columbia Broadcasting System) and NBC (National Broadcasting Company)—and all are in colour now, following the lead set five years ago by NBC to give a 100% colour-TV service—there are many organisations and societies in the USA which also originate colour transmission, yet are virtually unknown outside the States. They include the National Association of Educational Broadcasts and National Educational Television (NET), which latter has a network of

stations. The Federal Communications Commission (FCC) controls broadcasting in accordance with procedures laid down in the Communications Act of 1934, and the advent of colour twelve years ago, with frequency-deviation problems, has simply added to the FCC's responsibilities. Currently there are some 863 TV stations licensed by the FCC.

Colour has increased the impact of public-utility broadcasts (as distinct from programmes transmitted by commercially-orientated stations), and these get Federal and local government support since the Carnegie Commission report on educational TV was published in 1967. The Public Broadcasting Act, 1967 also provides for the establishment of a 'Corporation for Public Broadcasting,' though so many million dollars have been invested in NBC, CBS and ABC colour networks that it is difficult to see a fourth separate network carrying colour. Nevertheless, it disposes of the idea that breakfast-foods, detergents and cosmetics in NTSC-colour are the only mainstays of US colour-TV.

Because of the increasing cost of the colour networks in the US (plus, of course, production costs of colour commercials), advertising revenue has become the prime criterion for the value of current colour programmes.

The sponsor, of course, is the main source of advertising revenue, and there are instances where the pattern of sponsored programmes ties the broadcaster down to 39 units of 15 minutes throughout the year. By contract such programmes have to be broadcast at fixed times and strictly in accordance with the agreed advertising copy, otherwise a suit for damages can be entered: and usually is. In specific cases, the major networks usually get around 70% of the advertising revenue, and the station itself only 30%.

With colour being costly, *rating* (the number of viewers) has become the key word.

Because of the wide frequency band for colour, services have to be carried in the UHF bands which already are overcrowded. As we shall see, the basic NTSC system has disadvantages compared with PAL when there are interference fringes. This problem can be overcome by putting colour-TV on cable rather than on-air. It cuts out shadow-spots in cities, but it introduces political and financial problems so that there is powerful opposition from conventional colour-TV nets.

Theoretically it is said that CATV (Community-antenna television) in colour is possible to only 5½% of the population at present. Cable TV could take some 60 interference-free channels to the average American home, but currently only 12 of the potential 60 channels are used for colour. The FCC is reviewing the position, a number of important conventions and symposiums have been held on CATV, and over it all hangs the threat of pumping 'cassette-colour' programmes into the CATV system, so there would be very little central control—by the FCC or by anyone else—over what sort of colour programmes are fed into homes. The FCC is equally concerned about another policy aspect which has come to a head with the advent of colour. The prohibition of cigarette advertising on TV has hit ad revenue, although it is fair to say that the major chain stores prefer newspapers and periodicals for their advertising, despite the attraction of colour television. As there are greater profits to be made on colour TV without the capital investment necessary in paper and printing, there has been a sizeable increase in the total of newspaper groups buying control of colour-TV stations . . . and this the FCC is determined to control.

On the less-controversial technical side, the US committed itself to the NTSC system back in December, 1953. It was basically a technique pioneered by RCA, then modified by national agreement by the US National Television Systems Committee, from the initials of which body comes the NTSC.

World Ice Hockey Championships broadcast from Prague, with Marconi Mark VIII colour cameras – transmitted via Eurovision and intervision. For the final match between Russia and Czechoslovakia there was a world audience of 150 million viewers.

Obviously if the picture scene is split into three basic colours, red, green and blue, and these are transmitted separately, the bandwidth of the whole transmission (including audio) would be quite impracticable. Also it would be a unique transmission, incapable of being conveyed by a monochrome-only channel. One essence of NTSC is that it is 'compatible,' that is to say, the colour transmissions can be displayed in black-and-white on a monochrome receiver, without any special adjustment. Further, the colour transmission occupies exactly the same channel bandwidth as the equivalent monochrome transmission.

In US NTSC, 525-lines 60 fields, the luminance signal is transmitted as amplitude modulation of the vision carrier, and two chrominance (colouring) signals are transmitted simultaneously as quadrature amplitude-modulation of a subcarrier. It provides compatibility and reverse-compatibility (i.e., one can have a monochrome display even on a colour receiver) but a weakness is the sensitivity of the NTSC system to phase errors. This means the need for readjustment of the receiver's hue control. On colour advertising it may also mean that colours are not displayed exactly as the sponsor would wish.

In the US the SMPTE (Society of Motion Picture and Television Engineers) gives a service which is also appreciated by colour-TV engineers the world over, in setting standards known as 'SMPTE Recommended Practices.' Each has a RP code number, and in most cases these are accepted internationally. They are detailed, precise, and sometimes deal with minimal aspects of colour television: for example, RP 41-1970 deals with 'colour and luminance of review room screens used for 16mm colour television prints'. At the other extreme, the SMPTE set up a technical sub-committee to decide upon standardization for time and control code for video tape recorders, to get display of real time on readouts of NTSC colour recordings where there are precisely 29.97-per-second frame-rates, compared with 30-per-second rates for monochrome.

In Great Britain, as we have seen, John L. Baird devised a disc-scanning system of colour-TV in August, 1928, and colour in the United Kingdom grew from that first strange experiment. Few colour-TV engineers today would know how to

produce results mechanically. Baird did it by having at the transmitting end a rotating disc perforated with three successive spirals of holes, with red, green and blue filters being mounted in the three successive sets of spirals. The disc was spun at 10 revs per second, so 30 complete images were transmitted each second, 10 red, 10 green, 10 blue.

At the receiving end was a synchronously-spun disc with a similar array of spirals and filters. There were two glow-discharge tubes, one a normal neon tube (for red), the other containing a mixture of mercury vapour and helium, which is rich in both green and blue.

Today, after a lengthy six-year series of BBC tests, first on 405-lines VHF and then on 625-lines UHF, the United Kingdom opted for a PAL system. Delay was partly due to failure to get international agreement throughout Europe, although since 1956 study groups of the CCIR (Comite Consultatif International des Radiocommunications) had toured Europe, and eventually it was decided that the final choice should be left to the administrations in each country. The BBC-II service began colour transmissions in July, 1967, and since 1970 BBC-I and most ITA stations have also been transmitting on 625-lines PAL. As mentioned, the VHF 405-line monochrome service continues, all programme material now being originated on 625-lines. Production of dual-standard receivers is ceasing, and within a decade it is possible to see an economy by a single 625-line transmission on each of the BBC and ITA services, since viewers who do not want a colour show at any particular time can always display monochrome— albeit not with such clarity, on the average shadowmask tube with its triads of phosphors.

On the PAL system as used in Great Britain, the polarity of one of the two colour-difference signals is reversed between alternate lines, allowing the receiver to average-out any phase errors introduced during transmission, or as the result of signal reflections and other propagation problems. Even on colour, the overall transmission takes up rather more frequency space than is theoretically necessary, and most of the information is contained in concentrated bursts of information at regular intervals in its channel. In the 1960's a team of BBC engineers pioneered a PCM sound-in-syncs system in which the sound is carried actually within the video channel, despite colour complexities.

In the wider technical scene, the UK last year opened the first combined radio-and-colour-TV regional centre, at Pebble Mill, Birmingham (in the British Midlands); and the Post Office Tower, one of the highest microwave links in the world, is the focal point of a data-transmission and colour-TV network of which the Goonhilly satellite station forms a part.

In France, colour broadcasting began in 1967. Originally France had broadcast on an 819-line standard, monochrome, and there was delay in getting a colour service started because of finance, because of political pressures associated with the De Gaulle Cabinet trade links with the Soviet Union, and the ultimate decision to adopt the SECAM version of NTSC, followed by the Russian adoption of a modified SECAM known as NIR.

As with NTSC, the total bandwidth on SECAM is equal to that of a monochrome transmission width (using the same line standard), and the name SECAM is derived from *'Sequential Coleur a Memoire.'* Here the luminance signal is transmitted as amplitude modulation of the vision carrier, and colour information is transmitted as FM, line sequentially, using a subcarrier. As with PAL, the receiver needs to include a delay line to give simultaneous display of the three colour components.

In 1964 the ORTF (Office de Radiodiffusion-Television Francaise) was established, which is under Ministry of Information Control. Colour broadcasting is therefore still State-controlled, but not so directly under political control as previously. The general ORTF policy is laid down by an administrative board, half the members being government-appointed, the other half representing other interests including the Press and the ORTF staff. Since 1967, when colour broadcasts began nationally, the second ORTF channel has become increasingly important.

In the field of colour television engineering, France is dominated by the two huge industrial groups. Thomson-CSF and Schlumberger. Both have associated companies throughout the world dealing with colour-TV equipment. In France all the PTT's transmitting and receiving centres are equipped with major Thomson-CSF electronic equipment; their colour cameras, telecine channels, caption-scanners and other colour equipment are marketed internationally. Schlumberger, based at Rueil, near Paris, has played an important part in equipping the ORTF Centre, on the Paris heights of Buttes-Chaumont. Schlumberger equipment is also marketed in the USSR (notably Moscow, Kiev and Leningrad) where, as we shall see, there is colour television.

Western Germany offers a unique situation in that here the Federal Government provides technical facilities, and is responsible for transmissions to foreign countries, but actual day-to-day TV is left to nine autonomous organisations working in Germany's eleven provinces (the *Lander*).

Because of ether-space and frequency problems associated with TV, a consortium was formed, known by its initials ARD—an abbreviation of the rather pompous *Arbeitsgemeinschaft der Offentlich-rechtlichen Rundfunkanstalten der Bundesrepublik Deutschland.* Long before there was any 625-line colour-TV plan, the ARD instituted an exchange of programmes between the *Lander* which became known as the First German TV Programme. The Second *(Zweites Deutsches Fernsehen),* ZDF, came into being in 1963.

Colour-TV equipment manufacture is of course dominated by the great Fernseh GmbH Group, at Darmstadt, whose KCU-series and colour TV film scanners are internationally marketed.

Belgium and the Netherlands, being neighbours, have kindred problems. There used to be three separate organisations in Belgium, but now with the increasing financial pressures of colour equipment there are only two—the BRT and RTB *(Belgische Radio en Televisie* and *Radio-diffusion-Television Belge)* respectively. The services are financed by an annual government grant, and at present there are no commercial colour broadcasts.

As there are so many differing religious and political groups in the Netherlands, there are no fewer than six independent private broadcasting organisations. They broadcast in turn, in what is known as the *Zuilenstelsel* (the pillar system), and of course the bulk of the Dutch TV equipment is provided by the Philips group at Eindhoven, with transmitters mostly built at Huizen in the North.

In Italy there are two transmission channels currently, both operated by the RAI *(Radiotelevisione Italiana).* Colour has been slow-starting in Italy which, largely because of postwar reconstruction, did not get going until 1954. Advertising commercials are allowed only at certain times of day.

The Soviet Union not only sets the pattern for NIR (based on SECAM) colour broadcasts, but also dominates the TV-technical pattern of countries in the Eastern Bloc.

Colour in Soviet Russia is transmitted on what is known as the 'Fifth programme,' this being an NIR version of the main Moscow national programme which is in monochrome. Due to the vast distances in the Union, only about 30% of Russian households can use a set, some 35% of the population live in

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US Colour-TV is becoming increasingly automated, as now made possible with such facilities as the RCA colour tape cartridge machine, here seen with IBE executive, Kenneth Ullyett, and RCA Great Britain's Len Fosbiook.

areas not yet served even by monochrome TV, and it is estimated that the current reception of Moscow-originated colour-TV applies only to some 4% of the population. There is as yet no plan to give NIR-colour of the Second programme (in the Moscow area only), or of the Third and Fourth programmes, which are mostly educational and cultural.

In Japan, although TV was not introduced until 1953, partly because of the US Occupation in the country, there has been the most spectacular development in monochrome and colour-TV.

The public-utility organisation in Japan is of course the Nippon Hoso Kyokai (NHK), and there are also some seventy private commercial stations, of which the largest is the Tokyo Broadcasting System. NHK provides a two-channel service (one mostly educational), and at the last count the NHK operated no fewer than 1,928 transmitters, relays and repeaters to cover 96% of the total population.

NHK themselves pioneered two-tube colour cameras which were first used at the Tokyo Olympics, but most Japanese colour studios now use more conventional three-tube lead-oxide-type cameras. The Olympics also showed the world for the first time how Japanese scientists have harnessed laser techniques to large-screen colour-TV, laser beams being video-modulated.

Although the colour-TV broadcasting world seems to be split between 50 and 60 fields, 525 and 625 lines, PAL, NTSC and SECAM (NIR), colour-TV technical problems are eased by international agreement between the various associations of broadcasters.

These include the EBU (European Broadcasting Union) in Western Europe and the Mediterranean area), the OIRT (International Radio and Television Organisation) with its headquarters in Prague, for Eastern Europe, the Asian Broadcasting Union (ABU) covering Asia and Australasia, URTNA for Africa, and recently the Arab-speaking ASBU.

Largest, and doubtless the most helpful in the global pattern of colour-TV, is the EBU, which was founded in 1950 with Sir Ian Jacobs as its first President. The General Assembly meets annually, and deals with the affairs of all the 28 active members from the European Broadcasting Area (most with a colour television service, except those in North Africa and the Near East), and the 50 associate members.

Brussels is the headquarters of the world's largest colour-TV programme exchange. This is the EVC, the Eurovision Control Centre. It links 23 EBU colour-TV members in the European Broadcasting Area, and can also connect with the Intervision Net for the Eastern Bloc.

The international EBU Technical Centre is in the Brussels Palais de Justice (backed by the calibration station at Jurbise, South-West Belgium) and of course it is the spread of colour-TV throughout the Western world which has increased the growth of Eurovision ten-fold in the past ten years.

From Brussels there are permanent colour circuits linking the main centres in the United Kingdom, France, Belgium, Holland, the German Federal Republic, the Scandinavian countries, Switzerland and Italy.

As colour-TV costs big money, this service is of course not free—nor could it be expected to be since it links nations with such colour-TV money-spinners as the World Cup, the Eurovision Song Contest, the Olympic Games, and Lunar Space missions. There is a varying scale of Eurovision Network payments for circuit use, based on each nation's use of the circuit and also on its ability to pay.

As BBC News, ITN News and others are now all handled in colour, there is increasing importance of the Eurovision TV News exchange, which takes place twice a day. At fixed times, following a telephone news conference in Brussels, selected news items are transmitted over the Eurovision network so that they can be locally video-taped for slotting into each nation's colour programmes.

What has held some colour services back has been the relatively high cost of satellite communications, particularly COMSAT, the Communications Satellite Corporation, with its 74 international partners in the International Telecommunications Satellite Consortium (INTELSAT). Some 35 countries have ground stations enabling them to pick colour-casts off space satellites, but the colour-TV progress was hampered by high cost.

Then, in 1969, the availability of the INTELSAT III series (making more satellite circuits open for telephony) made it possible for the Americans to make almost a 40% reduction of COMSAT's rates for TV.

The rates which previously applied to combined video and audio channels were abolished, and there was now no extra rate charged for colour broadcasts.

This simple act of price-cutting may prove to be one of the biggest world landmarks in international colour-TV exchanges.

HOT COLOUR

The inside story of the colour tv situation in the Republic of South Africa.

By

Ian Robertson, BSc and Jonathan Chambers.

"THE Government has decided to adopt the PAL system of 625-line colour television," Senator J. P. van der Spuy, Minister of National Education, told the world Press last November.

"Most countries with advanced electronics have adopted the PAL system," he added, "and most countries of Western Europe with which South Africa has trade relations have done and are still doing much research on the development and manufacturing of equipment for the PAL system. Since colour transmissions are more effective from the point of view of mass communications media, no further investigations into monochrome transmission will be undertaken."

That, we repeat, was last November. Since then there have been swift moves, not only behind the scenes of the administrative capital of Pretoria and of the South African Broadcasting Corporation, but in the board-rooms and design-centres of all the major electronic groups hoping to get colour-TV launched in the Republic.

To the outside-world—but not in the Republic itself—the issue has become a hot-colour subject because of the apparent racial questions involved. Instead of being only electronic, the subject has become emotive.

Immediately the PAL decision was made, after fourteen months of discussion at Government level, we of *INTERNATIONAL BROADCAST ENGINEER* were commissioned to make a full exposition of the technical, programme, language and financial aspects of South Africa's 'hot colour.'

It must be stressed that our international technical journal has no political or racial bias, and we are concerned only to report the facts with absolute impartiality. In this we have been given full cooperation not only by representatives of the Government, but of the South African Broadcasting Corporation, of the South African Embassy in London, England, and of industrial groups potentially able to deal with South Africa's technical consultants Fischbach and Moore, Box 10, Johannesburg (they are representatives of a United States Group), to whom Great Britain's Thames Television technical headquarters is sub-contracted to advise the S.A. Government, on behalf of the British Government.

Strizdom microwave tower on the skyline of Hillowbrow, Johannesburg.

It is no secret that major TV companies of Britain, France, Germany and Japan have been giving technical demonstrations in South Africa—but some of these companies have instituted a publicity clamp-down amounting almost to censorship.

The chief marketing executive of one company flatly told us that he had not yet been to South Africa, yet our investigations show that this company has indeed sold a medium-power transmitter to the Republic, for training and pilot transmissions.

Widely-differing views have been expressed in the world Press, some of which protect companies not anxious to disclose their sales-bids to S.A. lest these disturb their TV customers in other areas of the African Continent.

Our contemporaries are expressing opinions of varying degrees of helpfulness. Ron Pretty of *Electronics Weekly* rightly gave it as his view that: "The South African Government decision, so impatiently awaited both inside and outside the country . . . is likely to be the starting signal for a period of some of the most frenzied commercial activity the industry has seen for years."

The *Rand Daily Mail* disclosed that: ". . . The initial capital cost of preparatory work on television and the first 17 transmitters in South Africa will be about R 54-million" (currently the Rand stands at 1.95 to the £). "In the first three years the accumulated capital expenditure on a one-channel TV service for White would be R 14-million. The preparatory work for a Non-white service, which will come into operation after the White service, would cost about R 4.5-million . . . "

Less helpful was the comment of our contemporary *Television Mail* in London, England: "There used to be a joke which said that when television came to South Africa the technical standards would be rather odd, because there'd be two channels—one black, one white. It's not a joke any more . . . Make no mistake, South African television will be strictly controlled. There'll be no *I Spy, Laugh-in,* no *Ironside,* no *Mod Squad.* South African television will present the government's point of view in every respect. But such is the

nature of television, such is its voraciousness for material, that inevitably a broader view will find its way on to South African screens . . . So good luck to everyone who goes dashing into the South African market. By helping the sun rise in glorious PAL-colour, they'll have joined the revolution!"

This is so completely at variance with the true situation.

It represents a section of world opinion which could be harmful not only to international electronic companies planning to help launch the SA service, but to international finance houses which could make the whole project very profitable for the United States, for Great Britain and for Western Europe generally.

There are special reasons why colour-TV is going to be a costly project in SA, although Dr. Piet J. Meyer, chairman of SABC (South African Broadcasting Commission) Board of Control, explained to us how by using SABC facilities, particularly the FM networks, the capital burden had been cut by R 8-million.

He explained that one of the factors contributing to the high cost is that on completion of the project the country will have a viewing public (White and Non-White) of only 17 viewers per kilometre^2.

Comparative figures are Britain 217, Western Germany 237, the United States 221, Japan 283, and Portugal 104.

Nor is it only a matter of providing dual channels—'one white, one black.' The origins of the Republic of South Africa are very complex, and now when colour-TV is coming to this vast country it is important to get the social-history straight.

Five years before Columbus sailed the Atlantic and discovered the New World (America), the Portuguese navigator Bartholomew Diaz discovered the southernmost part of Africa. And here, at the Cape of Good Hope, a victualling station for the Dutch East India Company set was set up in 1652. Huguenots (Protestants) came here from religious persecution in France. The origins of the White South African nation go back, therefore, over more than 300 years—to about the same period when the Pilgrim Fathers sailed for America. The only indigenous people with whom the early white settlers came into contact were the nomadic Hottentots and Bushmen. These Bushmen still continue their stone-age existence in remote semi-desert areas. The Hottentots, decimated by smallpox epidemics through the centuries, have mixed with other races and peoples (including the Asiatics) to form the Cape Coloured community of today. *All this is part of colour-TV's problem.*

Communications engineers who for political and other reasons tend to image South Africa as 'right off the map' since she became a sovereign independent republic on May 31, 1961, forget that it is only a 12-hour jet hop to London (17 hours to New York), and that when it comes to sending space capsules to the moon (seven days' return journey), SA's satellite tracking station at Hartbeesthoek is used by the Americans in cooperation with South African scientists.

Now this tracking station will be available for direct reception of colour-casts from the rest of the world.

Video is international. One of SA's problems not fully understood by the outside is the range of population, dialects and languages. Out of the total of some 21.5-million people, the diverse population is thus:-

Whites	3,720,000
Coloureds	2,018,000
Asians	621,000
Xhosa	3,930,000
Zulu	4,026,000
Swazi	498,000
Sepedi	1,604,000
North Ndebele	181,000
South Ndebele	233,000
Tswana	1,719,000
Seshoeshoe	1,451,000
Shangaan	737,000
Venda	359,000
Others	318,000

Thus, while it would be very convenient for the SA government and the SABC if they could cope with TV on a 'one white, one black,' basis, the audio side with so many languages to cover is something which is overlooked outside the Republic.

Where will the capital come from, to provide such a widespread colour-TV service? Dr. Piet Meyer says: "The SABC wants to borrow R 21-million overseas to help it set up television. Discussions with banks and financial institutions in Europe have already been held. Various favourable offers have been received, and are being investigated in conjunction with national education and finance . . ." SABC is also contemplating entering into a revolving credit arrangement abroad for financing the TV service, although at the moment the SA Government does not wish to name any countries in which this revolving credit arrangement would be established. It involves promissory notes guaranteed by the government.

When are we likely to see the first colour transmissions on-air?

Neither the consultants Fischbach & Moore nor Thames Television are allowed to disclose the target dates, but three senior SABC men have been seconded to top TV-programming posts—Pieter de Bruyn, Hennie Human and R. M. Knox-Grant —and planned visit to Great Britain, France, Germany, Holland and Belgium, and according to the schedule to which they appear to be working, South Africa should see its first colour test transmission by Christmas 1973.

Cape Town should be transmitting on a test basis by April 1974, Durban by September 1974 and East London a few months later.

By January 1975, 70% of the country should be on a 'full test' basis.

This, we understand, is not a colour phase-in programme (test cards in colour should be transmitted from next June/July), although this is what the local SA electronic industry wants, to give it time to step up colour-receiver manufacture.

"The SABC has proved unsympathetic," a spokesman told a *Financial Gazette* Press group. "The TV Commission recommended that when the formal switch-on takes place, it should be simultaneous in 17 major urban areas, giving coverage to about 70-75% of the country. They will probably adhere to this, with the State President appearing as the 'first face' on that date."

"The betting is very strong on both sides of the House that it will be before the next General Election, at present scheduled for April, 1975. Forecasts of an early General Election can be dismissed. So it means mid-1974, or just after . . ."

Although we cannot comment on the political pressures affecting colour-TV in the Republic, these cannot be ignored by broadcasting engineers and executives. We have been told by a United Press spokesman: "Television is too powerful a political weapon for a Government facing trouble on other fronts to ignore. For at least six months, possibly a year, it would be the nation's biggest single talking-point. It would take the voters' minds off other immediate problems . . . That's why the timing is so enormously important. The next election, unlike all others, will not be fought on ideological

Pan Am introduce the first-ever First Class dining room

The China Clipper was a Martin M130 with a cruising speed of 130 mph; she was one of three owned by Pan Am. She could seat 32 passengers—only 15 to 20 on long journeys. With a range of 2,400 miles, she was Pan Am's first long-distance aircraft.

In 1936, when 'Gone with the Wind' first hit the bookstalls like a hurricane and William Powell starred in the glassy, glittering 'Great Ziegfeld,' the Pan Am China Clipper flew with the first-ever flying dining room.

Pan Am first served food on board in 1929. In 1935, galleys were installed and the first hot meals served. A dining room came next.

It was small but well appointed, like a lift in the Waldorf Astoria, and it seated fifteen diners very comfortably while still leaving the lone steward room to manoeuvre.

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The 747 travels at 625 mph with a range of 6,700 miles. Unfortunately there cannot be a dining room on board to accommodate all the thirty-eight First Class passengers. Just ten can use the dining room, so far.

Perhaps it should all be one big dining room, but till that day, should you decide that you want to be a pioneer too, please remember to book your table early.

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grounds: it will be on bread-and-butter issues. The introduction of a national lottery would have much the same effect, although on a much smaller scale."

The colour-TV probe really got going on 15th December, 1969, when State President J. J. Fouche requested a commission to 'inquire into matters relating to television.'

On 10th February, 1970, a comprehensive questionnaire was compiled and sent to 125 bodies representing all sectors of public opinion, and all experts and interested groups, inviting them to submit memoranda. At this stage of course it was not decided whether SA should start with a monochrome service, or blossom out directly in colour.

Of these 125, 95 memoranda were considered. These weren't concerned only with PAL, SECAM or NTSC, with 525 or 625 lines, but with the likely effect of *any* television on the heterogenous composition of the population, and the influence it might have on the manpower position, the economy, the Press, the film industry and the entertainment industry.

Under the chairmanship of Dr. Piet Meyer the commission began work, other members being Prof. H. B. Thom, Dr. J. S. Gericke, Dr. P. J. Riekert, Dr. S. M. Naude, Prof. N. Sieberhagen, Prof. O. P. F. Horwood, Dr. P. A. W. Cook, Prof. J. M. Leighton, Bishop R. W. F. Cowdry, Prof. G. J. Beukes, Dr. S. J. Naude, and Dr. J. H. T. Schutte as secretary.

As most nations already having a colour-TV service know, members of the South African Commission visited them, to study programmes and technical requirements. They went to PAL, NTSC and '819' countries.

Dr. Meyer reported: "Although for over a decade the SABC has been making precise and specialised studies of matters related to TV in leading countries, and has been able to place this information at the disposal of the Council of Inquiry, it is nevertheless necessary to coordinate all recent developments in those countries—particularly with regard to satellite, cable, closed-circuit and cassette-TV.

"The chairman of the Control Board" (that is, of the SABC) "who acted as chairman of the Commission, made an extensive tour to Australia, Japan, the United States, Canada, Brazil and the Argentine, where he had discussions with the leading TV experts, particularly with regard to the management, administrative and financial aspects of TV. Dr. Schutte examined recent programme aspects, with particular regard to colour broadcasting.

"The doors of all these broadcasting organizations that the SABC approached for information and advice were thrown wide open to all our representatives . . For our part we ourselves will never hesitate to be as helpful as possible to visitors from abroad . . . "

A confidential report was prepared at last, and on 28th April, 1971, the SA Government told the world that it had accepted part of this report.

As there have been prejudiced and wrongly-informed statements made by other governments and pressure-groups, it highlights the 'hot colour' scene if we quote the SA Government's spokesman, Senator J.P. van der Spuy (Minister of Education at the time). This will emphasise which parts of the report now do form SA's colour-TV plan—and which therefore will concern other nations able to help South Africa get on-air—and will allay fears expressed without any factual foundation that *'It will all be in English,' 'It will all be in Afrikaans,' 'They're cutting out commercials,'* or worse, *'All colour-casts will be subject to censorship, with a religious and racial bias.'*

Now the *exact* wording of the Minister's statement is this: "The Cabinet has approved in principle the introduction of a statutorily-controlled television service for South Africa which

South African Broadcasting Corporation news services, in English, Afrikaans and on Springbok radio will provide a parallel service for the Republic's 625-line PAL transmissions.

would form an integral part of the Republic's broad educational system as a whole. It will be based on a foundation designed to ensure that the Christian values of South Africa and the social structure of its various communities are respected.

"The public is warned not to buy TV sets at this stage, nor to commit themselves to hiring or purchasing receivers at a later stage. Today's most up-to-date sets might be obsolete in a few years' time.

"For various reasons it will be possible to start transmissions only after at least another four years. These reasons include: (1) The demands the service will place on the country's financial resources and manpower potential. (2) Considerable preparatory work that has to be done. (3) Technical and financial aspects that call for closer investigation, and (4) Other more essential projects over which TV does not have priority.

"The service will necessarily have to be introduced in phases, and initially there will be a service of about 37 hours a week on one channel only, in English and Afrikaans, with completely *equal* treatment of these, the two official languages. From the outset the service will be presented in colour which can be received also on compatible black/white receivers. The service will have no sponsored programmes, but only a strictly limited number of approved spot advertisements before and after programmes.

"A technical advisory committee will be set up, consisting of an equal number of representatives from each of the following: The SABC, The Human Sciences Research Council, The South Africa Bureau of Standards, The Armaments Board, The Industrial Development Corporation, and the departments of Commerce, of Industries, and of National Education. The secretarial work will be undertaken by the SABC. The department of Industries is being directed to promote the establishment of a local industry for the further development of an all-embracing electronics industry in collaboration with the Armaments Board."

Here for the first time was the direct hint of a 'local

industry,' reinforcing rumours that the SA Government was banning import of receivers or colour-tubes of sizes being mass-produced in other countries, more specially the Japanese Sony Trinitron colour-tube, now widely used in Great Britain and among US manufacturers of professional colour monitors.

Hottest of the three hot-colour problems in South Africa are these:

(1)Will the government ban import of certain types of colour receiver or professional colour monitoring equipment?

(2)Will there be unreasonable programme censorship?

(3)How many Coloureds and Asiatics will be able to get (or even afford) colour-TV, and is there ever any hope of a second channel for the Bantu service?

Ignoring guesswork, we give the answers from official sources.

(1)*Government control of colour-TV screen sizes, and precautions against foreign set dumping.* Mr. S. L. Muller, Minister of Economic Affairs, says: Both colour and monochrome sets may be imported and used. Specifications for both will be drawn up by the Bureau of Standards, and will be made compulsory. Sets will be standardized in 18 in. and 26 in. screens for colour, and in 10 in. 12 in. and 18 in for monochrome. As for the local industry, the Cabinet states that: 'Local manufacturing of receiving sets on a sound economic basis will be encouraged . . . with due consideration for the advisability to develop the electronics industry simultaneously for other purposes. (Obviously, Defence. — *Ed.*)

There *will* be government control of imported spares, and even of the number of firms allowed to make TV equipment.

Exact official statement is: "The Department of Industries will assist to rationalize the local industry by limiting the number of manufacturers and/or assemblers . . . on the understanding that healthy competition will be maintained. In the first instance, the importation of complete sets can cost the country between R 40 and R 80-million annually. A large variety of makes will then be on the market, which in turn will obviously demand a variety of spares . . . For these reasons it has been decided that the importation of fully-manufactured sets be under strict control . . . "

(2)*Unreasonable censorship?* The Commission's report puts it plainly, although other nations may put other interpretations on the decision: "An SABC-controlled radio and TV service for South Africa should, in the interests of all its people, give direct and unequivocal expression to the established Christian, Western set of norms and values that are valid for South African society in all spheres of life, in order to strengthen and enrich our own religious and spiritual life. Our Broadcasting Act, like the National Education Policy Act No. 39 of 1967 (as amended by the National Education Policy Amendment Act No. 73 of 1969) should therefore provide that all radio and television services shall have a Christian and a broad national character. Only in this way will it be possible to ensure from within that the broadcasting services of our country will be introduced and presented by norm-conscious officials . . . in such a way that the morals and morale of the community will not be undermined, and especially that no programmes harmful to the youth of our country will be presented . . . "

As yet no censorship machinery has been set up, but the SA Government has accepted the opinion that . . ."The broadcasting licence of the SABC should be so adapted as to include television programmes, thereby making it subject to the provision that *the Corporation refrain from broadcasting any news, information or other material which is blasphemous, improper, obscene, offensive or distasteful, or which is liable to cause public unrest or civic disturbance."*

(3)*Programmes for other-than-Whites?* Even the Commission's report did not suggest a *pledge,* only a desire to 'consider.' The exact official statement gives this view: "An SABC-controlled South Africa radio and TV service, bound by Christian and broad national principles and guidelines, in which common loyalty to South Africa finds expression, will obviously be able to function fruitfully only as an inherent part of South Africa's particular socio-cultural structure and conditions.

"This means that separate services for the Afrikaans and English-language cultural communities in their own languages, as well as for all the various Bantu peoples of South Africa in their own languages, will have to be considered, as well as special programmes in Afrikaans and English to meet the cultural needs of our country's Coloured and Asian populations."

That is the 'will-have-to-be-considered' part of the official view. But how will it work out in terms of colour-TV equipment? There is a little-known official summary of the Plan which explains that the Phase One single-channel (37 hours a week) in English and Afrikaans "Should be available in the areas of the Witwatersrand, Pretoria, Rustenburg, Ptchefstroom, Middelburg (Transvaal), Klerksdorp, Bloemfontein, Kroonstad, the Free State Goldfields, Kimberley, Durban, Pietermaritzburg, the Natal South Coast, the Cape Peninsula, the Boland, East London and Port Elizabeth.

"This will mean that the TV service will be available to 75% of the White population, 60% of the Coloured, and 84% of the Asiatic population . . . As soon as possible afterwards, a start must be made with the introduction on a second channel of a Bantu service in Sotho and Zulu in the Witwatersrand area.

"The first phase will be followed as soon as possible by a second phase which will provide for *separate* services for Whites in English and Afrikaans . . . In the second Phase, the Zulu service for the Witwatersrand will be expanded to Durban and a Xhosa service will be introduced in the Eastern Cape. Following this, as it becomes feasible, a start will be made with the gradual expansion of the Bantu services to the bordering homelands."

Cynics may say that phrases such as 'as it becomes feasible' and 'as soon as possible afterwards' don't hold out much hope of these coloured areas getting coloured-TV.

Our impartial investigations for *INTERNATIONAL BROADCAST ENGINEER* led us to probe what the SABC already *does* for Bantu radio listeners. If they are getting a square deal now, things may work out well in time for Bantu coloured-TV. The facts are as follows.

'Radio Bantu' is SABC's radio service for the Bantu peoples. At present they get 592 programme radio hours each week in seven languages—Zulu, Xhosa, Southern Sotho, Northern Sotho, Tswana, Venda and Tsonga. On FM this service reaches 96% of the Bantu population. On completion of the FM network (going ahead with the colour-TV transmitters), this will give 99.5% Bantu coverage.

Of course not all the population have access to a radio, nor even desire this. Of those who do have access, 98% regularly listen.

There is a regular daily audience of 4-million, including 2.9-million adults. Radio Bantu itself has a staff of 250 (more than 200 being Bantu), including 84-multi-lingual announcers. There is of course going to be a parallel problem with colour-TV. Some have said that the Bantu people don't want coloured-TV, nor even radio. Radio Bantu HQ in Johannesburg gets over 6-million letters a year from Bantu listeners. Currently there are 700,000 Bantu school-children listening to the Schools radio service on 4,400 government-provided sets, and much the same should happen with Bantu colour-TV.

Many thousands of readers of this journal are vitally

Radio Bantu disc-jock J. Ntoapane at the turntables—all part of the Specialised Service giving 592 radio hours weekly, soon to be supplemented with Colour-TV.

interested in the South African colour-TV plan because of the international business to be done in colour advertising on film and videotape.

As the money needed for the service is to come (so the Government has been advised) from an annual licence fee of R 21 per set, from spot commercials, from the sales duty on TV receivers and from excise and import duties, there may not be the commercial boom some film and video tape men were expecting.

The facts, unpleasant reading though they make, are as recommended to the Government, and these are:

(1) Spot commercials will be at start and end of programmes, and not in the middle of programmes—"so as to interrupt them." There has as yet been no SA Government definition of a Commercial Break.

(2) There will be no advertising at all on Sundays. Advertising time will not exceed 10% of the total transmission time on the six week days.

(3) Advertising preference should be given to products (and to advertising copy) produced locally.

(4) Grouping of advertising time according to a rotation or other system, to ensure presentation of programmes of outstanding quality, particularly at peak times, and that they will be completely free from 'any pressure that listener and viewer ratings may have on advertising schedules and advertising tariffs.'

Perhaps outside the scope of *INTERNATIONAL BROADCAST ENGINEER* as a technical journal, but nevertheless of paramount interest to production companies and others producing colour-TV commercial material, was the Commission's recommendation to the SA Government that: "Negotiations should be entered into with the Association of Accredited Practitioners in Advertising (Pty) Ltd. for a reduced advertising commission on spot advertisements, since these advertisements will be very limited . . . "

Finally what sort of employment opportunities will there be in SA colour-TV?

Dr. Piet Meyer's team says that "The SABC will need about 1,000 persons to launch the first phase of the TV service" (at present the Corporation employs some 3,400 to work the national, Bantu and 'Voice of South Africa' transmissions).

"Since television will be a new industry in South Africa, by and large it will not be necessary to recruit trained and experienced persons from other industries. *It might be possible to attract a considerable number of South Africans at present employed in the television industry abroad back to South Africa . . .*

"Training on a large scale will be necessary for the technical staff. It will also be necessary to bring a limited number of specialists in different fields to South Africa to advise the SABC on details of the equipment . . . Some could be employed on a full-time basis, but their number would be very small in comparison with the total number of staff."

SA colour-TV may offer capital-equipment opportunities, with the consent of the American consultants Fischbach & Moore. It may offer a new market for electronic equipment in the CKD (completely-knocked-down) form for assembly in the Republic. It could offer a new but censored market for colour film and video programme and commercial material. But the Establishment in Johannesburg has no intention of offering permanent plum technical executive posts to any *other* than South Africans.

Be warned. They say: "A prerequisite for proper control over the nature and quality of the programmes is, *inter-alia,* that such control should be exercised by responsible, expert officials.

"That is why it is considered essential that the officials who will be directly concerned with programmes should be recruited in South Africa as far as possible, from among South African citizens."

The most complete line of AM, FM, and Audio products ... from Gates

Producer recording mixer. Professional-quality audio mixer designed to fill the void for production recording, dubbing, editing and monitoring equipment. 12 inputs to four mixing channels.

Gates turntables. Complete 12" and 16" transcription turntables and systems built for continuous 24-hour service, meeting the requirements for faithful reproduction of modern stereophonic recording.

Criterion 80. All solid state. Direct capstan drive comparable to the finest reel-to-reel machines. Speed accuracy of 0.2%. With 1, 2, or 3 tone signals for automatic equipment.

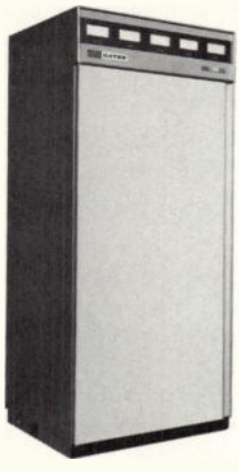
Gatesway 80. 8-channel monaural console; 18 inputs. Frequency response ±1.0 dB, 20 Hz to 20 kHz. Ideal for the typical AM/FM or TV station that broadcasts stereophonic programs exclusively. 100% transistorized.

Stereo Statesman console. 5-channel, solid state stereo audio console. 9 stereo, 2 mono inputs. Response 20 to 20,000 Hz ± 1 dB. Complete stereo monitoring facilities. All channels are full stereo.

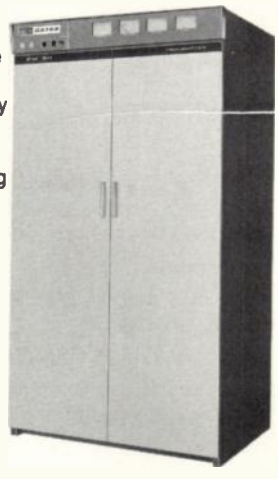
AM peak limiter. Peak limiting without clipping. Features include: 3-5 microsecond attack time; 30:1 compression ratio; allows 99.5% negative modulation without overmodulation. Completely solid state.

10 and 50 watt FM transmitters. Gates has consistently offered the most complete line of low-power, wide-band FM transmitters . . . especially designed for educational broadcasting.

BC-1H, 1,000 watt medium wave transmitter. Features reliable, long life 833A tubes, solid state oscillator, instantaneous power cutback, 120% positive peak modulation capability.



FM-5H3, 5,000 watt FM transmitter. Gates has the most complete line of FM transmitters in the industry from 10 to 40,000 watts. All with 100%, solid state 10 watt exciters employing DCFM and digital automatic frequency control.



BC-10H, 10,000 watt AM transmitter. Solid state. Only 5 tubes. Lowest tube cost. Power amplifier efficiency approaching 90%. Dependable ceramic type 3CX2500F3 triodes employed in modulator and PA stages.

For more information, write Gates Division, Harris-Intertype Corporation.

HARRIS INTERTYPE CORPORATION

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A DIVISION OF HARRIS-INTERTYPE

Quincy, Illinois 62301, U.S.A.

The Link Electronics Type 103 Camera in use. This Camera, which is for monochrome studio and outside broadcasting, has brought Link Electronics over £75,000 worth of orders since its launching just 4 months ago, of the orders, £50,000 worth are for export.

£75,000 OF ORDERS FOR NEW T.V. CAMERA IN 4 MONTHS

£50,000 worth of Exports

Within just four months of launching their new monochrome studio and outside broadcast television camera, Link Electronics Ltd., of Andover, Great Britain, have taken orders worth over £75,000.

Of a total of 28 Type 103 cameras, in seven separate orders, 19 are due for export. Five export orders worth over £50,000 have been taken from many parts of the world. Some of the cameras have already been delivered, and the rest will be despatched shortly.

NRK, the Norwegian Broadcasting Corporation are using two of the cameras to provide studio and mobile coverage of news and local events from the Arctic Circle. Based at Tromso in the Northern reaches of Norway, the mobile unit will be able to record news items using the Link cameras with helical scan VTR machines. The items will be used for subsequent transmission on the local transmitter or for direct injection into the corporation's microwave-link network thus saving the time previously lost by flying film back to the nearest main studio centre.

Seven cameras have been delivered to Canada. Four of the cameras are to be used by two mobile educational television units belonging to the New York and Niagara Colleges in Canada. Three further cameras are for use by Scarborough Cable, a television cable company who produce their own programmes. A further order has also been received by Link Electronics for four more cameras to be used for educational television in Canada.

Two cameras have also gone to Saudi Arabia for broadcast use, whilst an order has been placed for a further 5 cameras also for the Middle East.

In the U.K. two universities are to have Link's Type 103 cameras. Three of the cameras will be used in a mobile unit being prepared by Studio 99 Video Ltd. for the University of London, where three more of Link's cameras will be used.

Finally, the University of Liverpool have ordered two of the cameras for use in a new mobile television unit.

The Link Electronics Type 103 monochrome studio and outside broadcast camera has been designed to use Plumbicon or Vidicon type 25mm or 35mm pick-up tubes. Incorporating an integral zoom lens, the camera has all the facilities expected of a broadcast camera, including a tilting viewfinder and talkback facilities. The extensive use of integrated circuits produces a compact, well balanced and extremely lightweight camera.

ADVANCED TELEVISION MOBILE

Link Electronics Ltd., of Andover, Hants, England will be showing an advanced television mobile vehicle at Inter Navex 72, the Audio Visual Aids Conference and Exhibition held at Olympia, London, from July 25th to 28th.

The mobile has been specially prepared for professional educational recording applications.

According to John Tanner, Managing Director of Link Electronics, the vehicle is built with modern educationalists in mind. "No longer are educationalists happy with cheap, low quality television systems," says Mr. Tanner. "Nowadays, they require high quality systems which will enable them to produce first class, professional recordings."

Bringing together all the latest television techniques into one compact vehicle, Link are hoping that their vehicle will satisfy the needs of the most demanding educationalists.

The vehicle has been built by Dell Coachbuilders, who are specialists in this field. It uses three of Link Electronics' Type 103 Cameras which are specially designed for monochrome studio and outside broadcast use. In addition, the vehicle contains six quality television monitors supplied by Prowest Electronics and a mixing system from Michael Cox Electronics.

AEL BROADBAND AMPLIFIER

American Electronic Laboratories, Inc. (AEL), Washington Division, (Springfield, Va.), announces its PAM-300 Series Amplifier which meets the need for a broadband, high-dynamic range solid state amplifier covering the entire 30-to-300 MHz VHF band.

The PAM-300 Series Amplifier is particularly useful for telemetry, ECM, monopulse, communications receiver applications, as well as in multicouplers and other frequency-distribution systems.

Because of its low-noise, high-gain, and excellent intermodulation/spurious products performance, the PAM-300 Series Amplifier is ideal for use in critical surveillance systems.

The PAM-300 features a 5.5–dB noise figure and an output of up to +10 dBm at 1–dB compression. Gain is 24

NEWS

AEL Broadband Amplifier

dB while gain variation is only ± 0.5 dB. For two −20 dBm input signals, the second-order intermodulation products are −40 dB and the third-order intermodulation products are −65 dB. The amplifier's form factor is ideal for service in low-profile equipment such as 1−3/4 inch relay rack modules.

Designed to mate with either TNC or BNC connectors, the PAM-300 Series Amplifier features a 1.7:1 input VSWR and a 1.3:1 output VSWR. It requires a power supply of 160 mA @ −24 V dc. The PAM-300 operates at temperatures from 0°C to +55°C while providing a reliability of 250,000 hours MTBF at 55°C. Including connectors and mounting flange, the unit measures 1-3/8 X 1-3/4 X 6 inches.

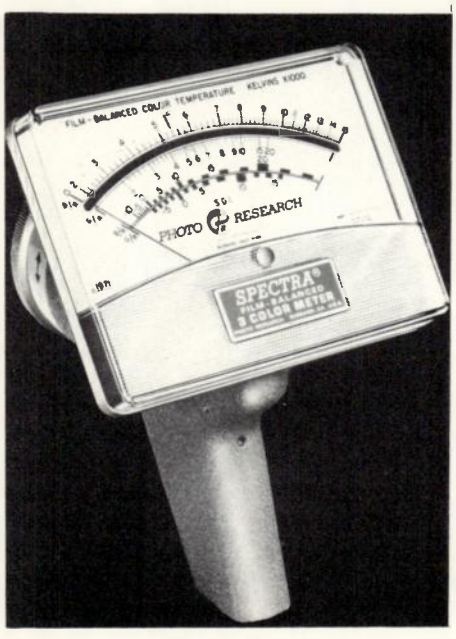


Photo Research was acclaimed a 'star' in the field of photometric instrumentation when it received a Scientific and Technical Award for its SPECTRA® Film-Lens Balanced 3-Color Meter at the 44th Annual Academy Awards Presentation.

As presented to James Branch, president of Photo Research, by noted actor McDonald Carey, the Academy Citation reads, "To Photo Research for the development and introduction of the film-lens balanced Three Color Meter. This meter has a spectral sensitivity which is precisely matched to that of a typical color negative and predicts exposure color balance of any light source."

The new SPECTRA® meter designed for high quality color reproduction from such light sources as dichroic filtered incandescent lamps, xenon arcs, fluorescent lamps and other common sources of cine illumination. A clearly marked dial provides direct readout of both colour temperature and required filter correction.

NEWS

FRENCH STUDIO BUYS NEVE

Societe Francaise du Son, a member of the Decca (Europe) group of sound recording studios, have placed an order with Rupert Neve and Co. Ltd., Great Britain, for a new 30 channel, 16 track console for their Paris studios. Among the facilities which will make this console the most modern and flexible in France, are a 24 track monitor system to allow recording and reduction of 24 track types and the most comprehensive equalisation yet produced. The console is so designed that quadraphonic recording can be undertaken by the simple addition of four plug-in modules.

Export orders already completed by Neve this year account for 48% of output and 65% of the outstanding orders are destined for overseas.

SEARCH-AND-REPEAT SCAN FACILITY FOR NEW 3M RECORDER

The Mincom model 120 recorder/reproducer from 3M is a high quality quarter-inch four-track machine with an optional search-and-repeat scan system and vernier speed control. It accepts any combination of FM and direct electronics modules.

In addition to the basic speeds of 15, 7½, 3¾, 1⅞ and ⅞ips, selected by means of a rotary switch, options are available for continuously variable forward search from 2 to 60 ips, vernier control of −30% to +50% on basic speeds, and the repetitive scanning of tape segments up to 10 seconds in duration.

In the analogue mode, the lower band edge is 50 Hz at all speeds and the upper band 64Hz at 15ips with automatic selection of equalization. The FM bandwidth at 15ips is DC to 5KHz on a 27KHz carrier with octave scaling on the lower speeds. Demodulators accept plug-in filters for any two tape speeds.

All transport modes are electrically interlocked; the stop function operates on the dynamic principle, while fail-safe mechanical brakes come into operation in the event of power failure, tape breakage or tape run-out.

There is a wide range of optional extras, including foot control pedal, remote conttrol and multiple outlet monitoring on 600 ohm headphones. The instrument will accept tape reels up to 10½in in diameter.

INTERNATIONAL ORDERS FOR RCA

TV broadcasters in the United Kingdom, Australia, Mexico and Venezuela have placed the first orders from outside the U.S. for RCA's new TCR-100, an automated system for reproducing short TV programme segments from video tape cartridges.

Nineteen of the S155,00 colour systems are in regular on-air use by TV stations in the U.S. and another 80 are on order from RCA's Camden, N.J. plant, according to Joseph P. Ulasewicz, Division Vice President, International Operations, RCA Communications Systems Division.

The purchases were made by Colour Television Consultants, Yorkshire Television and London Weekend Television in the U.K., Austerama Television in Australia; TV Independiente de Mexico S.A., and by Corporacion Venezolana de Television S.A. (Venevision) in Venezuela.

Mr. Ulasewicz noted that the TCR-100 is the first broadcast system in the worldwide TV industry to apply the cartridge handling technique to video tape and the company regards it as a major step toward the automation of TV station technical facilities. RCA began domestic shipments last year.

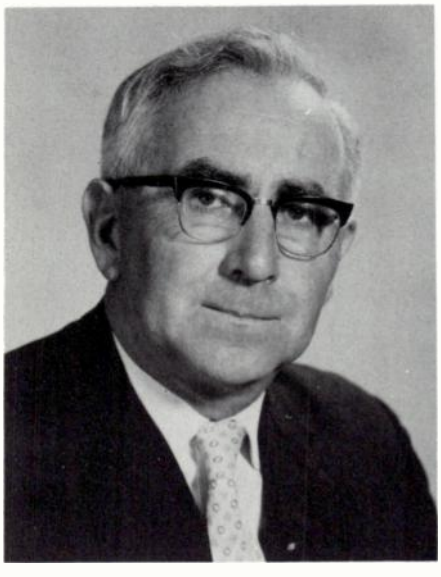
The cartridge system is being used by broadcasters to streamline TV station operation, particularly during the "panic period" station break when standard procedure calls for originating a number of short programme segments from several equipment sources. The RCA system, which has recording as well as playback capability, handles the full station break at the touch of a start button.

In operation, the TCR-100 is controlled by a miniature special purpose computer and plays back a sequence of pre-recorded video tape cartridges at the touch of a button. Its magazine holds 22 cartridges, each containing up to three minutes playing time.

NEWS

DISTINCTIONS FOR POST OFFICE DIRECTORS

Two top men from Post Office Telecommunications whose work has helped to shape the way the world communicates—and will communicate in the future—have been awarded important academic and scientific distinctions.



Mr. W.J. Bray
Director of Research Post Office Telecommunications

Mr. J.S. Whyte
Director of Operational Programming Post Office Telecommunications

Mr. William John Bray, Director of Research, has been appointed a visiting Professor in the Department of Electronic and Electrical Engineering, University College, London, England.

Mr. John Whyte, Director of the Operational Programming Department of Post Office Telecommunications is appointed a Vice-President of the Royal Institution, learned scientific society of which Michael Faraday—whose work in electromagnetism last century was an essential stepping stone to the development of the telephone—was a director.

Both men have made important contributions to modern telecommunication, Mr. Bray as a pioneer of inland Microwave Systems and intercontinental communication by satellite—now used on a global scale—and Mr. Whyte as a leading figure in the establishment of digital communications (using a type of computer 'language' to transmit telephone conversations). Digital transmission is becoming increasingly important with the mushrooming growth in demand for a network able to handle an ever-increasing volume of computer data.

NEW SUBMARINE CABLE

An 1800—channel submarine cable is to be laid between Israel and Italy and the $40 million cost will be shared equally by the two countries. In addition, Israel is to have a one-third share in a 3000—channel cable between France and Italy which will cost $15 million. The joint project will become operational in 1975.

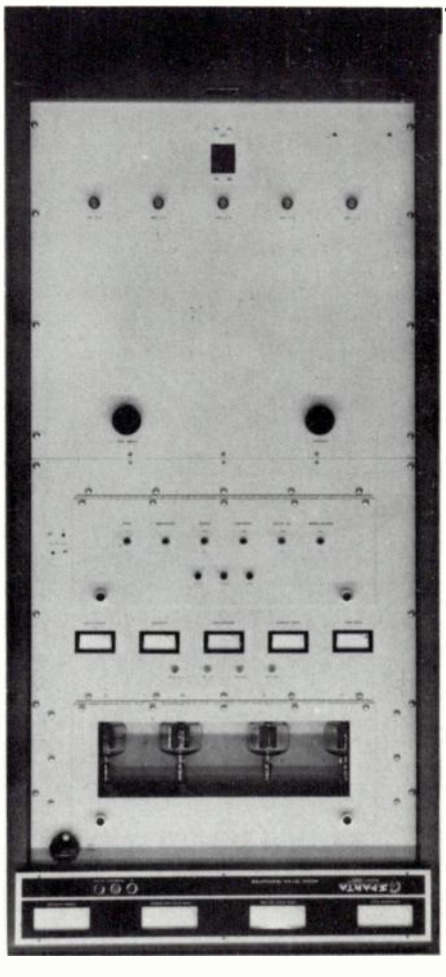
Israel's present telecommunications link with the outside world is via a 128-channel cable laid in 1968, and twenty radio channels. A satellite ground station is being built near Jerusalem and will be in operation by the end of the summer. All its 500 channels will be operating by 1975. The satellite station also has direct lines for telex, telegraph, computer and television hookups.

MODEL 701 1Kw AM Transmitter

SPARTA ELECTRONIC CORPORATION has developed a new 1Kw AM Transmitter. The new design has improvements in three major areas over the extremely successful, now discontinued early model 707. The greatest difference lies in the power tubes. The Model 701 1Kw AM is the only broadcast transmitter to use the new EIMAC Tetrode, the 4-500A. By adding the larger tubes to the basic Fritz Bauer designed 707, the new 701 will deliver easier full power operation, better asymetrical modulation, and will require less maintenance.

Other major improvements represented in the 701 include a bigger cooling system and a solid state dual oscillator. The larger blower, which is the same type used in SPARTA's 4Kw transmitters, increases air circulation tremendously allowing greater operating efficiency and longer component life. The solid state dual oscillator incorporated in the new 701 is also an addition to the entire AM transmitter line.

The 701 is offered in any two power levels, the most common being 1000/500 and 1000/250 watts. Nuisance outages are eliminated by a built-in device that resets the overload relays when only single, short overloads occur. ▲



NEWS

NEWS

Top executives from the Turkish Radio and TV Administration were in Chelmsford last week to look at television equipment at GEC—Marconi's Waterhouse Lane establishment.

The Turkish Radio and Television organisation recently placed an order with Marconi Communication Systems Limited for seventeen Mark V camera channels and associated equipment, which they will use in a big new expansion programme for their service.

Seen in the photograph examining the Mark V black-and-white camera in the Marconi studio are Mr. Muhtar Korkcu, head of Programme Planning (left), and Mr. Dogan Erden, Assistant Director General of the Turkish Organisation. Showing them the camera is Mr. J. Swain (right) of Marconi's Broadcasting Division.

NEW POWER PACK

A reliable low-cost lightweight high-energy Portable DC Power Pack, Model 800NC, by Frezzolini Electronics Inc. in Hawthorne, New Jersey, U.S.A.

It features a reliable nickel-cadmium battery and a built-in charger, accurate, colour-coded DC voltmeter and indicator lights for "operation" and "charge". It is fully automatic; the battery is protected during charge/discharge periods.

Frezzolini Model 800NC was designed for powering all professional portable light heads or running any 28-volt DC motion picture camera motor. It will supply 250 watts at 30 volts DC for 30 minutes before recharging. Weight: 10 pounds, size 5 5/8 inches wide, 9½ inches high, 3 inches deep.

AEI PRESENTS THE COMMUNICATIONS SYSTEM CALCULATOR

A new communications system calculator, designed by American Electronic Laboratories, Inc., provides a simplified slide rule for the systems engineer to determine fundamental relationships between transmitter power, antenna gain and frequency and receiver parameters.

The new AEL calculator design was announced by George Pekar, General Manager of AEL's Washington division in Springfield, Va.

The following independent variables are incorporated in the AEL rule: transmitting frequency, receiver bandwidth, receiver input noise figure, receiver input signal to noise ratio, receiver input, transmitter power output, path loss, total antenna gain, total path distance, and horizontal ray altitude.

NEW CAMERA

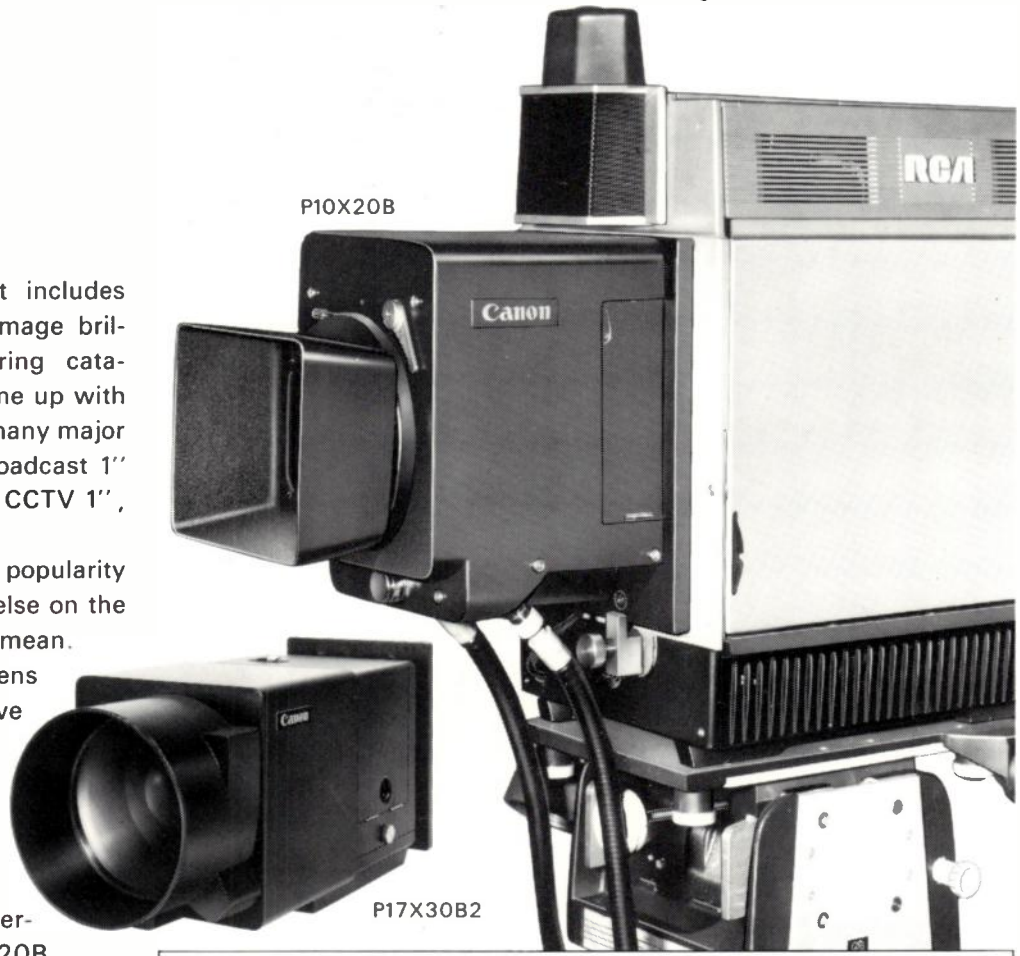
A new lightweight (12½ pounds-ready-to-roll) professional 16mm TV newsfilm ▶ sound/cordless motion picture camera, Model LW-1, is manufactured by FREZZOLINI ELECTRONICS INC. in Hawthorne, New Jersey, U.S.A.

It features a genuine famous Bach Auricon movement and a crystal-controlled DC "Frezzi-Cordless" internal camera drive system. The camera is perfectly balanced for hand-held shooting without brace. It can be used with either single or double-system sound.

The camera is supplied with Angenieux 12-120mm zoom lens and V-30 one-inch finder with TV reticle. A "Frezzi-Power-Control-Handle" is optional. Frezzolini Model Lw-1 Camera may be purchased separately or as part of a *Special TV Newsfilm Package* complete with a choice of camera accessories, amplifiers, portable "Frezzi-Lites", and customized carrying case.

The camera itself is perfectly accurate to dead sync for 1200 feet of 16mm. Running time is 2 hours or twelve 400-foot magazines per charge from quick-change 12-volt plug-in internal battery. It can also be run from external portable battery, car battery through lighter socket, or from battery charger/converter connected to AC power lines. The camera can roll during charging period. ▼

Shopping for lenses? Compare Canon!



Draw up a checklist that includes price, specifications and image brilliance, then start comparing catalogues. You'll probably come up with the Canon answer, like so many major camera producers—for broadcast 1" or 1 1/4" PLUMBICON® or CCTV 1", 2/3" vidicon.

Stack these two Canon popularity favorites against anything else on the market and see what we mean. The Canon TV Zoom Lens P17X30B2 has an impressive 1:2.5 relative aperture at focal length range (440-500mm), in spite of its 17X zoom ratio. At 30—440mm it's a remarkable 1:2.2, offering the same performance as our P10X20B, specially designed for maximum versatility with three different range extenders.

Both are ideal for a variety of situation, including dim lighting and open areas like field events.

Here are some other examples of the wide Canon line:

Manual				
	Name	Range of Focal Length	Zoom Ratio	Maximum Relative Aperture
1¼"PLUMBICON	P17 x 30B2	30—500mm	1 : 17	F 2.2
	P10 x 20	20—200mm	1 : 10	F 2.2
1" PLUMBICON	PV17 x 24B	24—400mm	1 : 17	F 1.8
	PV10 x 16	16—160mm	1 : 10	F 1.6
	PV10 x 15B	15—150mm	1 : 10	F 2.0
1" Vidicon	V10 x 15	15—150mm	1 : 10	F 2.8
	V6 x 16	16.9— 95mm	1 : 6	F 2.0
	V5 x 20	20—100mm	1 : 5	F 2.5
	V4 x 25	25—100mm	1 : 4	F 1.8
⅔" Vidicon	J10 x 13	13—130mm	1 : 10	F 2.8
	J 6 x 13	13— 76mm	1 : 6	F 1.9
	J 5 x 15	15— 75mm	1 : 5	F 2.1
	J 4 x 12	12.5— 50mm	1 : 4	F 1.8
Servorized/Motorized				
	Name	Range of Focal Length	Zoom Ratio	Maximum Relative Aperture
1¼"PLUMBICON	P10 x 20B4	20—200mm	1 : 10	F 2.2
1" Vidicon	V10 x 15R (DC)	15—150mm	1 : 10	F 2.8
	V6 x 16R (AC/DC)	16.9—95mm	1 : 6	F 2.0
	V4 x 25R (AC/DC,EE)	25—100mm	1 : 4	F 2.5

® N.V. Philips of Holland

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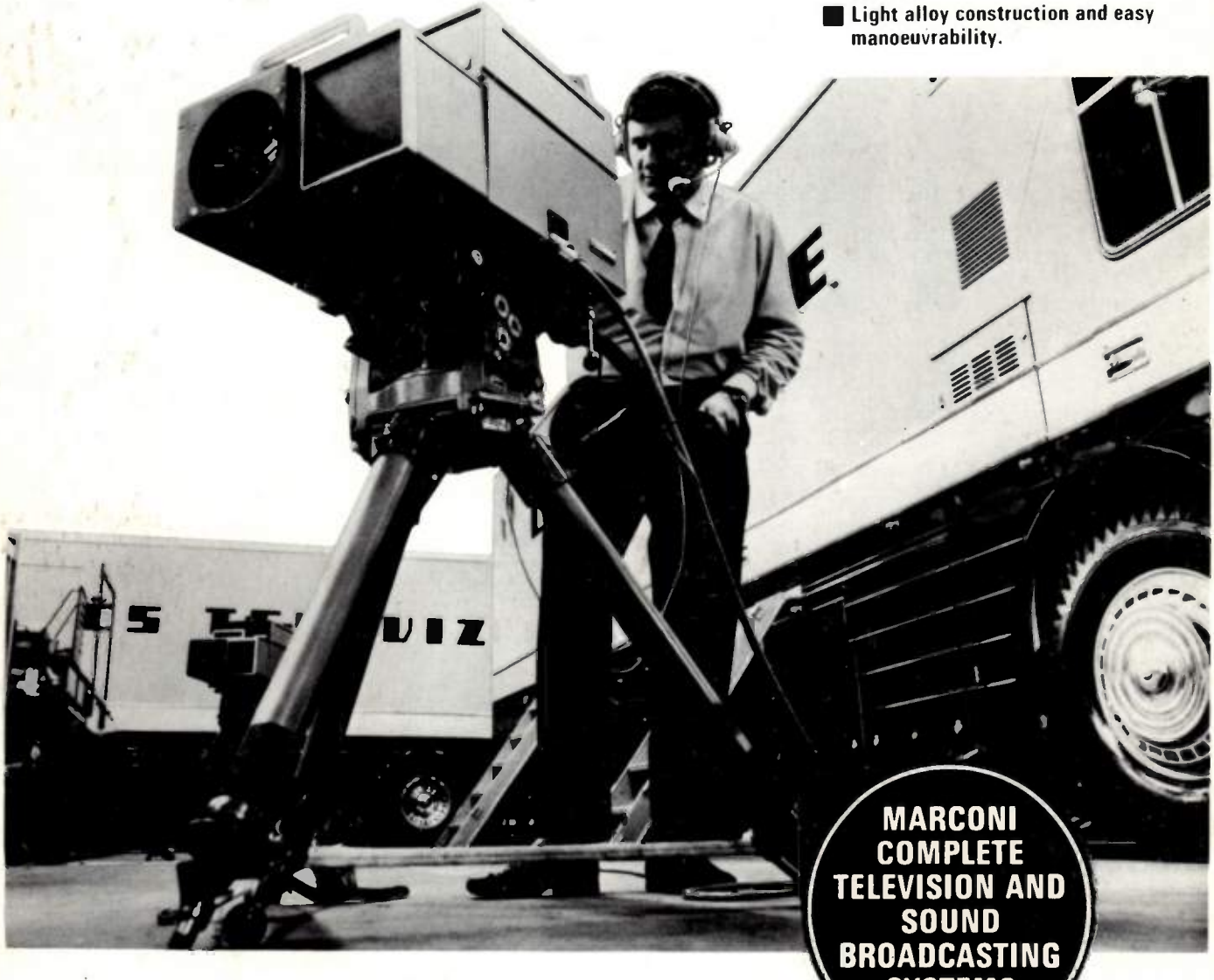
Canon

Marconi Outside Broadcast Units

Marconi has more than 20 years' experience in the design and development of OB units, and has exported them to 30 countries, where they are operating in sub-arctic and torrid climates and in mountainous and desert terrains.

- Complete mobile multicamera control rooms for complex outside broadcasts or simple 2-camera units.
- Standard designs or custom designs for particular requirements.
- Colour or black-and-white operations.
- Compact, lightweight, automatic Mark VIII colour camera perfect for OB use.
- Air-conditioned vehicles with particular attention to operators' comfort.
- Light alloy construction and easy manoeuvrability.



MARCONI COMPLETE TELEVISION AND SOUND BROADCASTING SYSTEMS

Marconi Communication Systems Limited
Broadcasting Division, Chelmsford, Essex, England
A GEC-Marconi Electronics Company

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