

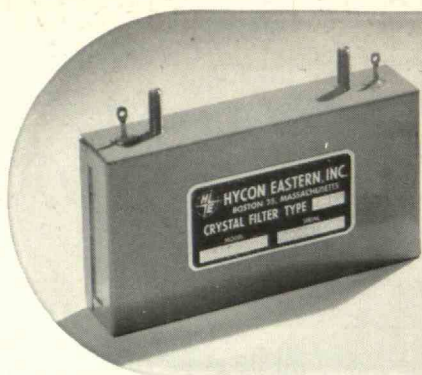
TECHNOLOGY

REVIEW

April 1956



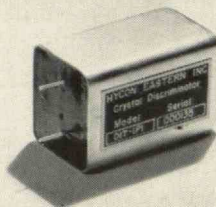
CRYSTAL FILTERS



Crystal Filter
Type 44F



Crystal Discriminator
Type WB



for FM Reception by HYCON EASTERN

Through the use of Piezoelectric resonators, filters are now available with extremely high selectivity at frequencies which eliminate the need for multiple conversions in VHF and UHF f-m receivers. The low insertion loss, linear transfer characteristic and non-microphonic quality of these filters permit their location at any point of low signal level such as between the mixer and the i-f amplifier. Using the Hycon Eastern Crystal Discriminator, Type WB, in combination with Crystal Filter Type 44F completely eliminates the need for any lower intermediate frequency. These filters can be produced on short notice in large or small quantities to meet *exact* performance requirements.

Write for Crystal Filter Bulletin

- **SMALL SIZE**
- **HIGH SELECTIVITY**
- **LOW INSERTION LOSS**
- **OPERATING TEMPERATURE: $-55^{\circ}\text{C. TO } +85^{\circ}\text{C.}$**
- **EXTREME STABILITY WITH VARIATIONS IN TEMPERATURE. FREQUENCY SHIFT LESS THAN $\pm 0.005\%$ TOTAL FROM $-55^{\circ}\text{C. TO } +85^{\circ}\text{C.}$**
- **NON-MICROPHONIC**
- **UNAFFECTED BY IMPEDANCE VARIATIONS COMMONLY ENCOUNTERED IN TRANSISTOR CIRCUITS**
- **WORKS DIRECTLY TUBE-TO-TUBE OR TRANSISTOR-TO-TRANSISTOR WITH NO PADDING**
- **HERMETICALLY SEALED, NO ALIGNMENT OR READJUSTMENT NECESSARY**
- **VIBRATION AND SHOCK PER MIL-E-5422**

ELECTRICAL SPECIFICATIONS

Center Frequency 13 Mc (Available 10-20 Mc)
Bandwidth at 6 db Attenuation: 30 Kc (Available with 20-50 Kc Bandwidth)

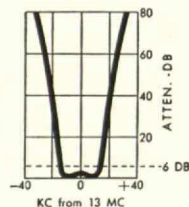
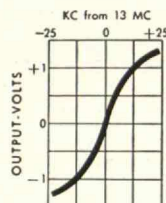
Shape Factor: $\frac{60 \text{ db Bandwidth}}{6 \text{ db Bandwidth}} = \frac{1.7}{1}$ Maximum

Power Insertion Loss: 6db Maximum

Passband Response Variation: ± 1 db Maximum

Ultimate Attenuation: 80 db Minimum

Center Frequency Shift: ± 1 Kc

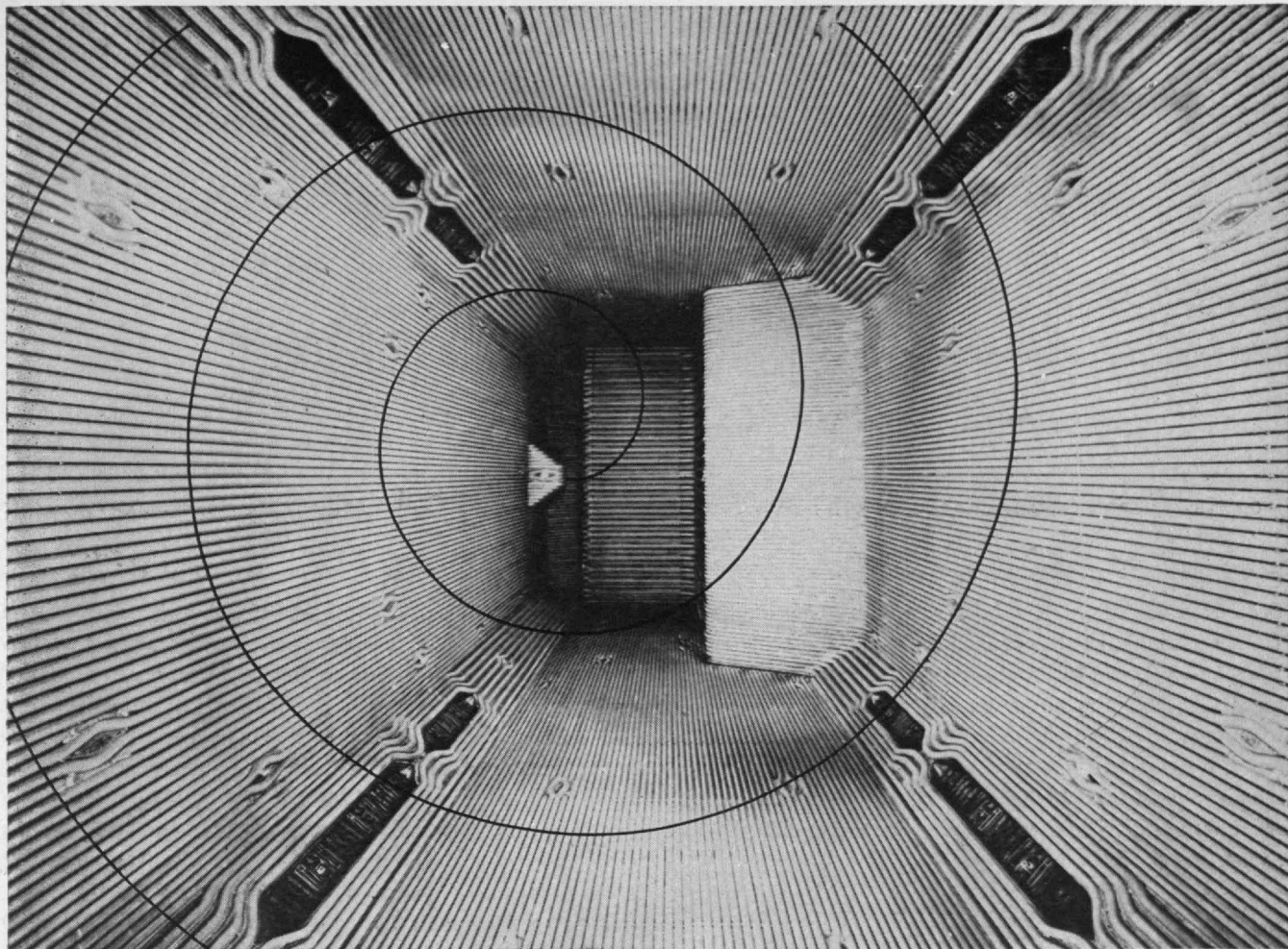


We invite your inquiry for any Crystal Filter application in the 10 KC to 20 MC Range

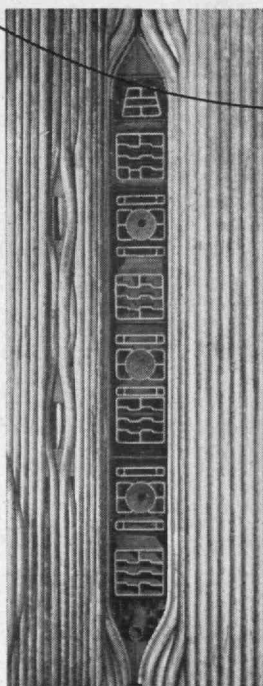


HYCON EASTERN, INC.
COMMUNICATION FILTER DIVISION

1360 Soldiers Field Road Dept. H-4 Boston 35, Massachusetts
Affiliated with HYCON MFG. COMPANY, Pasadena, California



Looking up inside one of two C-E Boilers at Piacenza Power Station of Italian Edison Company



Corner of furnace showing one of four C-E Tilting Burners (Type TV) for firing pulverized coal, oil or gas, separately or in combination.



COMBUSTION ENGINEERING

Combustion Engineering Building
200 Madison Avenue, New York 16, N. Y.

The camera sees an *Inferno*

That's right! The tiny white spot you see in the center of the picture is a water-cooled window through which a television camera has a bird's eye view of the eight-story-high inferno raging in this C-E Utility Boiler.

A screen in the control room of the power station shows the operator what the camera sees, giving him invaluable information on flame conditions, combustion stability, etc.

For drama in a boiler, there's no better show "on camera" than that put on by those remarkable performers—one in each of the four corners of the furnace—aptly named TV Burners. For these Tangential Vertically adjustable burners—exclusive development of Combustion Engineering—create a literal *cyclone of flame*. The four flame streams—blasting into each other with tremendous impact—result in thorough mixing of fuel and air in the shortest possible time; thus effecting rapid and complete combustion, whether the fuel is pulverized coal, oil or gas.

Furthermore, this inferno moves up and down automatically to maintain the uniform steam temperature so important to peak turbine performance.

While the C-E "TV" Burner is "on stage" only in large power stations, it typifies the many major advances in fuel burning and steam generation pioneered by Combustion. These advances mean top performance in *any* boiler, large or small, that bears the Combustion nameplate.

B-811

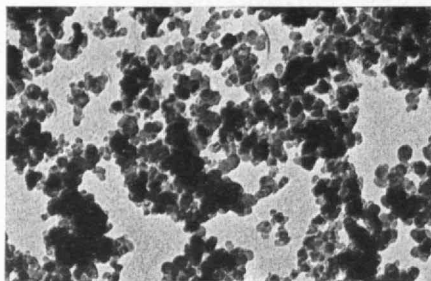
BOILERS, FUEL BURNING & RELATED EQUIPMENT; PULVERIZERS, AIR SEPARATORS AND FLASH DRYING SYSTEMS; PRESSURE VESSELS; AUTOMATIC WATER HEATERS; SOIL PIPE

THE TECHNOLOGY REVIEW, April, 1956, Vol. LVIII, No. 6. Published monthly from November to July inclusive at Emmett Street, Bristol, Conn. Publication date: twenty-seventh of the month preceding date of issue. Annual subscription \$4.00; Canadian and Foreign subscriptions, \$4.50. Entered as second-class matter December 23, 1949, at the Post Office, at Bristol, Conn., under the Act of March 3, 1879.

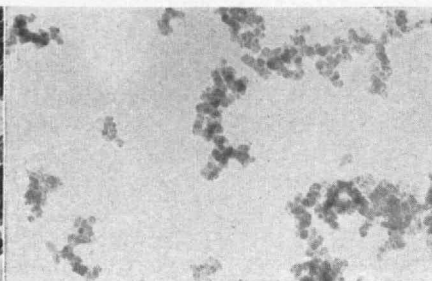
And NOW... **CABOT Cab-o-sil®**

The **SAF** of the Silica Pigments

Electron Micrograph
of Vulcan 9 (SAF)
Carbon Black at 50,000 X



Electron Micrograph of
Cab-o-sil Colloidal Silica
at 50,000 X



1 micron

Cab-o-sil®, with a finer particle size (0.015-0.020 micron) than even the finest of rubber reinforcing carbon blacks (0.023 micron), has been called the SAF—Super Abrasion Furnace—pigment of the silica field. Cab-o-sil, unique in many respects, is manufactured by a flame process similar to that used for the highly reinforcing (SAF) carbon blacks, and not by an aqueous precipitation process. Fine particle size, with exceptionally high external surface area, results in remarkable stiffening of uncured stocks. Cab-o-sil's remarkable properties include

High Chemical Purity

Extremely Fine Particle Size

Enormous External Surface Area

Unusual Optical Properties

Clean White Color

Startling improvements in rubber—not possible with precipitated silicas, silica gels and aerogels—are realized with the use of only small quantities of Cab-o-sil. Improvements include

Outstanding Tensile Strength

High Elongation

Excellent Tear Resistance

Exceptional Hardness at Low Loadings

Minimum Cold Flow of Uncured Stocks

Good Dielectric Properties

Low Water and Moisture Absorption

TESTED and USED in

Butyl Rubber . . . 5-15 parts of Cab-o-sil per 100 parts of rubber improve the electrical, weather aging and mechanical properties. Due to the low water adsorption of Cab-o-sil, resistance to change of electrical properties after long periods of immersion is especially good. Low loadings can minimize cold flow while helping the extrudability of the stock.

GR-S . . . Light colored compounds containing 5-10 parts of Cab-o-sil and 100 parts of clay per 100 parts of rubber give excellent abrasion and tear resistance.

Neoprene Latex . . . 5-10 parts of Cab-o-sil per 100 parts of rubber substantially increase tensile and tear strength and abrasion resistance in neoprene latices. Dipping operations are more efficient due to reduced drainage time and increased stability of the filled latex. Dispersions of Cab-o-sil in neoprene latices used for dipping operations result in superior tear resistance, higher abrasion resistance and, by reducing drainage, permit the deposition of thicker films.

CHEMICAL and PHYSICAL PROPERTIES

Silica Content (Moisture-Free Basis)	99.0 - 99.7%
Free Moisture (105°C.)	0.2 - 2.0%
Ignition Loss (1000°C.)	0.2 - 1.0%
CaO, MgO	0.00%
Fe ₂ O ₃	0.004%
Particle Size Range	0.015 - 0.020 micron
Surface Area (Nitrogen Adsorption)	175 - 200 m. ² /gm.
Specific Gravity	2.1
Color	White
Refractive Index	1.55
pH (10% Aqueous Dispersion)	4.5 - 6.0
Apparent Bulk Density (Compressed Grade)	6.0 - 6.5 lbs./cu. ft.

Cab-o-sil is available in commercial quantities. Send now for a free sample and the bulletins describing Cab-o-sil applications.



WHITE PIGMENTS DIVISION TR

GODFREY L. CABOT, INC. 77 FRANKLIN ST., BOSTON 10, MASS.

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- ☐ Aqueous Dispersions of Cab-o-sil (#cmis-2)
- ☐ General Properties, Functions and Uses (#cgen-1)
- ☐ Cab-o-sil in Plastics (#cpla-2)

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Power is Combustion's business, whether the heat source be conventional or nuclear fuels. For nearly three-quarters of a century, C-E has been designing and manufacturing equipment for the generation of steam to produce power. A decade ago, it moved naturally into the nuclear power field. And now, with the new facilities under construction and completed at its Chattanooga plant—and the soon-to-be-completed Center at Windsor—Combustion is uniquely qualified for a leading role in the atomic power industry.

Combustion is the third major contractor selected by AEC to design and build a Naval nuclear propulsion system—and will be the first company in the country to complete such a contract using its own facilities. It is also designing and manufacturing a large portion of the reactor vessels and steam generators for electric utility and Naval nuclear power plants.

At Combustion's Nuclear Center in Windsor, only 8 miles from Hartford, you will find CAREERS—not jobs—and the opportunity for advanced education at nearby graduate schools under Combustion's tuition reimbursement plan. Moreover, you can establish your home in a delightful countryside providing every facility for pleasant living. Relocation assistance is, of course, provided.

B-908

Must be U. S. Citizen. Replies held in strict confidence. Submit complete resume.

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REACTOR DEVELOPMENT DIVISION

Room 1021, Port Authority Bldg., 111 Eighth Ave., New York, N.Y.

Phone: MUrray Hill 9-4600, Ext. 720

THE TABULAR VIEW

Science and the Educated Man.—No nation on earth, including the U.S.S.R., depends more completely upon science and technology to foster its economic and social system than does the United States. But, in the last few decades, increased dependence upon science has been accompanied by a marked deterioration of American public education in the hard core of scientific subjects. For example, *Scientific Personnel Resources*, issued by the National Science Foundation, reminds us that, between 1922 and 1949, the fraction of high school students studying physics dropped from 8.9 to 5.4 per cent; those taking algebra decreased from 40.2 to 26.8 per cent; and enrollment in geometry fell from 22.7 to 12.8 per cent. In "Science and the Educated Man" (page 285) JULIUS A. STRATTON, '23, Vice-president and Provost of M.I.T., reminds us that we can hardly hope to understand ourselves or our way of life if, as a nation, we remain ignorant of science. Dr. Stratton's message was originally delivered in New York on February 2 on the occasion of the 25th anniversary of the founding of the American Institute of Physics. Dr. Stratton (S.B., 1923; S.M., 1926; Sc.D., 1927) is the M.I.T. officer most directly concerned with the Institute's educational program. For this reason The Review is particularly happy to carry the Provost's message which disarms the highly vocal apologists for rigorous intellectual discipline and turns tables on the Caspar Milquetoasts of modern pedagogy.

Salt of the Earth.—HARRY W. VON LOESECKE, whose articles on "Food of our Colonial Forefathers" and "Dollars from Wastes" appeared in the May, 1955, and February, 1956, issues, respectively, pens "Salt of the Earth" (page 289) for this issue of The Review. Mr. von Loesecke is a graduate of Harvard University, and has been research chemist for a number of large manufacturing concerns.

(Concluded on page 274)



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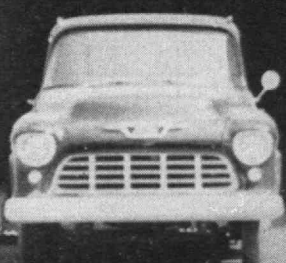
INDUSTRIAL CONSTRUCTION

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BELLE CHASSE TUNNEL



ELECTRICAL CONTRACTOR: Walter J. Barnes Electric Co., New Orleans, La. ENGINEERS: Palmer & Baker, Inc., Mobile, Alabama

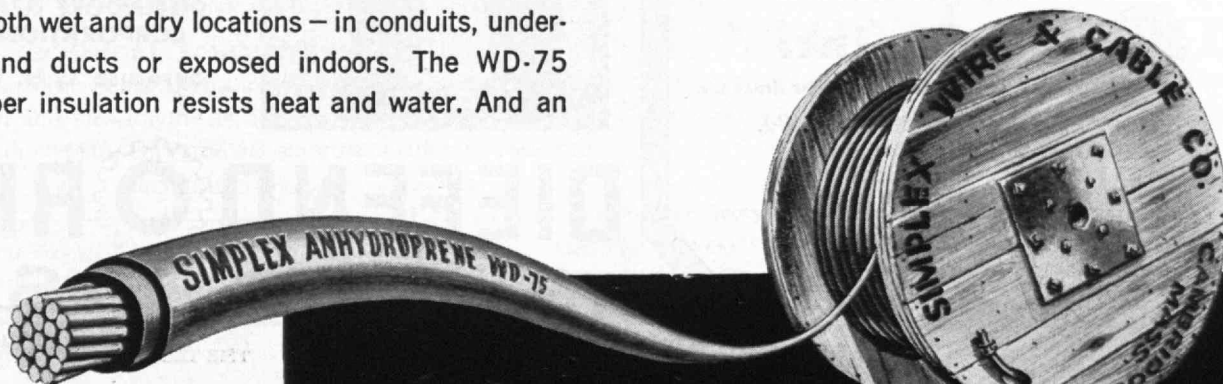
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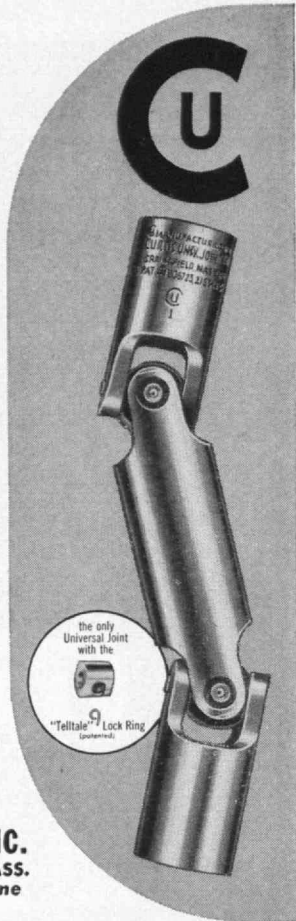
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THE TABULAR VIEW

(Concluded from page 272)

Engineering and Scientific Education. — "Unless the number of our scientists and engineers increases at an accelerated rate, our economy will be in serious trouble for lack of technological nourishment, because our pool of graduate engineers is the source from which arise nearly all our technological advances." Such, in brief, is the essence of the article "Engineering and Scientific Education" (page 291) by REAR ADMIRAL H. G. RICKOVER, as condensed from a luncheon address sponsored by the Thomas Alva Edison Foundation, in East Orange, November 22, 1955. A graduate of the U.S. Naval Academy in 1922, Admiral Rickover is chief of Naval Reactors Branch, Division of Reactor Development of the U.S. Atomic Energy Commission, and assistant chief of the Bureau of Ships for Nuclear Propulsion.

Freedom and Probability. — Perpetual advance is the natural objective of life, and this will be most rapid if each individual has freedom to pursue his own bent, thereby providing greatest diversity. This message is contained in "Freedom and Probability" (page 293) by H. B. PHILLIPS, Professor of Mathematics, Emeritus, and occasional — but always welcome — contributor to The Review. Professor Phillips retired as Head of the M.I.T. Department of Mathematics in 1947.

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Specifications

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— Memorial Gate, University of Pennsylvania

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50 TECHNICAL SCHOLARSHIPS are also available in specific fields of study. They cover the student's tuition and fees for the senior year. In addition, to assist graduate students and to support academic research.

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Styroflex has these outstanding advantages:

Can be installed and operated at temperatures down to *minus* 100 degrees Fahrenheit.

Electrical characteristics remain constant, regardless of years of service.

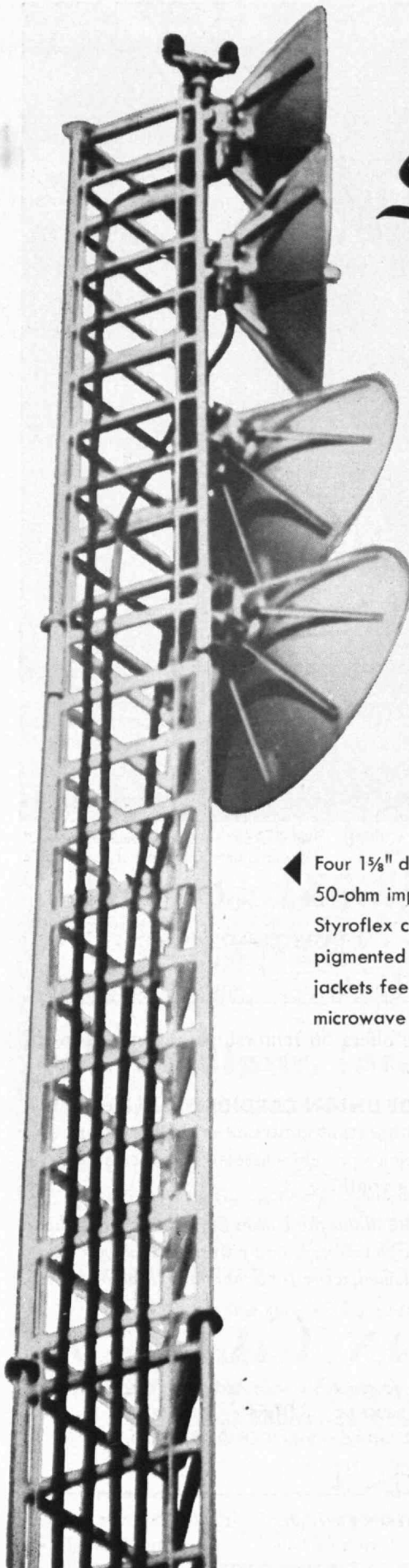
Low attenuation and low VSWR.

Designed and manufactured with instrument-like precision.

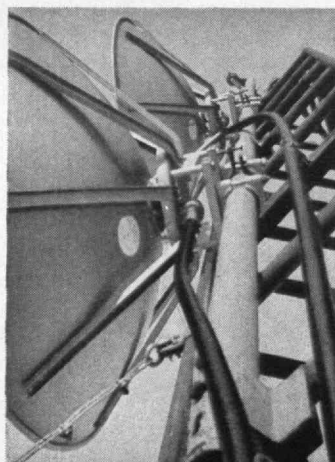
Unusually strong mechanical characteristics.

No joints or couplings necessary—continuous length from transmitter to antenna.

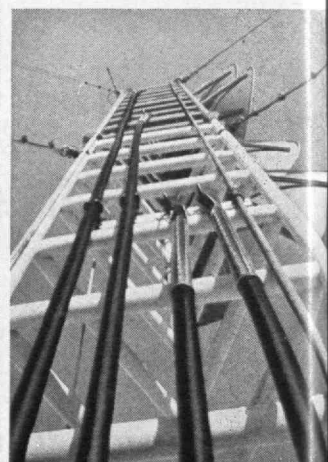
Ideal for remoting video circuits for both television and radar.



◀ Four 1½" diameter, 50-ohm impedance Styroflex cables with pigmented polyethylene jackets feed Alaskan microwave system.



Semi-flexible qualities of Styroflex make direct connections to parabolic antennas very simple.



Kellems Grips are used to provide positive support for Styroflex cables on tower.