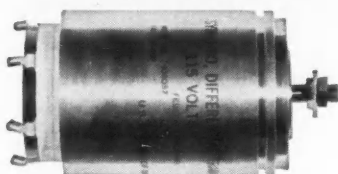


SYNCHROS



MIL-S-20708

SIZE 11 CT4c, 26V-CT4c, CX4c, 26V-CX4b, CDX4a, 26V-CDX4b, TR4b, 26V-TR4b, TX4b, 26V-TX4b

SIZE 15 CT4b, CX4b, CDX4b, TR4c, TX4b, TDX4b, CT6b, CX6b, CDX6b, TR6a

SIZE 18 CT4b, CX4b, CDX4b, TR4b, TDX4b, CT6b, CX6b, CDX6b, TX6a, TRX6a

SIZE 23 CT4, CT4a, CT4b, CX4, CX4a, CX4b, CDX4, CDX4a, CDX4b, TR4, TR4a, TR4b, TX4, TX4a, TX4b, TDX4, TDX4a, TDX4b, TDR4, TDR4a, TDR4b, CT6, CT6a, CT6c, CX6, CX6a, CX6c, CDX6, CDX6a, CDX6b, TR6, TR6a, TX6, TX6a, TX6b, TDX6, TDX6a, TDX6b, TDR6, TDR6a, TRX6a

SIZE 31 TR4d, TX4a, TX4d, TDX4b, TDR4b, TR6b, TX6b, TDX6b, TDR6b

SIZE 37 TR4a, TX4b, TDX4a, TDR4a, TR6b, TX6b, TDX6a, TDR6a

MIL-S-2335

TYPE 1 1D, 1F, 1HCT, 1HDG, 1HG

TYPE 3 3D, 3F, 3HCT, 3HDG, 3HG

TYPE 5 5D, 5F, 5HCT, 5HDG, 5HG, 5N

TYPE 6 6HDG, 6HG



WRITE FOR FREE

Rapid Reference Guide to Military Synchros. ►

Synchro Engineering
◀ Catalog



OTHER MONTROSE PRODUCTS

Aircraft Autosyn® synchro pressure and position transmitters and indicators; servoed angle-of-attack indicators; various other servoed indicators; variable reluctance-type pressure transmitters and indicators; DC synchro-type indicators; aircraft and missile pressure switches; DC motors (under 1/4 HP); dynamometers; Ordnance lighting and degasser switches.

Home Office—South Montrose, Pennsylvania
West Coast Sales and Service Office—117 East Providencia Avenue, Burbank, California
Canadian Sales Office—Aviation Electric Limited, 200 Laurentian Blvd., Montreal, Quebec, Canada
Export Sales and Service—Bendix International, 205 East 42nd St., New York 17, New York

Visit with us at the WESCON SHOW, Booth 832-838

Montrose Division



CIRCLE 92 ON READER-SERVICE CARD

Index of Articles

January 4 through June 21

The kind of article is identified by the following reference keys:

ART Article (bylined by an authority)
DD Design Decision
DIG Digest
DYF Designing Your Future
ED Engineering Data
EDN ELECTRONIC DESIGN News
GA German Abstract
IFD Idea for Design
PF Product Feature
RT Russian Translation
SR Staff Report

All articles are indexed under one of the basic categories listed below:

Automatic Control, Servos

Circuits, Mathematical Analysis

Communications, Methods and Equipment

Components (except microwave components, tubes and semiconductors)

Computers, Data Processing, Auxiliary Devices

Consumer Electronics

Detection, Techniques and Equipment

Human Factors

Measurements, Instrumentation, Test Equipment

Microwave Components, Techniques

Navigation and Guidance Techniques

Packaging Techniques, Electromechanical-Thermal Design, Production Processes and Equipment

Power Sources

Radio Frequency Interference

Research and Development

Semiconductors, Solid-State Devices

Space Electronics

Systems

Telemetry

Tubes, Electron

AUTOMATIC CONTROL, SERVOS

Automated landing control for helicopters, aircraft
EDN p28 Feb 15
De converter with saturable-reactor stabilization
RT p108 Feb 15
Ignition system links spark, engine speed.
EDN p30 Feb 15
Mag-amp circuit divides 2 analog voltages.
IFD p96 Feb 15

CIRCUITS, MATHEMATICAL ANALYSIS

Added trigger tape simplifies ero display.
IFD p62 June 7
Amplifier stabilizes system over large dynamic
range.
IFD p60 April 12
Amplitude control in dc-coupled circuit holds dc
level constant.
IFD p100 March 15
Analyzing time-varying systems by difference equa-
tions.
ART p82 Feb 15
Balanced blanking gate switch is stable, operates
linearly.
IFD p56 March 1
Band switcher uses light-sensitive resistors.
IFD p88 May 24
Bridged-T feedback yields "maximally flat" re-
sponse.
IFD p46 Feb 1
Capacitor storage technique demodulates pulse train.
IFD p52 March 29
Circuit clips carrier, yields low-distortion am sig
Circuit furnishes variable parameter pulses for
multi testing.
IFD p58 April 12
Considerations for antenna test ranges.
DIG p108 May 10
Continuous averaging using passive networks.
GT p78 April 12
Data-flow diagrams: A graphical means of system
representation, Part 1.
ART p46 June 7
Data-flow diagrams: A graphical means of system
representation, Part 2.
ART p76 June 21
Delta-wye transform reduces resistance of feedback
pair.
IFD p208 Jan 18
Differentiating circuits.
GA p98 May 10
Digital circuit protects satellites optical unit.
DD p78 June 7
Distributed two-port networks.
GA p72 March 29
Divider-resistors for series regulator, design of.
ED p104 Feb 15
Double coupling capacitors avoid leakage current.
IFD p65 March 1
Extra short keeps coupled balun resonant.
IFD p81 May 10
Feedback path ups input resistance of operational
amplifier.
IFD p98 March 15
Filament phantom circuit maintains continuity.
IFD p68 June 7
Filterless detection for fm multiplex.
DD p66 March 1
Five amp dc current amplifier has low output im-
pedance.
IFD p86 June 21
Generation of functions of two variables and their
mean values.
GA p94 May 24
Go/No-Go test set checks semiconductor.
IFD p82 June 21
Guide for designing low-drift, dc input amplifiers.
ART p82 March 15
Indicating shift register uses silicon-controlled
rectifiers.
IFD p83 June 21
"Junk Box" current limiter protects breadboard
equipment.
IFD p84 June 21
Lighted photocell replaces mercury bias battery.
IFD p57 April 12
Low impedance line driver uses standard coils.
IFD p56 April 12
Modified regulator is made more sensitive to output
changes.
IFD p72 April 26
Multi-buffered switch eliminates contact bounce.
IFD p47 Feb 1
90 deg phase shifter uses electro-optical servo
element.
IFD p76 April 26
Nomogram converts decibels to per cent distortion
ED p53 Feb 1
\$1000 "Idea of Year" award made at IRE.

EDN p24 April 12
Phase shifter, ± 90 deg, uses double-tuned circuits
at 4.5 mc.
IFD p88 May 24
Positive, negative feedback combine to reduce
noise.
IFD p86 May 24
Pulse-shape discriminator separates signal from
noise.
IFD p96 Jan 4
Pulse width integrator independent of input ampli-
tude.
IFD p86 May 10
Reducing power dissipation in emitter-follower
circuits.
IFD p80 June 21
Relay bridging avoided through isolation scheme
IFD p87 May 24
Root taken using biased diode networks.
IFD p85 June 21
Second-order sinusoidal equations, nomogram solves
ED p111 May 10
Short cut connection simplifies transformer-coupled
biasing.
IFD p108 March 15
SCR drives cold cathode counter tube.
IFD p80 June 21
Simple high-gain oven control uses positive feed-
back.
IFD p66 June 7
Three-stage relay driver all 'OFF' or 'ON'.
IFD p83 May 10
Time delay control circuit provides varied delays
IFD p86 May 24
Time-domain synthesis of one-port networks.
ART p48 March 29
Transient simulator produces power-line voltage
changes.
IFD p56 March 29
Trig tables can shorten calculation time of radicals
IFD p107 March 15
Unijunction phase-control circuit gives high gain
IFD p64 June 7
Using neon lamps for low-speed, low-duty-cycle
logic, Part 1.
ART p56 June 7
Using neon lamps for low-speed, low-duty-cycle
logic, Part 2.
ART p62 June 21
Variable-pulse-width regulators gain popularity.
EDN p8 March 15
Voltage, curr. limiter protects circuitry from
shorts and
IFD p103 March 15
Voltage control starts free-running multivibrator
IFD p86 June 21
"Water" in the pipes helps measure vswr.
IFD p59 April 12

COMMUNICATIONS, METHODS AND EQUIPMENT

Alarm system and small amplifier, news from
Britain.
EDN p30 May 24
Communications, Design '62.
SR p38 Jan 4
Tropospheric scatter communication systems, design
guide for.
ART p34 Jan 18

COMPONENTS

(except microwave components, tubes and semi-
conductors)

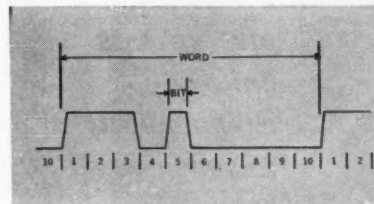
Circuit breakers, selecting for electronic applica-
tions.
ART p90 March 15
Component tolerance calculator can be built into
your slide rule.
IFD p62 March 1
Components, Design '62.
SR p40 Jan 4
Connector adapts round cable to flat conductor.
PF p258 March 15
Crystal oven, natural phenomenon controls.
PF p158 May 24
Delayed-pulse generator uses fewer components.
IFD p63 June 7
Ferrite attenuator operates to 50 mc.
DIG p92 June 21
Filters, how to select and test.
ART p44 Jan 18
Fluid rotor gyro shows promise in lab experiments
EDN p36 June 7
Four approaches to next-generation gyros.
EDN p50 March 15
Illuminated lever switch color-codes switch posi-
tions.
DD p69 March 1
Isolated transformer reduces chassis ground current
DD p85 June 7
Kerr-cell framing camera has 5-nsec exposure rate

100,000,000 Pulses/Sec from TI



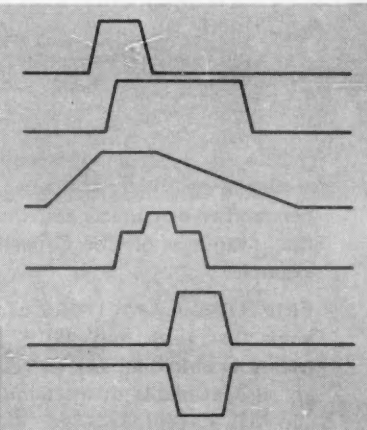
PROGRAMMED PULSE GENERATORS

- Bit Rates up to 25 MC
- 10 Bit Programmable Words



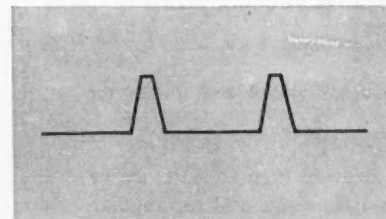
GENERAL PURPOSE PULSE GENERATORS

- PRF 100 cps to 25 MC
- Variable Pulse Width and Delay
- Variable Rise and Fall Times
- Pulse Mixing
- Plus and Minus Outputs



CLOCK PULSE GENERATORS

- PRF 100 cps to 100 MC
- Rise and Fall Times—
Less Than 4 nanoseconds
- Pulse Width—
Less Than 8 nanoseconds



Texas Instruments complete line of pulse instrumen-
tation features compact design and high reliability
through use of all solid state circuitry. Versatile modular
construction permits custom combination of desired
performance characteristics.

Write for complete information



TEXAS INSTRUMENTS

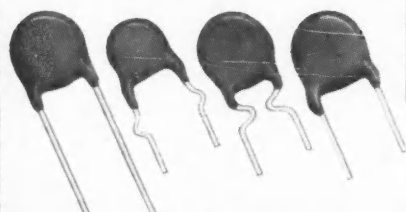
INCORPORATED
APPARATUS DIVISION

3609 BUFFALO SPEEDWAY
P. O. BOX 66027 HOUSTON 6, TEXAS

CIRCLE 93 ON READER-SERVICE CARD

501

ERIE CAPACITORS



*give circuits
built-in
dependability
...conserve
space*

Whether your schematic is a commercial, military or industrial circuit, Erie "Weecon" and disc capacitors assure the dependability demanded and the space-saving required. Check the advantages of Erie Capacitors for your applications. For example . . .

ERIE DISC CAPACITORS are available in high-reliability levels that allow only .001% failure per 1,000 hours of life testing at rated conditions of voltage and temperature. They are also available to meet military specifications, MIL-C-20 and MIL-C-11015.

Capacitance: 0.45 pf through .2 mf.

Working Voltage: Low transistor voltage through 6 KV.

Size: .225" through .920" diameter.

Leads: Conventional for point-to-point and kinked and Wil-Lok for printed circuits.

Body Insulation: Phenolic, wax impregnated.

ERIE WEECON plate capacitors provide high capacitance in limited board space. Their sub-miniature size and rectangular shape allow maximum component density on printed boards and for applications where space is critical. Full range of T. C. and Hi-K bodies.

Capacitance: 6 pf through .1 mf.

Working Voltage: 200 VDC.

Size: .150" x .150" x .100" to .750" x .562" x .170".

Body Insulation: Dipped, resin coated.

For complete information about Erie's disc and plate capacitors, write for Brochure B.

ERIE ELECTRONICS

Division of Erie Resistor Corporation
645 West 12th Street, Erie 6, Pennsylvania

Sales Offices in principal cities of U.S.A., Canada, Europe

CIRCLE 94 ON READER-SERVICE CARD



Index of Articles

EDN p28 April 26
Laboratory-built, pulsed 60-mc oscillator saves time and effort. DD p82 June 7
Linear accelerator delivers electron burst of 10 nsec EDN p23 Jan 18
Log-lin amplifier has wide range, fast pulse response. PF p50 Jan 18
Low bridge relay is compact, versatile. PF p14 Feb 1
Novel gyros promise ruggedness, long accuracy. EDN p4 March 1
Pellet components ganged for higher density package. EDN p49 March 15
Pulse transformers, specifying. ART p94 March 15
Resistor current-noise index, nomogram for. ED p121 March 15
Rotary high-voltage relay features high-vacuum elements. PF p268 March 15
Single gyro believed feasible for Comsat. EDN p22 Feb 1
Subminiature right-angle connectors offer constant impedance. PF p264 March 15
30-db notch filter has 0.25% frequency separation. PF p266 March 15
Tiny lamps light lucite panels in miniature decimal readout. IFD p106 March 15
Transducer bridge circuits, designing. ART p54 June 21
Transducers. SR p44 June 21
Designing transducer bridge circuits. SR p54 June 21
New materials and methods pay off. SR p48 June 21
Semiconductors increase strain-gage outputs. SR p45 June 21
Specifying transducer environments. SR p50 June 21
"Universal" components, GE latest to introduce. EDN p18 Jan 18

COMPUTERS, DATA PROCESSING, AUXILIARY DEVICES

Active pathways sought for self-organizing systems. EDN p16 June 21
All-pneumatic unit used to move tape. EDN p36 June 21
Analog computer, portable, has KC-range ban bandwidth. PF p48 Jan 18

Analog computer has digital memory, logic. EDN p4 May 10
Analog converter, recorder process physiological data. EDN p30 April 12
AND/OR gate multiplexer uses voltage-amplitude coding. IFD p70 June 7
Basic logic "nor" modified for 10 mc, two-phase clock. IFD p94 Jan 4
Bionics, Design '62. SR p43 Jan 4
Computer designers at AIEE set sights on gigacycle era. EDN p8 Feb 15
Computer designers turning to functional circuit approach. EDN p4 May 24
Computer designers wonder: What price redundancy? EDN p8 March 1
Computer hardware, logic carve out new gains. EDN p4 Jan 4
Computer speeds spectral analysis. EDN p32 March 29
Computer to handle non-numerical work. EDN p18 Jan 4
Cryogenic memories described at SJCC: one is objective. EDN p22 May 24
Fail-safe logic with ferrite laddie. DIG p105 May 10
Generate a worst-case noise pattern in coincident-current memories using a toggle switch. ART p76 May 10
"Idiot proof" method for analog simulation of transfer functions. ART p70 June 21
Lamps light up for coincident narrow pulses. IFD p94 Feb 15
Logarithmic analog-to-digital converters. ART p36 Feb 1
Logic, counting, selection done by reed switches. EDN p26 June 7
Optical reader fast, accurate. EDN p12 Feb 1
Perceptron, Cornell U., to recognize spoken words. EDN p8 Jan 4
Regeneration stylus driver samples shift-register storage. IFD p72 June 7
Solid-state computer features 2-musec memory access time. EDN p31 Feb 15
Speech compression, new twist in. EDN p28 June 21
Symbol printer for x-y plotter weighs 6 oz. EDN p19 March 29
Thin-film memory plane features 150 bits per square inch. PF p94 March 1
Tiny drum memory holds 4096 words on 1-inch rotor. EDN p34 June 7
Two-plane magnetic-core comparator cuts computer

for better drafting from...KOH-I-NOOR

Recognized by draftsmen everywhere as instruments of unmatched precision and professional performance!

RAPIDOGRAPH TECHNICAL FOUNTAIN PENS

Uses India ink for ruling, lettering, tracing or writing. Available in 7 "Kolor Koded" line widths. Two models—Desk Sets (3065) with 7, 4, 3, and 1 interchangeable point sections, each with airtight, refillable ink cartridge, Pocket Model (3060) has self-contained automatic filling system.

KOH-I-NOOR LEAD HOLDERS

Comprehensive line of lead holders with patented non-slip, non-turn replaceable clutch. For all 17 degrees and 9 colors of Koh-I-Noor drawing leads.

EJECTOMATIC LEAD DISPENSERS

Feeds lead directly to lead holder without touching fingers.

KOH-I-NOOR INC.

BLOOMSBURY 24, NEW JERSEY



patented
wide-opening
clutch!

CIRCLE 95 ON READER-SERVICE CARD

ELECTRONIC DESIGN • July 19, 1962

costs.....DD p74 June 7
Voice spectrogram deemed reliable in identification work.....EDN p31 June 21

CONSUMER ELECTRONICS

Fluorescent lamp works on battery EDN p28 May 24
Low-drive circuits cut price of 19-in. TV set.....EDN p18 Feb 1
Neon tube serves as tuning indicator for fm receiver.....IFD p99 March 15
New luxury liner's added touch, TV at sea.....EDN p16 March 29
Power-line broadcasts, engineer boosts range in battle with village officials.....DD p181 Jan 18
TV headset blows up picture to 8-ft diameter.....EDN p24 April 26
Transistorized five-in. TV set works on ac, dc.....EDN p16 May 24

DETECTION, TECHNIQUES AND EQUIPMENT

A-blast detection, measurements, U.S. refines.....EDN p4 Jan 18
Decoding system identifies planes.....EDN p14 Feb 15
Delay-line discriminator detects sequence of pulse.....IFD p60 March 1
Design of phase-sensitive demodulators.....RT p72 April 12
Designers take new tack to counter radiation effects.....EDN p8 March 29
Heterodyning prolongs stimulated ionosphere.....EDN p29 March 29
Modified detector adds marks for frequency response tests.....IFD p56 April 12
Shaft-speed transducer.....DIG p100 May 10
Sonobuoy hydroplanes tune in on submarines.....EDN p32 May 24

HUMAN FACTORS

How to hire a man for your groupDYF p72 March 1
Merit increase, how to negotiate.....DYF p58 Feb 1
Tackle a technical report as you would a circuit.....DYF p214 Jan 18
Writing: Open channel to professionalism.....DYF p96 May 24

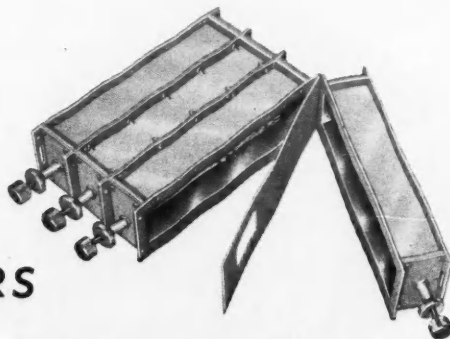
MEASUREMENTS, INSTRUMENTATION, TEST EQUIPMENT

Cheap sweep developed for frequency-amplitude testing.....IFD p80 May 10
Complex waveforms, generating.....RT p130 March 15
Correlation of measurements using statistical techniques.....ED p193 Jan 18
Dual-channel sampling scope is modular, portable.....PF p262 March 15
Eliminating pickup noise in test equipment.....ART p44 April 12
Instrumentation in step with environmental science.....EDN p16 May 10
Light meter, stable, sensitive.....GA p94 May 24
Measurement circuit displays phase-tracking error of IF limiters, amplifiers.....ART p58 April 26
Modified chopper drives zero-center meter.....IFD p97 Jan 4
Noise measurements by arithmetic means.....GA p107 Feb 15
Pulse height analyzer uses dual-step conversion.....DIG p76 March 29
Pulse-train generator has 15 nsec. fall time.....PF p260 March 15
Scope display yields value of crystal's mechanical Q.....IFD p100 March 15
Scope preamp measures sine wave phase shift.....IFD p55 March 29
Servo analyzer uses gauss-effect signal generator.....DD p68 April 12
Test equipment, eliminating pickup noise in.....ART p66 April 26

MICROWAVE COMPONENTS, TECHNIQUES

Antenna equipment shows structural trends.....EDN p18 March 15
Communication satellites: Challenge and progress in four microwave systems.....SR p156 Jan 18
CW laser refines measurement of light.....EDN p14 June 7
Demodulators hasten laser-beam communications.....EDN p4 June 7
Glide path antenna mounted in runway under test by FAA.....EDN p22 June 7
Klystron modulators, determining pulse fall time in.....ART p60 June 7

NEW MODULAR CONCEPT IN PRESELECTORS



REL can provide you with the preselector you require for use in the 400 mc, 1 kmc and 2 kmc frequency bands. Basic units with an exceptionally low insertion loss and VSWR are available for use in filter configurations of one to six sections. Tell us your requirements for:

- | | |
|-------------------------------------|-------------------------------|
| A. Operating center frequency | E. VSWR |
| B. Pass band characteristics | F. Tunability |
| C. Attenuation band characteristics | G. Other special requirements |
| D. Insertion loss | |

We will provide you with the solution to your preselector problem. WRITE or CALL for our Preselector Technical Data Bulletin.



Radio Engineering Laboratories, Inc.

A subsidiary of Dynamics Corporation of America

Dept. ED • 29-01 Borden Ave • Long Island City 1, NY
Stillwell 6-2100 • Teletype: NY 4-2816

CIRCLE 96 ON READER-SERVICE CARD

ELECTRONIC DESIGN • July 19, 1962



Rockbestos Firezone Aerospace Wire Rockets to Red Heat in the X-15

Flying at the fantastic speed of more than 4,000 miles per hour on the very fringe of space, the skin, nose and leading edges of the X-15 reach temperatures in the neighborhood of 1100° F. This unique aircraft is designed to withstand 1200° F.

Rockbestos RSS-101 Firezone Aerospace Wire is used to resist these extreme temperature conditions in power and control circuits of the X-15.

Standard Rockbestos Aerospace and Electronic Wires are available for temperatures ranging from 257° F to 2000° F. Special constructions are available for environments of extreme low temperature, radiation exposure and other problem areas of wire and cable application.

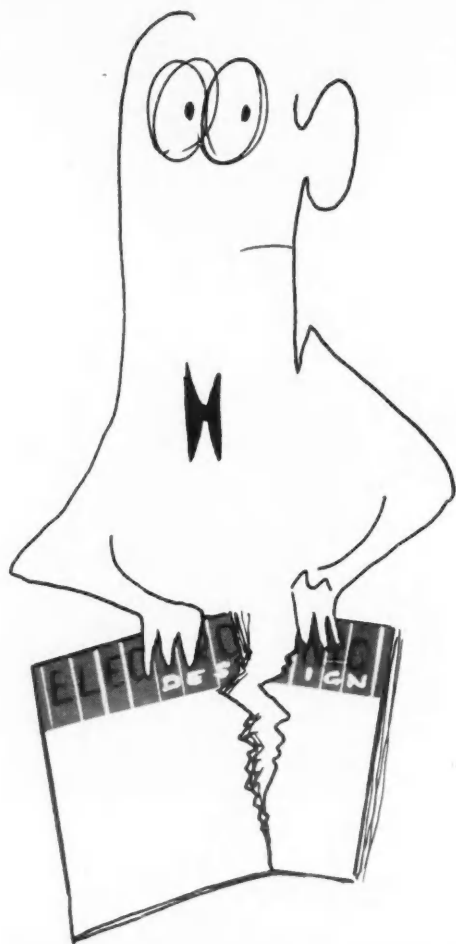
Send today for the Rockbestos Aerospace & Electronic Catalog to help solve your wire and cable problems.

ROCKBESTOS WIRE & CABLE CO.

DIVISION OF **CERRO CORPORATION**

MAIN OFFICE AND FACTORY: Nicoll and Canner Streets, New Haven, Conn.

CIRCLE 97 ON READER-SERVICE CARD



why
oh
why
isn't ELECTRONIC DESIGN
the right size?

Occasionally readers suggest that *Electronic Design*, although their most valued technical magazine, should be standard size. The 11 x 11 inch format, they say, makes it difficult to file articles or tear sheets.

But ED pioneered and maintains this high visibility format for several very important reasons!

- The magazine can be sent to you free because the advertisers pay the freight.
- Advertisers are attracted to *Electronic Design* because their messages are read.
- One of the reasons their messages are read is because every ad is surrounded by editorial data. The 11 x 11 inch size makes this possible.

The more advertisers, the more editorial. The 11 x 11 size permits big, impact, editorial spreads that make it easier for readers to see and comprehend a subject at a glance.

Index of Articles

Measuring complex permeability of ferrites at meter wavelengths.....RT p86 June 7
Microwave antennas, designed for space.....SR p40 May 10
Microwave frequency reference accurate to 1 part in 10⁷.....DIG p90 June 7
Microwave relay net transmits at 11 Gc.....EDN p22 Jan 4
Microwaves, Design '62.....SR p36 Jan 4
New microwave circuits stand out at PGMTT symposium.....EDN p8 June 7
Novel pumping scheme studied to boost laser power.....EDN p16 April 12
Optical maser, how to build.....ART p86 Feb 15
Optical maser crystals, guide to specifying.....ART p90 Feb 15
Optical radar spurred by new maser developments.....EDN p36 Feb 15
Parametric-like device divides frequency in half.....IFD p98 March 15
Plasma re-entry blackout, new techniques proposed to solve.....EDN p30 April 26
Polarization-diversity antenna feeds, guide to.....ART p42 May 10
Solid-state laser works continuously.....EDN p14 Jan 18
Spacing phased-array elements for maximum gain.....ART p50 May 10
Symmetrical bandpass filters, design of.....ART p40 April 12
Synthesizing antenna radiation patterns.....ART p48 June 7
Tunnel-diode amplifier operates to 7 Gc.....PF p112 Feb 1
Unfurlable antennas for space vehicles.....ART p54 May 10
Waveguide nomogram for X-band.....ART p48 April 12

NAVIGATION AND GUIDANCE TECHNIQUES

Airborne-ground surveying system covers 150 miles.....EDN p22 April 26
Air-traffic center gets bright display system.....EDN p26 Jan 18
Museums doppler radar strictly for the birds.....EDN p11 Jan 18
Ophthalmoscope to be used in flight motion simulators.....EDN p34 Feb 15

Radar lets planes fly low and blind.....EDN p30 March 29
Range-safety tracker ready for Nike-Zeus.....EDN p33 Feb 15

PACKAGING TECHNIQUES, ELECTROMECHANICAL-THERMAL DESIGN, PRODUCTION PROCESSES AND EQUIPMENT

Aluminum-powder encapsulant conducts heat, allows repairs.....IFD p100 Feb 15
Components, what one designer looks for in.....ART p52 April 26
Die-stamped circuits, designing and specifying.....ART p86 March 15
Electron beam welding and shaping.....GA p142 March 15
Flux-core solder speeds wiring of oxidized contacts.....DD p81 June 7
Microelectronics, design considerations: It's the system that counts.....SR p57 Feb 15
Microelectronics, Design '62.....SR p42 Jan 4
Microelectronics, standards.....SR p54 Feb 15
Microelectronics, state of the art.....SR p50 Feb 15
Microelectronics design considerations.....SR p66 Feb 15
Microelectronics in review.....SR p49 Feb 15
Micromin, solid ceramic circuits big step to.....EDN p4 Feb 15
Micromin standards, EIA, AIA pursuing.....EDN p26 Feb 15
Microminiature magnetic modulators feature low-drift circuit.....PF p176 April 12
Molecular electronics in missile systems.....ART p74 Feb 15
Must all packages be welded?.....ART p78 March 15
"Potting" can help tube circuits too.....ART p46 March 29
Printed-circuit boards, effect of vibration on.....DD p190 Jan 18
Printed-circuit packaging: can it be carried further?.....SR p36 April 26
Printed-circuit packaging: Case 1, circuit redesign shrinks board.....SR p38 April 26



Try this simple test. Tie a piece of Gudalace around a pencil in a half hitch and pull one end. Gudalace's flat, nonskid surface grips the pencil—no need for an extra finger to hold Gudalace in place while the knot is tied!

Gudalace makes lacing easier and faster, with no cut insulation, or fingers—no slips or rejects—and that's *real* economy. Gudalace is the original flat lacing tape. It's engineered to *stay* flat, distributing stress evenly over a wide area. The unique nonskid surface eliminates the too-tight pull that causes strangulation and cold flow. Gudalace is made of sturdy nylon mesh, combined with special microcrystalline wax, for outstanding strength, toughness, and stability.

Write for a free sample and test it yourself. See how Gudalace takes the slips—and the problems—out of lacing.

GUDEBROD

Electronic Division
225 West 34th Street
New York 1, N.Y.

BROS. SILK CO., INC.

Executive Offices
12 South 12th Street
Philadelphia 7, Pa.

CIRCLE 118 ON READER-SERVICE CARD

ELECTRONIC DESIGN • July 19, 1962

Printed-circuit packaging: Case 2, core logic simplified.....SR p42 April 26
 Printed-circuit packaging: Case 3, logic system organized on board.....SR p46 April 26
 Printed-circuit packaging: Case 4, a minority report—digital modules without boards.....SR p50 April 26
 Protrusions in potting shell position leads for soldering.....DD p69 March 1
 Recessed contacts prevent damage to module components, matrix.....DD p90 May 10
 Shipping container serves as test jig.....DD p115 March 15
 Simulated fuses cut cost of training B-58 crews.....DD p117 March 15
 Skewed-wire pin gives new twist to micromin interconnections.....DD p64 April 12
 Sliding rack drawers coil, uncoil cables neatly and without slack.....DD p60 March 29
 Solar converter, amplifier use thin films.....EDN p4 March 15
 Versatile constant-current modules use one basic circuit board.....DD p88 June 21

POWER SOURCES

Energy conversion: big stride into space.....EDN p4 June 21
 Liquid-collector thermionic cell produces 30 W.....EDN p28 May 10
 Load cell terminology will be standardized.....EDN p34 March 29
 Measuring RF fields with thermoelectric converters.....RT p94 May 10
 Nicad batteries make good farad capacitor equivalents.....IFD p64 March 1
 Rectifier connections reduce ripple in two-phase supply.....IFD p58 March 1
 Regulated power supply uses low-cost diodes.....IFD p65 June 7
 Solar cell weight and cost cut by new panel designs.....EDN p22 June 21
 Standby batteries protect supply against ac power loss.....IFD p57 March 1
 Thermionic systems studied for use in space power plants.....EDN p38 June 7

RADIO FREQUENCY INTERFERENCE

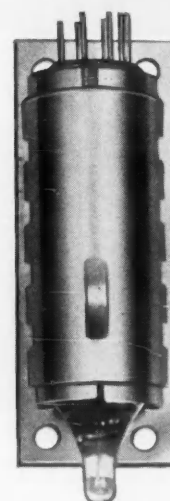
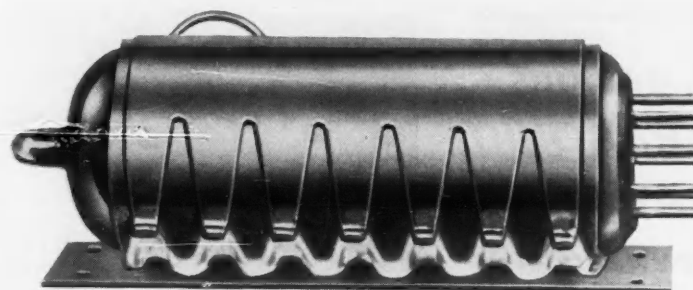
Applying shielded cables to reduce interference.....ART p48 Jan 4
 RFI, Design '62.....SR p35 Jan 4
 RFI and interaction in silicon-controlled rectifier circuits, coping with.....ART p54 March 1

RESEARCH AND DEVELOPMENT

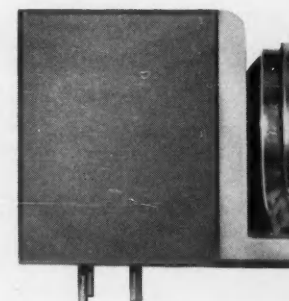
Rectifier studies simulate radiation effects in space.....EDN p8 May 10
 Two teams and one idea: flux pumps create high fields.....EDN p8 May 24

SEMICONDUCTORS, SOLID STATE DEVICES

A look inside the diode.....ART p58 May 24
 Active device designers turn to bulk effects.....EDN p4 April 26
 Biased diode reduces nonlinearity of ac meters.....IFD p63 April 12
 Blocking oscillator-AND gate produces standard output pulse.....IFD p44 Feb 1
 Breadboard technique for high-speed transistor circuits.....DIG p88 April 12
 Complementary transistor circuits, a review of.....ART p52 June 7
 Complementary xisters decrease multi recovery time.....IFD p104 March 15
 Decreasing miller effect in transistor amplifiers.....ART p68 June 21
 Designer's check list for reliable, producible transistor circuits.....
 Part 1—Parametric variations and safety margins.....ART p40 March 29
 Part 2—Broadband IF and UHF oscillator circuits.....ART p52 April 12
 Part 3—Counting multivibrators and blocking oscillators.....ART p62 April 26
 Part 4—Audio and video amplifiers.....ART p66 May 10
 Part 5—Series regulators and inverters.....ART p82 May 24
 Designing a transistor RC oscillator using the cur-



**VERSATILE
TUBE
RETAINERS
FOR OPTIMUM
THERMAL
DESIGN!**



Patented.



IERC Horizontal Hardmount Series for all Miniature and Subminiature tubes give you Maximum Control and Isolation of tube-generated heat!

Separate hot tubes from associated components — thermally link tubes to a heat sink or cold plate with IERC horizontal mounting tube shields for the most efficient removal of tube-generated heat!

Compatibility with a wide variety of design and mounting techniques plus complete availability for all miniature and subminiature tube sizes provides you with new, versatile and effective answers for improved thermal design. Efficient tube cooling and vibration protection gained with the Hardmount Series extends tube life and reliability — cuts costs!

IERC DIVISION



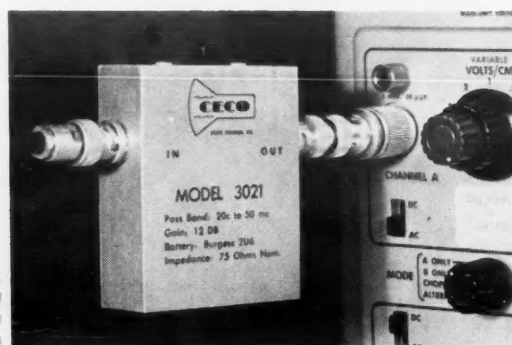
HORIZONTAL SERIES — part of the complete line of more than 1,400 sizes and types of IERC Heat-dissipating Electron Tube Shields in Military, Industrial and Commercial Use.

INTERNATIONAL ELECTRONIC RESEARCH CORPORATION

135 West Magnolia Boulevard, Burbank, California • Victoria 9-2481
 Foreign Manufacturers: Europelec, Paris, France. Garrard Mfg. & Eng. Co., Ltd., Swindon, England

CIRCLE 120 ON READER-SERVICE CARD

CESCO'S
WIDE BAND,
SOLID STATE



GENERAL PURPOSE AMPLIFIER

Cesco's Model 3021 General Purpose Amplifier, featuring a 20 cps to 50 mc bandwidth, is a versatile, solid state device designed for laboratory use for video, rf, audio and pulse amplification. Gain is 12 db with a 75 ohm load, or 30 db with reduced bandwidth with an open circuit load. The unit is powered by an internal battery having a typical life of three weeks. Its compactness (3 x 3 x 1 in.) and light weight (6 oz.) permit installation on oscilloscope terminals. Price is \$60.00. Write for specifications.

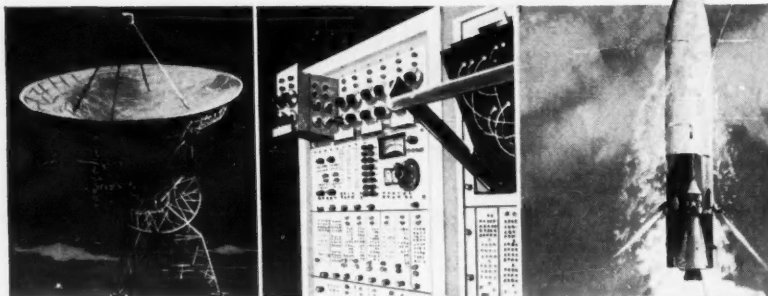
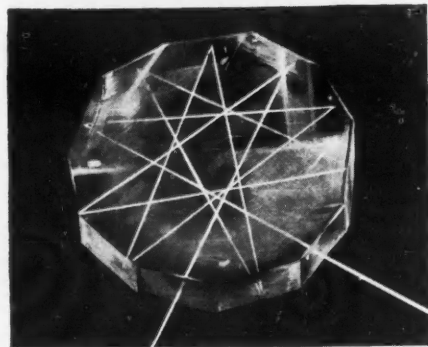
**Community
Engineering
Corporation**

STATE COLLEGE,
PENNSYLVANIA
Phone AD 8-2461 Area Code 814

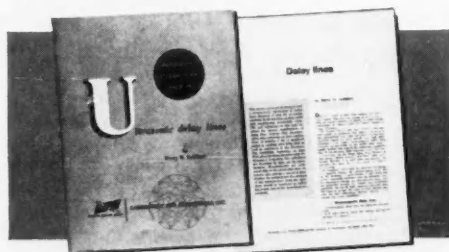
CIRCLE 119 ON READER-SERVICE CARD

ELECTRONIC DESIGN • July 19, 1962

LFE designs ULTRASONIC DELAY LINES for every application



Engineering and production experience dating back to 1947 account for the performance and reliability of LFE delay lines. Production delay lines with the precise characteristics of laboratory models — are delivered on time, at reasonable prices. All LFE Ultrasonic Delay Lines and Range Markers are custom-engineered — quartz, mercury, glass — with delays ranging from less than one to more than 4000 microseconds. And you trade on LFE's long experience and unique design sophistication — you are backed by LFE's solid record in meeting specifications.



Two valuable brochures which belong on the desk of anyone designing storage devices, computers, radar, MTI, and ECM systems can be yours by circling the return card number at the bottom of this page. For specific answers to your questions write to: Marketing Manager, LFE Delay Lines, LFE Electronics, 1079 Commonwealth Avenue, Boston 15, Massachusetts.

Visit us in Booth 521-522 at WESCON.

LFE
DELAY LINES

LFE ELECTRONICS

A DIVISION OF LABORATORY FOR ELECTRONICS
BOSTON 15, MASSACHUSETTS

Ultrasonic Delay Lines & Range Markers
Including: Quartz, Mercury and Glass

CIRCLE 121 ON READER-SERVICE CARD

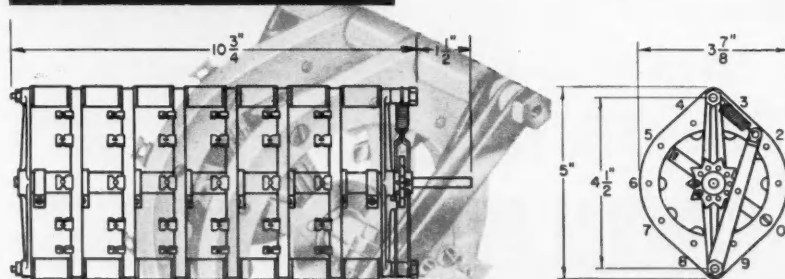
Index of Articles

rent dual of the Wien network.....DIG p82 April 12
Designing parametric amplifiers from static characteristics.....RT p82 April 26
Diode-resistor pair improves one-shot multi fall time.....IFD p101 Feb 15
Diodes '62.....SR p36 May 24
Flipping transformer is eliminated from SCR flip-flop.....IFD p62 April 12
Gated tunnel-diode oscillator.....IFD p69 June 7
Generator multiplies input by ionization.....EDN p26 Jan 4
Goto circuit TD's give rapid A/D conversions.....DD p78 April 26
Graphical method speeds design of vacuum-tube blocking oscillators, Part 2.....ART p66 March 15
High-speed TD logic circuits developed by IBM.....EDN p28 June 7
How to design practical SCR circuits.....ART p68 May 24
How to select the right rectifier diode.....ART p48 May 24
Hybrid dc amplifier replaces output transformer.....IFD p209 Jan 18
Integrated chopper is packaged in TO-18 case.....PF p174 April 12
Modified emitter follower has very low output impedance.....IFD p87 May 10
Molecular electronics, Air Force receiver uses.....EDN p23 March 15
Novel multigun structure improves deflection linearity.....DD p112 March 15
Organic semiconductors: a progress report.....EDN p4 March 29
Output pulse amplitude ignores tube parameters.....IFD p204 Jan 18
Photocells indicate angular alignment of flat surfaces.....DD p64 March 29
Photoconductors find increasing use in circuits.....EDN p8 April 26
Photo-sensitive cell tests camera shutter accuracy.....IFD p72 April 26
Power-transistor cooling devices, how to evaluate.....ART p44 March 29
Practical tunnel-diode NOR circuit.....ART p72 March 15
Rapidly calculate sensitivity and noise figure of rf systems.....ART p40 Jan 18

Ring multi generates fast, variable output pulses.....IFD p204 Jan 18
Schmitt triggers yield 180 deg out-of-phase waves.....IFD p54 March 29
Self protection against voltage transients with controlled avalanche silicon rectifiers.....PF p256 March 15
Semiconductor diode manufacturer's directory.....SR p80 May 24
Semiconductor power rectifiers in the USSR.....RT p92 May 24
Semiconductors, Design '62.....SR p40 Jan 4
Series capacitors simplify complementary push-pull stage.....IFD p102 March 15
Shift register uses Shockley four-layer diode.....IFD p82 May 10
Shockley diode modernizes neon-tube oscillator.....IFD p206 Jan 18
Shorting transistor reduces scr turn-off time.....IFD p44 Feb 1
SCR charge-discharge circuit samples slow rep-rate pulses.....IFD p70 April 26
Silicon diode demodulates laser signals.....PF p176 June 7
Slip ring contacts, for reliable, specify surface finish, brush pressure.....ART p44 Jan 4
Solar cells used to read holes.....ART p78 Feb 15
Solid-state bridging amplifier has high input impedance.....PF p268 March 15
Solid-state control has clever circuitry, advanced packaging.....DD p118 March 15
Solid-state parley: TD circuits, m.waves.....EDN p13 March 1
"Static-logic" system designed to control traffic lights.....DD p110 March 15
Sweep frequency oscillator operates on collector capacity.....IFD p94 Feb 15
Switching time measurements, making better.....ART p58 May 10
Thyristor-tunnel diode combination generates fast 10-ma pulses.....DD p50 Feb 1
Transistor amplifiers, overload protection of.....GA p140 March 15
Transistor-biasing networks for thermal stability.....ART p32 Feb 1
Transistor in pentode plate acts as constant-current source.....IFD p75 April 26

Switch to the Best

- 13,000 volt peak flashover at 60 cps
- 30 ampere current carrying capacity
- Current carrying members heavily silver plated
- Coin silver contact shoes



MODEL 88 SWITCH

- Low loss silicone impregnated steatite stator and shaft
- White glazed steatite spacers
- Nylon detent wheel
- Black anodized die cast aluminum support brackets
- Stainless steel detent arm
- Oil impregnated bronze sleeve bearings
- Anodized aluminum shaft and rotor bushing



RADIO SWITCH CORPORATION

MARLBORO, NEW JERSEY
Telephone: HOpkins 2-6100

CIRCLE 122 ON READER-SERVICE CARD

ELECTRONIC DESIGN • July 19, 1962

Transistor linear sweep generators.....GA p70 March 1
 Transistor switching amplifier, maximizing current gain in a.....ART p62 March 15
 Transistor-switching applied to power supply.....DD p102 Feb 15
 Transistor time delay relay circuits.....GA p133 March 15
 Transistor-tube duo ups cathode-follower.....IFD p52 March 29
 Transistors, low voltage, ganged for high-voltage current limiter.....IFD p71 April 26
 Transistorized voltage-frequency converter operates linearly.....IFD p85 May 10
 Tube-transistor triode offers useful circuit designs.....IFD p42 Feb 1
 Tunnel diode: can it compete?.....ART p37 May 24
 Tunnel-diode oscillators.....GA p89 June 7
 Tunnel-diode oscillators and mixers.....GA p135 March 15
 Tunnel diode used in insertion-loss modulator for UHF.....IFD p70 April 26
 Tunnel diodes approach 1-psec switching speed.....EDN p4 Feb 1
 TD's pushed for digital and analog circuits.....EDN p24 March 15
 Two transistors, feedback produce free running pulser.....IFD p47 Feb 1
 Unpolarized clipper makes AFC 'let go' of strong signal channels.....IFD p84 May 10
 VR tube, removed from load, is fired by source.....IFD p58 April 12
 Zener-biased BO has high repetition rate.....IFD p90 May 24
 Zener circuits, three unusual.....ART p76 May 24
 Zener, diode bridge form double-ended clipper.....IFD p57 March 29
 Zener diode characteristics, test set displays.....IFD p4 April 26
 Zener diode helps set blocking oscillator synch.....IFD p48 Feb 1
 Zener diodes replace thermocouple ice-junction.....IFD p42 Feb 1
 Zener regulated supply, light bulb improves.....IFD p95 Feb 15

SPACE ELECTRONICS

A-power would boost Comsat satellite into 24-hr

orbit.....EDN p22 March 29
 Britain prepares orbital payload, ion-layer study.....EDN p22 March 15
 Echo II shot to test phase locked tracking array.....EDN p8 Jan 18
 First solar-observation satellite performs well.....EDN p24 March 29
 Nimbus payload features intricate axis control.....EDN p52 March 15
 Radio-relay satellite shot, Japan picks '64 for.....EDN p18 May 10
 Satellites, Design '62.....SR p33 Jan 4
 Standardized OGO to mark new satellite era.....EDN p16 Jan 18
 Telstar takes shape for orbit shot in May.....EDN p16 April 26

SYSTEMS

Reliability symposium, redundancy takes spotlight at.....EDN p8 Feb 1
 Systems, Design '62.....SR p31 Jan 4

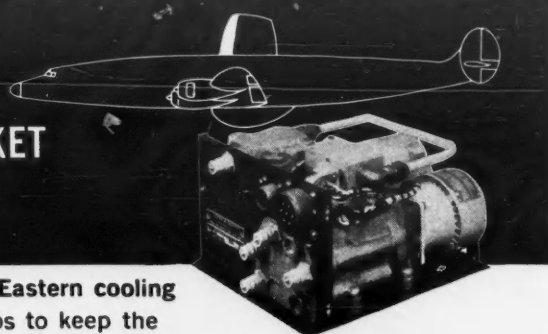
TELEMETERING

FSK transmitter used to telemeter physiological data.....EDN p27 June 21
 Strain gages, a buffer stage for.....DIG p87 April 26
 Telemetry devices, biologists press for miniaturized.....EDN p30 April 26
 Telemetry transmission, data handling show progress.....EDN p8 June 21

TUBES, ELECTRON

Graphical method speeds design of vacuum tube blocking oscillators.....ART p48 March 1
 Mixer output frequencies, nomogram quickly yields.....ART p70 May 10
 Pentode replaces triode for current-limiting in tube supply.....IFD p88 May 10
 Planar ceramic triode has high transconductance.....PF p260 Feb 15
 Single-ended amplifier can reject common-mode signals.....IFD p63 March 1
 Tubes, millimeter, reach usable power levels.....EDN p16 June 7
 Vr-tube circuits, designing.....ART p62 May 10

ABOARD A RADAR PICKET PLANE



... a new Eastern cooling system helps to keep the Philco APS-103 search radar on the lookout for bogies and bandits. The liquid cooling unit has a capacity of 1600 watts, but weighs only 15 lbs., and fits into a compact 5-9/32" x 9-7/8" x 7-7/8" volume. Designed for operation to 50,000 feet, it features an ingenious internal manifold which makes for simplicity, reliability, and which eliminates most internal connections. If you need efficient, miniaturized light weight cooling units for airborne electronics cooling, call on Eastern. Eastern is your perfect source for liquid tube cooling units for capacities from 50 to 20,000 watts.



EASTERN INDUSTRIES

A DIVISION OF LABORATORY FOR ELECTRONICS, INC.
 100 SKIFF STREET • HAMDEN 14, CONNECTICUT

CIRCLE 123 ON READER-SERVICE CARD

ELECTRONIC DESIGN • July 19, 1962



with this new ultra-low distortion,
stable-amplitude oscillator

When the specs get critical, you need an oscillator that won't add distortion and instability of its own. Here's a stable-amplitude, low-distortion oscillator — Krohn-Hite's new Model 446 — that gives you a *cleaner* sine wave than any other oscillator you've ever worked with!

Amplitude stability is ultra-high: 0.001 db (0.01%), due to a unique infinite-gain AVC circuit (patent pending). Amplitude bounce near line frequency is no longer a problem — less than 0.05%. Distortion — phenomenally low: less than 0.01%.

But that's not all. The 446 push-button oscillator offers continuous frequency coverage from one cycle to 100 kc. Voltage output is continuously adjustable from 0 to 10 volts, with infinite resolution all the way.

And when you need *power* along with stable amplitude and low distortion, team up the Model 446 oscillator with Krohn-Hite's Model UF-101A ultra-low distortion 50-watt amplifier. Here's an amplifier which preserves the stability and distortion-free characteristics, even at a full 50 watts. Frequency response of the amplifier — from 20 cps to 20 kc at full power. A convenient load impedance switch offers a choice of 1, 2, 4, 8 and 225 ohms.

Together, this oscillator and amplifier provide a highly-stable, low-distortion, variable-frequency Power Source (Model LDS-115) — for the most critical meter calibration or measurement needs. Send for technical literature on these new Krohn-Hite instruments.



KROHN-HITE CORPORATION

580 Massachusetts Avenue • Cambridge 39, Mass.
 Pioneering in Quality Electronic Instruments

CIRCLE 124 ON READER-SERVICE CARD