EDITOR'S PROFILE of this issue

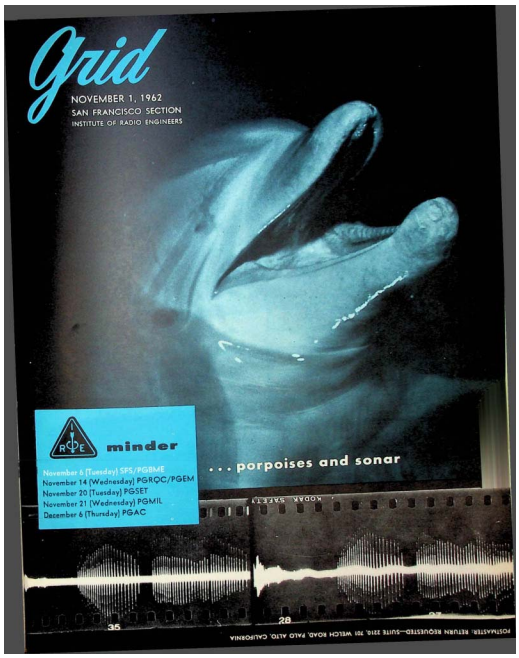
from a historical perspective …

with Paul Wesling, SF Bay Area Council GRID editor (2004-2014)

November, 1962:

Cover: The dolphin and its sonar pings are shown. Research on this phenomenon is covered in one of the meetings (page 7).

Page 7: Stanford's Ronald Bracewell gives a formula that computes cost (in dollars) as a function of radio-telescope size and the wavelength of interest. He then outlines how to make an equivalent "virtual" telescope from a series of spaced smaller units.



Archive of available SF Bay Area GRID Magazines is at this location:
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At time of scanning, the bound volumes are held by Paul Wesling. July, 2021 Contact p.wesling@ieee.org

Grid

NOVEMBER 1, 1962
SAN FRANCISCO SECTION
INSTITUTE OF RADIO ENGINEERS

minder

November 6 (Tuesday) SFS/PGBME
November 14 (Wednesday) PGRQC/PGEM
November 20 (Tuesday) PGSET
November 21 (Wednesday) PGMIL
December 6 (Thursday) PGAC

. . . porpoises and sonar

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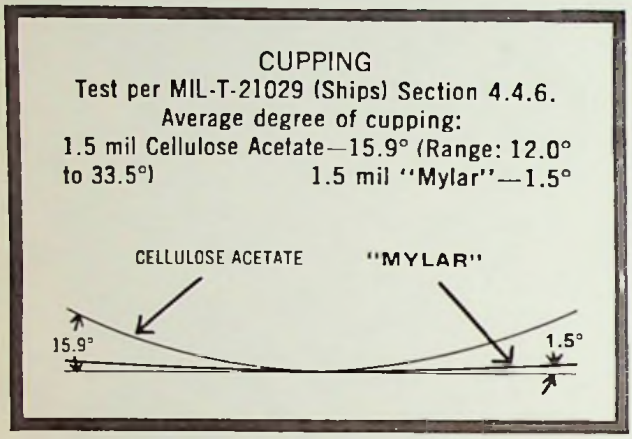

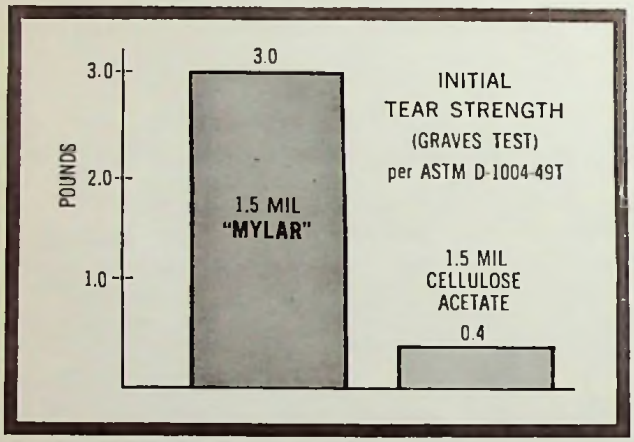

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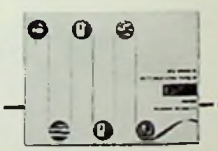

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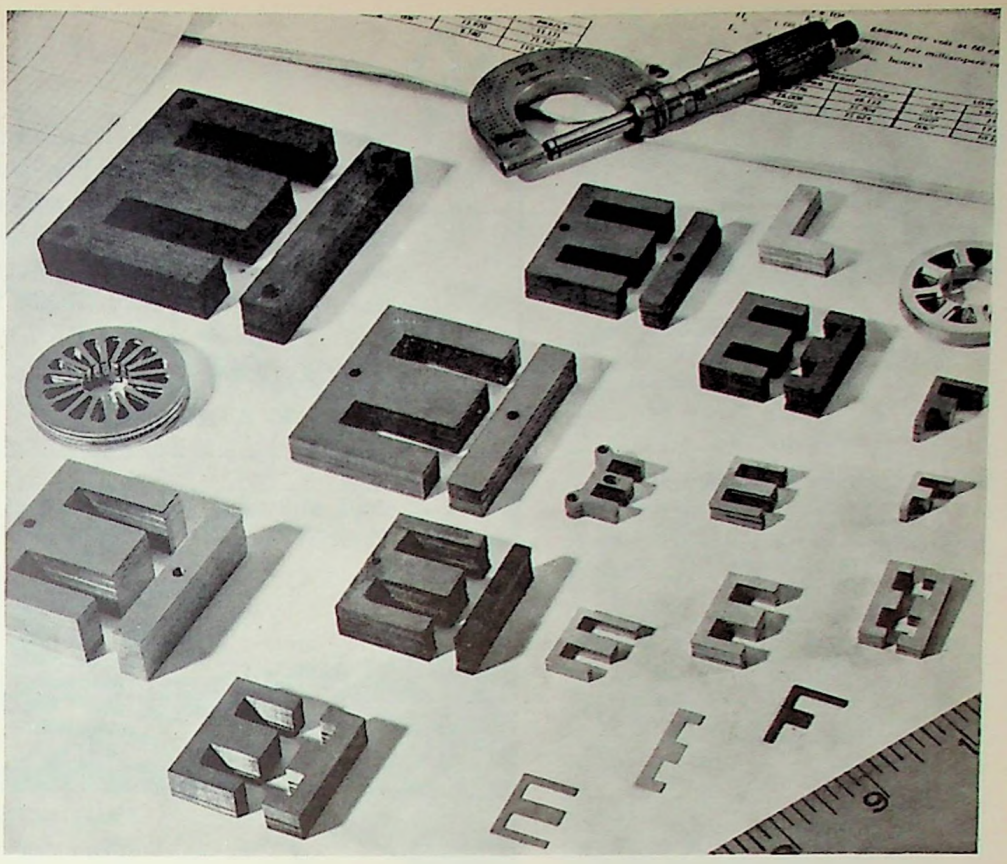

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contents

cover

Below the bottlenose dolphin are oscilloscopic films of the sound-pings it sends and receives.

Long fabled in poetry and literature, the graceful and friendly dolphin, or porpoise, has recently become an important tool in marine and biophysical research and will be the subject of the November 6 meeting jointly presented by the section and PGBME. For full details, see the meeting calendar and the story on page 7.

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MEETING CALENDAR

SAN FRANCISCO SECTION

8:00 P.M. • Tuesday, November 6

"Porpoises and Sonar"
(Joint meeting with PGBME)
Speaker: Dr. Winthrop N. Kellogg, professor of experimental psychology, Florida State University, visiting consultant at SRI
Place: Main conference room, Stanford Research Institute, Menlo Park
Dinner: 6:00 P.M., Ramor Oaks, 3435 El Camino Real, Atherton
Reservations: Mrs. Doris Gould, Section Office, DA 1-1332

PROFESSIONAL GROUPS

Automatic Control

8:00 P.M. • Thursday, December 6

"Drag-Free Satellites, an Application of Contractor Control in Rotating Reference Frames"
Speaker: Ben O. Lange, graduate study engineer/scientist, Lockheed Missiles and Space Division, Palo Alto
Place: Electrical Engineering 126, Stanford University, Stanford
Dinner: Time and place to be announced
Reservations: Mrs. Pauline Eckman, DA 1-3300, Ext. 268

Bio-Medical Electronics

8:00 P.M. • Tuesday, November 6

(Joint meeting with San Francisco Section, see above)

Engineering Management

Wednesday, November 14

(Joint meeting with PGRQC, see below)

Military Electronics

8:00 P.M. • Wednesday, November 21

"Satellite Control and Communications Systems"
30-minute Movie, "Horizons Unlimited"
Speaker: Robert Vader, manager of control and communications systems at Lockheed Missiles and Space Company
Place: Lockheed Auditorium, Bldg. 202, 3251 Hanover Street, Palo Alto
Dinner: 6:30 P.M., Red Shack, 4085 El Camino Way, Palo Alto
Reservations: General Victor Conrad's office, DA 6-4000, Ext. 2212

Reliability and Quality Control

7:00 P.M. • Wednesday, November 14

(Joint meeting with PGEM)
"Management Controls for Reliability on the Minute Man Program"
Speaker: L. L. Schneider, Space Technology Laboratories Associate Reliability for Minute Man
Dinner-Meeting: 7:00 P.M., Dinah's Shack, Burgundy Room, 4269 El Camino Real, Palo Alto. $3.50, tax and tip included
Reservations: Mrs. Doris Gould, Section Office, DA 1-1332

Space Electronics & Telemetry

8:15 P.M. • Tuesday, November 20

"Listening in on the Universe"
Speaker: Charles L. Seeger, acting director, Stanford Radio Astronomy Institute
Place: Lockheed Auditorium, Bldg. 202, 3251 Hanover Street, Palo Alto
Dinner: 6:30 P.M., Red Shack, 4085 El Camino Way, Palo Alto
Reservations: Tom Linders, RE 9-4321, Ext. 28394

remarks from the chairs

AN OPPORTUNITY FOR THE PGBME

Today the PGBME has the challenging opportunity to bring together and serve the rapidly expanding interdisciplinary effort of physical and life scientists to use the knowledge and techniques of each other's fields for their common benefit.

A satisfactory name for this broad area is lacking, but various subareas have been given names such as biophysics, bioengineering, medical electronics, bionics, sensory communication, medical engineering, space biology, and many more. The professional societies, in both organization and function, follow the disciplines created in college for teaching and degree purposes. The increase of interdisciplinary research creates a need for professional societies that can serve such activities at the working level and supplement the annual joint meetings and the international conferences.

The IRE membership consists of scientists and engineers representing a wide variety of talents and disciplines. Their abilities range from the highly theoretical and conceptual to the ability to implement realizations of these concepts with a variety of systems, components, and techniques. The role of the PGBME should be to provide the common meeting place and forum for the research scientist from the life sciences to meet and consult with the diverse talents available within the IRE. Experience has shown that this can uncover and stimulate mutual interests that will lead to joint research goals and efforts. Ideally, this can promote the integrated interdisciplinary teams needed to stimulate, formulate, and plan the research efforts needed to attack many of the problems confronting mankind today.

At the section meeting for November 6, "Porpoises and Sonar," Dr. Winthrop Kellogg will describe an interdisciplinary experiment in which the techniques used and the results obtained are of interest to scientists and engineers of diverse interests.

KENNETH GARDINER
CHAIRMAN, PGBME
SAN FRANCISCO CHAPTER

Winthrop N. Kellogg

meeting ahead

BOTTLENOSED MARVELS

The ancient Greeks suspected that the porpoise, or dolphin, had a keen sense of hearing, and it was well known that it made sounds in water. Winthrop N. Kellogg, speaker at the joint SFS/PGBME meeting on November 6, first realized in 1951 that the true function of these abilities had not been gauged, and it occurred to him that the porpoise might be using its own echo-ranging system to perceive the nature of its environment.

For ten years the speaker and other researchers investigated the elaborate method of "seeing with ears" used by the porpoise, a method that antedates—by millenniums—and surpasses man's electronic sonar achievement. This playful and intelligent animal is now being studied to see what tricks it can teach the Navy concerning acoustical analysis, to improve sonar gear on ships and submarines.

Dr. Kellogg is responsible for major advances in this field. He was able to discover how the porpoise—whose brain is in many respects more complex than man's—sends out beaming noises, detects distant objects even at night, avoids obstacles, and selects the food it wants by listening to the echoes from fishes' bodies.

The speaker is professor of experimental psychology at Florida State University, Tallahassee, a visiting consultant at SRI, and a past member of the Oceanographic Institute. He has also taught at Columbia University, Indiana University, and the University of Southern California. His work has been supported by the Civil Aeronautics Authority, the Office of Naval Research, the National Institute of Health, and the National Science Foundation. He is the author of "Porpoises and Sonar" (University of Chicago Press), "The Ape and the Child" (1933), and contributor to "Methods in Psychology" (1948) and "Readings in Learning" (1953). His talk will be illustrated with slides.

meeting review

RADIO TELESCOPING THE FUTURE

Nearly fifty attended the first meeting of the year jointly sponsored by the section and a professional group, when Dr. Ronald N. Bracewell, Stanford University, previewed the future of large radio telescopes, October 2 in the Philco auditorium, under joint SFS/PGAP sponsorship. Attended by a majority of section officers and many members of other PG's, the meeting augured well for the future of the new section-wide series.

In order for the field of radio astronomy to accomplish foreseeable research tasks, the United States needs to commence the design and construction of a radio telescope having resolution of one minute of arc at wavelengths such as 21 cm (natural line radiation of the universe), Professor Bracewell said. This requires dimensions on the order of 3000 feet. The single large parabolic dish approach is not necessarily the best approach, this fact being underscored by the recent cancellation of the 600-foot-diameter dish at Sugar Grove, Virginia.

- Cost is proportional to steel, which in turn is proportional to diameter cubed plus other factors such as wind and inconvenience during construction caused by height.
- An empirical formula has been deduced, accurate to a factor of 3:

$$\text{US } \$ = \frac{D^{3/2}}{\lambda}$$

where D equals dish diameter in meters and λ equals minimum operating wavelength in meters.

- Even simple scaling is not adequate. For example, a 36" I-beam 3000 feet in length cannot be picked up by its center without folding into a limp hairpin shape.
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Current opinion holds the 300-foot diameter is the foreseeable dish-size limit.

(Continued on page 8)

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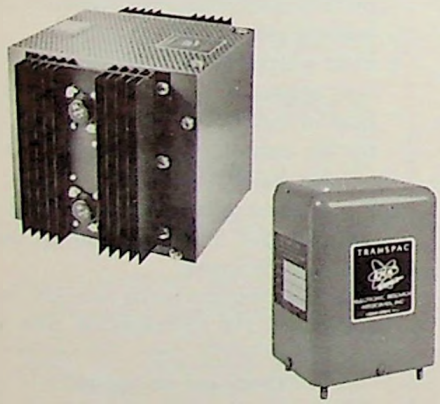

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- Funding can be extended over many years, facing one fiscal year at a time. If funding cannot be arranged, this should be regarded as a technical failure of the design.
- The antenna can be used while it is under construction to hold the interest of competent scientists.

Examples Shown

Examples were shown of several radio astronomy installations in operation or in development that make use of this design. In the United States, the largest radio telescope (defined as an instrument that has been used for radio astronomy) is still only 90 feet in diameter. The discussion of the 600-foot and 140-foot dishes has served to hold back attempts to exceed the 90-foot mark elsewhere in the United States. The contrast between radio astronomy today in the United States and outside the United States is disheartening indeed.

- The 250-foot Jodrell Bank telescope has been producing results in the form of a flood of competent scientific journal articles for five years now. Note also the contrast between two large dishes on which design commenced in 1955: one now operating in Australia with 210-foot diameter (originally discussed at 260 feet) and one incomplete but scheduled for 140 feet.
- The professional radio astronomers are financed at foreign institutions in groups of 25 or so. In the United States, it is difficult to hold more than one good radio astronomer per location (possibly this is so at universities because radio astronomy falls between physics and electrical engineering, is not supported

(Continued on page 10)

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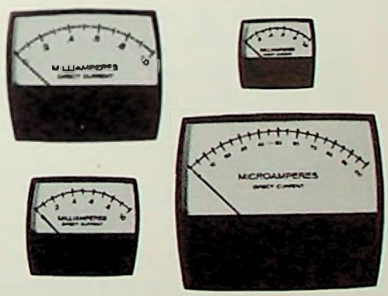

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PAPERS CALLS

Dec. 1: Three copies of the paper, including one set of reproducible illustrations and a photograph and biography of each author, should be submitted for a special issue of the "Proceedings" on new energy sources for publication during the spring of 1963 on the following: (a) thermoelectricity; (b) plasma physics (plasma diode and MHD generators); (c) photovoltaic conversion; (d) fuel cell; and (e) new approaches to power production. A brief description or suggested titles of possible contributions should be submitted to: W. H. Clingman, editor, IRE New Energy Sources Issue, Texas Instruments, Inc., P.O. Box 5474, Dallas, Texas.

Dec. 15: 800-word abstracts for either 10- or 20-minute presentations at the Fourth Symposium on Engineering Aspects of Magnetohydrodynamics, University of California, April 10-11. Authors of 20-minute papers should submit reproducible copies of their paper by Feb. 20, 1963, for preprinting, not to exceed 4000 words. Ten-minute papers may consist of brief reports on research currently in progress, selection in this category to be based on 200-word abstract due Jan. 15. No preprints required for 10-minute papers. Abstracts should be submitted to the program chairman: Dr. G. Sargent Janes, Avco-Everett Research Lab., 2385 Revere Beach Parkway, Everett 49, Mass.

Jan. 24: Complete papers for the Third PICA Conf. to be held Apr. 24-26, 1963, in Phoenix, Ariz. A title and a 150-200-word abstract, as soon as possible, to: G. W. Stagg, prog. chm., American Electric Power Service Corp., 2 Broadway, New York 8, N.Y.

MORE REVIEW

by either, yet does not stand as a department by itself).

The shortage of United States support for radio astronomy science has seriously curtailed discovery, permitting foreign groups with amassed brain-power to forge ahead with "string and sealing-wax" radio telescope systems. The super-dish does not seem the correct approach.

ROLPH B. DYCE

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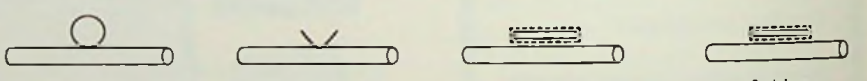
Palo Alto, California

GUDELACE® **FACT SHEET**

Why Doesn't Gudelace Lacing Tape Cut Thru?

Take a round piece of lacing cord and tie it! When you pull, you create a cutting edge on the side touching the cord. The tighter you pull, the sharper the cutting edge!

Gudelace is different! When you pull flat braided Gudelace, it spreads, creating a broader surface touching the wires. With Gudelace, the stress is distributed evenly over the full width of the tape. The special microcrystalline wax in Gudelace acts as a "cushion" or buffer between the insulation and the tape. This wax is soft—it gives under pull. Thus, this wax cushion always remains between the insulation and the lacing tape itself. *Gudelace doesn't cut thru!*



Round Cord touching wires | Round Cord after pulling | Gudelace touching wire | Gudelace after pulling

Write for free samples of Gudelace and our Technical Products Data Book which explains why Gudelace and other Gudebrod lacing materials offer real economy and better profits for you!

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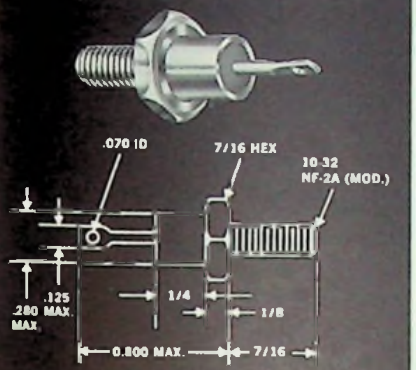

- 10 WATTS DISSIPATION UP TO 75°C CASE TEMP.
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- LOW THERMAL COEF. (%/°C)
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TYPE	NOMINAL VOLTAGE E_z (Volts) @ I_{zt}	CURRENT TEST I_{zt} (Ma)	DYNAMIC IMPEDANCE Z_{zt} @ I_{zt} (ohms) MAX. PER EIA	DYNAMIC IMPEDANCE Z_{zt} @ I_{zt} (ohms) TYPICAL FOR DIODES, INC.
1N3015	200	12	300	250
1N3014	180	14	280	230
1N3012	160	16	200	180
1N3011	150	17	175	135
1N3009	130	19	100	70
1N3008	120	20	75	50
1N3007	110	23	55	35
1N3005	100	25	40	30
1N3004	91	28	35	25
1N3003	82	30	25	19
1N3002	75	33	22	15
1N3001	68	37	18	12
1N3000	62	40	17	11
1N2999	56	45	16	9.0
1N2997	51	50	15	8.0
1N2995	47	55	14	7.0
1N2993	43	60	12	6.0
1N2992	39	65	11	5.5
1N2991	36	70	10	5.0
1N2990	33	75	8	4.5
1N2989	30	85	8	4.0
1N2988	27	95	7	3.4
1N2986	24	105	5	2.8
1N2985	22	115	5	2.6
1N2984	20	125	4	2.4
1N2983	18	140	4	2.2
1N2980	16	155	4	2.0
1N2979	15	170	3	1.8
1N2977	13	190	3	1.8
1N2976	12	210	3	1.7
1N2975	11	230	3	1.6
1N2974	10	250	3	1.4
1N2973	9.1	275	2	1.0
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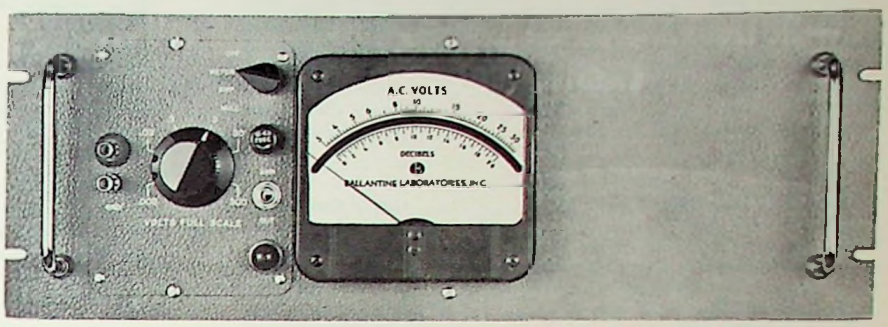

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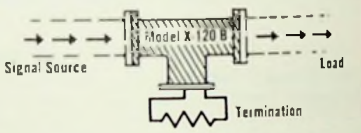

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The new Type 82 Unit has 2 input channels, 4 operating modes, and calibrated step attenuation, continuously variable between steps. Independent controls for each channel allow individual attenuation, positioning, inversion, and ac or dc coupling as desired.

Two supplied small-size low capacitance probes provide high input-impedance characteristics.

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Dual-trace display of 100 Mc sine waves at 10 nsec/cm. Phase difference is approximately 55 degrees. Phase comparison and similar measurements are possible with the stable high-frequency triggering system of the Type 585.

Dual-trace display of input and output pulses of a transistor amplifier at 10 nsec/cm. Lower trace delayed 1 nsec by the amplifier under observation. Note time resolution. The Type 585 Oscilloscope—with 82 Unit—can display time coincidence between input channels with no measurable difference at 10 nsec/cm.

TYPE 585/82 FEATURES

PASSBAND—typically dc-to-85 Mc at 3-db down, dc-to-120 Mc at 6-db down, dc-to-160 Mc at 12-db down.

SENSITIVITY—8 calibrated steps from 100 mv/cm to 20 v/cm, 1-2-5 sequence, continuously variable uncalibrated from 100 mv/cm to 40 v/cm. The dc-coupled 10X Amplifier extends calibrated range to 10 mv/cm to 2 v/cm, 1-2-5 sequence, continuously variable uncalibrated from 10 mv/cm to 4 v/cm.

RISETIME—(of oscilloscope, plug-in unit, supplied probe) at overall sensitivity of 1 v/cm is approximately 5 nsec.

SWEEP RANGE—24 calibrated rates from 50 nsec/cm to 2 sec/cm, 1-2-5 sequence, continuously variable uncalibrated from 50 nsec/cm to 5 sec/cm. 5X Magnifier extends calibrated range to 10 nsec/cm.

SWEEP-DELAY RANGE—continuously variable from 2 μsec to over 10 sec.

TRIGGERING—dc to beyond 100 Mc.

PROBES—increase input R to 10 megohms and decrease input C to approximately 7 pf.

Type 585 (without plug-in) $1725
Type 82 Dual-Trace Unit . . . . . $ 650
(includes 2 low capacitance passive probes)
Type 81 Plug-In Adapter . . . . . $ 135

The Adapter allows insertion of 17 letter-series plug-ins without loss of bandwidth or basic sensitivity of the plug-in.

Type 581 Oscilloscope

Also accepting Type 82 Unit, the Type 581 has all features of Type 585 Oscilloscope, except for sweep delay capability.

Type 581 (without plug-in) $1425

U.S. Sales Prices f.o.b. Beaverton, Oregon

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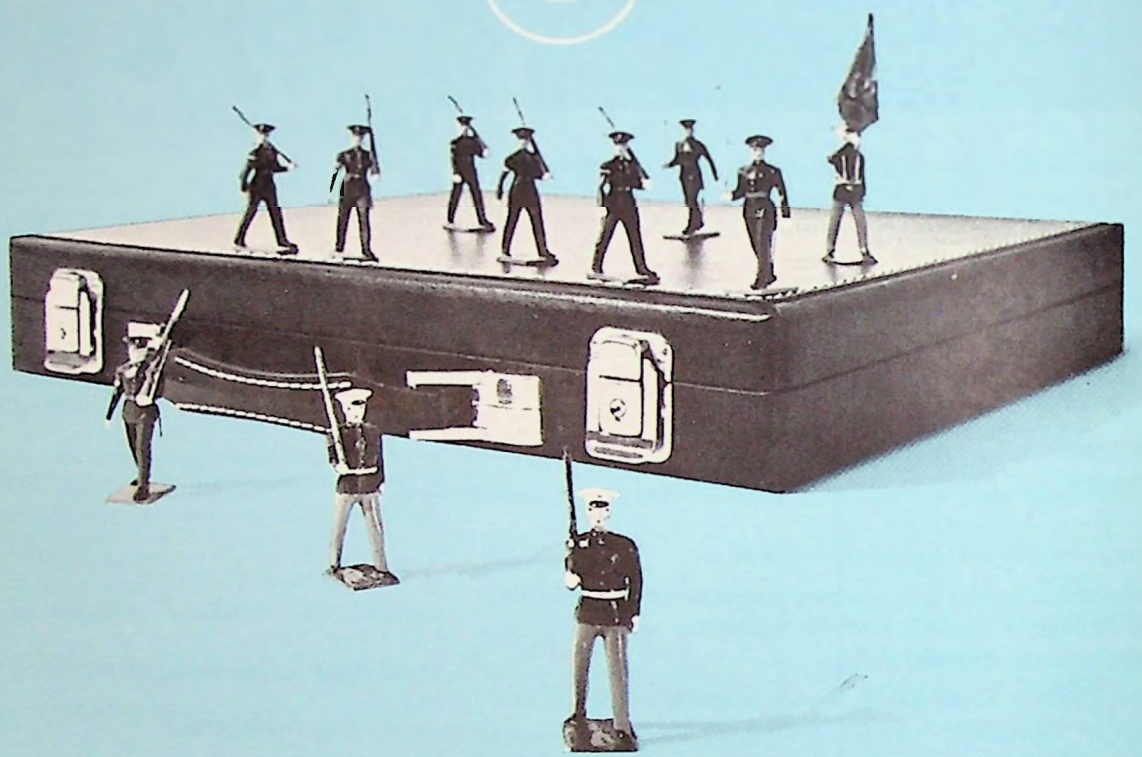

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