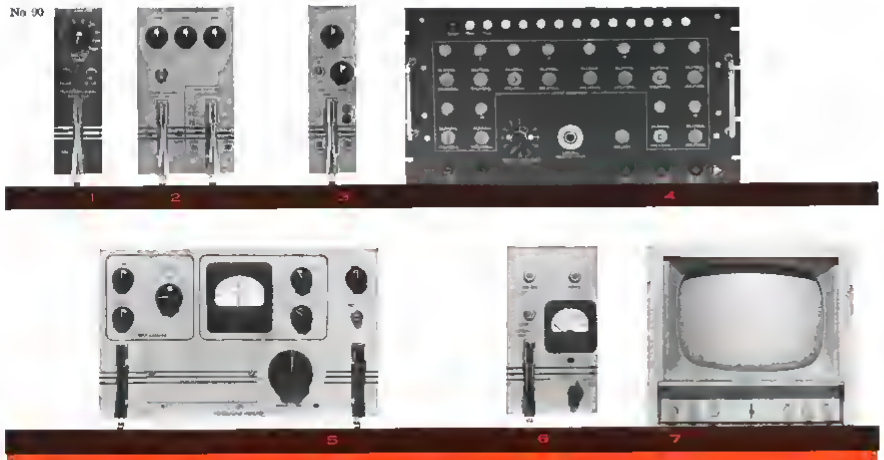
No 90



CHOOSE YOUR "BUILDING-BLOCKS"... SYSTEMS OR PLUG-IN SYSTEM COMPONENTS BY HALLAMORE

Successful performance of systems contracts for all branches of the United States Armed Forces provides the background for the Hallamore "Building-Block" principle making possible the quick supply of reliable systems and system components so urgently required in the accelerated missile and satellite programs Choose from these typical Hallamore "Building-Blocks" for adaptation in your current project 1 DC Amplifier (drift less than ±2 Microvolts) 2 Phase-lock Discriminator (applying a concept new to telemetry) 3 FM Subcarrier Oscillator (linear stable internal bias) 4 Channel Calibrator (0.1% absolute accuracy) 5 Band-switched Discriminator (compact single control switching) 6 Summing Amplifier (18 channels plus internal reference oscillator) 7 Closed circuit T V monitoring systems 8 Complete Missile Telemetry Systems. Write Dept. 20J, 8352 Brookhurst Avenue, Anaheim, California/TWX Code AH-9079

HALLAMORE ELECTRONICS COMPANY a division of The Siegler Corporation

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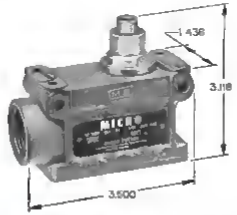
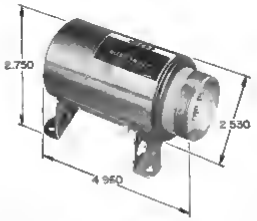
Circle Number 47 on Reader Service Card

MICRO SWITCH Precision

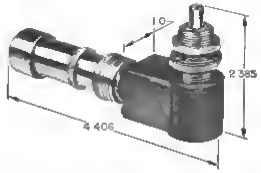
These 17 switches represent the widest for aircraft, missile, rocket, launcher,



4CE1—This weather-proof, corrosion-resistant switch is used as an indicator or limit switch on missile shelter, erecting and launching equipment Has SPDT contact arrangement Rating 10a 125vac, 5a 250 vac Operating force 6-10 lbs *Data sheet 151*

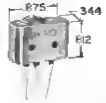


1RS1—High reliability telemetering switch for missile program sequencing Hermetically sealed Has rotary solenoid and 24 SPDT gold-contact "SM" switches 74 terminals Quick disconnect plug *Data sheet 151*

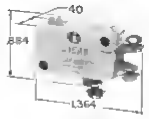


1EN42-R—A special design for high shock applications Used on shipboard launching equipment Meets requirements of U S Navy Bureau of Ordnance Contains two SPDT switches Quick disconnect connector Ice and mud scraper on plunger Operating force 6-12 lbs Rating at 28vdc inrush 24a, resistive 4a, inductive 3a, motor 4a. *Data sheet 151.*

S4PB67-T2—Space saving lighted pushbutton assembly Flexible indication provided by indicator lamp and two-level position of button Alternate action (on-off) of the switch contacts is provided Four SPDT subminiature switches All switch and lamp terminals are isolated. *Data sheet 135.*



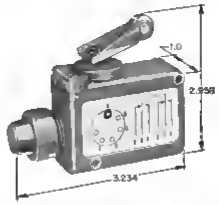
1SE1—Smallest sealed environment free switch SPDT Rating at 28vdc and 3a, res 4a, inrush 15a Leaf and roller-leaf auxiliary actuators available *Catalog 77*



V3-1301—Operates reliably at 600°F For jets, missiles, electronic gear SPDT 30vdc rating and 10a, res. 10a, motor 6a *Cat 74*

12HR1-S
Hermetically sealed, high temperature DPDT switch for reliable use to 600°F All seals in accordance with Par. 5 2 2, MIL-E-5272A Ice scraper ring on actuator Rating 28vdc—res 5a, and 2a Operating force 6-12 lbs. *Data sheet 122.*

44EN1-6 (MS-24420-4)—Rotary actuator adjustable through 360° One 4-circuit basic switch Rating: 28vdc-inrush 30a, res. 15a and 10a Operating torque—10 in lbs *Catalog 77.*



3EP2-E—Sealed enclosure Rugged, two-hole side mounting Two high capacity SPDT basic switches Sealed connector receptacle and roller lever actuator Rating 28vdc—inrush 36a res. 10a and 6a Operating force 4-6 lbs. *Catalog 77.*

201LS1—
Heavy duty, sealed "Plug-in Limit" switch Can be replaced on the job in 20 seconds Switch enclosure, with actuator, positioned by dowels and secured by two No 10 screws Available in six actuator designs Used in ground equipment as limit or indicator switch. *Catalog 54.*

Switches have uses unlimited

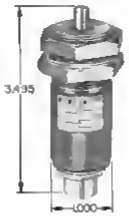
range of precision switches available marine and ordnance applications

Each of the switches illustrated on these pages represents a different *series* of MICRO SWITCH Precision Switches . . . Each switch has been designed to high reliability standards for a particular purpose . . . Each series includes many variations—sizes, weights, contact arrangements, electrical characteristics, housings, actuators, sealing, temperature, shock and mechanical characteristics . . . For example, the switches in which "EN" is a part of the catalog listing constitute a series in which nearly 100 different switches and assemblies are available . . . No other source of precision switches offers as broad a line . . . Furthermore, no other can offer the services of as large a staff of Application Engineers—in branch offices at strategic points throughout the country. Consult the yellow pages.

MICRO SWITCH . . . FREEPORT, ILLINOIS
A division of Honeywell
In Canada Honeywell Controls, Ltd., Toronto 17, Ontario

Honeywell
MICRO SWITCH PRECISION SWITCHES

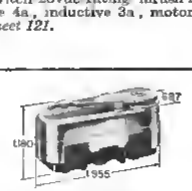
1EN75-R—High-impact shock switch for use on launching platforms, near jet after-burners, etc. Heavy duty push plunger with ice-mud scraper. Operating force 6-12 lbs., release force 4 lbs. Environment and immersion proof (MIL-S-901B, Navy and MIL-E-5272A, Proc. 1). Contains two SPDT switches. Available with straight (shown) or angle connector plug. *Data sheet 152.*



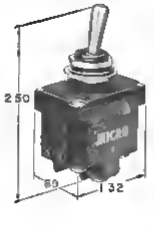
5ET1-6—Compact, magnetically-held toggle switch has a built-in 28vdc solenoid. Works as a momentary action toggle switch, but is converted to a maintained contact switch when solenoid is energized. Permits remote electrical release of the lever, thus eliminating auxiliary relays, etc. Toggle lever can be manually over-ridden. Environment and immersion-proof enclosure (MIL-E-5272A Proc. 1). SPDT basic switch 28vdc rating: inrush 24a., resistive 4a., inductive 3a., motor 4a. *Data sheet 121.*

4TP1-1—Rocker-actuated key switch combines the advantages of both pushbutton and toggle manual control. Key is flat, like a pushbutton and can be engraved, but has toggle feature of visible position. Also enhances panel design and provides edge-light indication. Construction of case is rugged and sealed, with integral, stepped terminal design. 4-pole DT circuitry (others available). 28vdc rating: res. 20a., lamp 7a., ind. 15a. *Data sheet 141.*

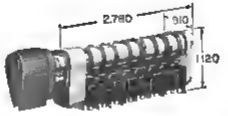
4TL1-1A—Same features as 2TL1-1 except toggle lever has safety feature which requires pull to unlock and move the lever. (Available in a variety of locking arrangements.) Knob facilitates operation with gloves. 4-pole DT circuitry. Rating same as 2TL1-1. *Data sheet 142*



1HS1 (MS-25011-1)—Hermetic sealed construction (metal-to-metal or metal-to-glass seals). Contacts sealed in dry gas under pressure. SPDT. 28vdc rating: ind. 10a., res. 25a. *Catalog 77.*



2TL1-1—Integral, stepped terminal design. High impact strength, arc resistant case. Silicone seal on bushing and self-sealing sealant between cover and case. 2-pole DT circuitry. Rating at 28 vdc: res. 20a., lamp 7a., ind. 15a. Available in variety of toggle positions. *Data sheet 139*



17AS8—Compact rotary selector switch handles eight different circuits, requires only 1¾ inch diameter panel area. Switching sequence is infinitely variable. *Data sheet 86*

Circle Number 48 on Reader-Service Card

C 81

RD INSTRUMENTS

FOR RESEARCH AND DEVELOPMENT

TUBE TESTERS

AUTOMATIC—CARDMATIC

MODEL 1230—Card programmed to automatically set up predetermined voltages and conditions for each tube under test. Self calibrating and accurate within 1 to 3% of best known standards for transconductance and plate current measurements. Reject levels set in accordance with military specs. Also permits special purpose tube tests to meet specific circuit requirements. Portable style with cover.

FIELD SERVICE STANDARD

MODEL 1575—Meets Western Electric specifications as a Mutual Conductance tester. 0-60 000 micromhos in 7 ranges. Two separate meters for line and grid bias voltage indications. Has 4 signal voltages. Features new, voltage regulator tube test. Built in roll chart. Portable style with cover.

RESEARCH LABORATORY MODEL (Not Illustrated)

MODEL 1700—For tube tests under handbook conditions. All voltages and currents are variable and metered (8 meters). 0-60 000 micromhos in 8 ranges. Electronically regulated and metered power supplies.

OSCILLOSCOPES

WIDE RANGE—VERSATILE

MODEL 1810—5" flat face post accelerated CRT and illuminated, calibrated screen. 4 mc band vertical amplifier. 10 millivolts peak-to-peak per cm sensitivity. Triggered or recurrent sweeps—variable from 2 cps to 30 kc. Built-in direct reading, regulated square wave voltage calibrator. AC or DC vertical amplifier inputs.

INDUSTRIAL'S 5" PORTABLE

MODEL 685—Features identical amplifiers DC to 750 kc—1 cps to 750 kc. 0.5 microseconds rise time. Sensitivity—20 millivolts RMS vertical (30 horizontal). Recurrent or triggered sweep. Covers 1 cps to 10 kc in 5 calibrated decade ranges with vernier control of 10 to 1. External sync for triggering and synchronizing the built-in sweep generator.

3" RACK MOUNT

MODEL 387R—Identical horizontal and vertical amplifiers. Triggered or recurrent sweeps from 1 cps to 100 kc. Slow sweeps (10 seconds or more) with external capacitors. 10 millivolts RMS per inch vertical sensitivity (14 horizontal).

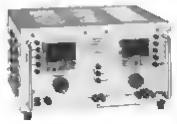
3" PORTABLE

MODEL 385 CSM—Rugged lightweight designed for field service. Features unitized circuit modules. DC amplifiers (horizontal and vertical) with frequency coverage to 4 mc at .075 RMS volts per inch. 2 MC bandwidth has roll-off per IRE standard. Telescopic light shield and shock mounted carrying case.

CARD PROGRAMMED SWITCH

Cardmatic automatic or manual multiple switch provides up to 10 million variables. Self-cleaning wiping type contacts rated .00025 ohms nominal (contact-to pin); current rating is 10 amperes. Prox. 7" x 7½" x 4½" D

GENERATORS



SINE WAVE—SQUARE WAVE

MODEL 710—Both sine and square wave outputs in one generator with wide frequency range (20 cps to 1 megacycle in 5 ranges). Sine wave total harmonic distortion below 1%. Hum level better than 90 db down. Square wave rise time less than 0.1 microsecond. Portable—easily adapted to rack mount.

SQUARE WAVE

MODEL 1715—Wide frequency range of 1 cps to 1 megacycle, continuous in 5 decade bands with constantly variable frequency available throughout the entire range. Rise time is 0.02 microseconds. Consistent output level is independent of frequency setting. Electronic regulation of power supply. Includes symmetry control and provision for external synchronization.

VACUUM TUBE VOLTMETERS

HIGH FREQUENCY MODEL

MODEL 1600—Accurately indicates AC voltages from .05 to 300 volts in frequencies from 20 cps to 700 mc (up to 3000 mc are possible). Includes special thermionic diode probe. Excellent plus or minus DC volts, readability from .05 to 1000 volts. 7-range ohmmeter with practical readability from 0.2 ohm to 1000 megohms. Power supply built in. Has 1% meter.

SMALL SIZE VOM

MODEL 456—Has full-wave bridge type rectifier circuit. Features a patented automatic (button reset) overload protection system to hold meter and associated circuits from damage due to accidental overload. 0-1200 AC or DC volts in 6 ranges. Sensitivity—20 000 ohms per volt DC (1000 AC). Resistance—0 to 100 megohms. 5 db ranges (−18 to +67).

HICKOK-DAWE INSTRUMENTS

True RMS-VTVM—300 microvolts to 300 volts, 5 cps to 500 kc.

Stroboscopes—3 models with wide ranges.

Sound Level Indicators—Portable and laboratory types.

Balancing Machine—For rotating parts (4 oz. to 10 lbs.).

HICKOK METERS

Accurate DC and AC Portables

Ammeters, milliammeters, microammeters, voltmeters, millivoltmeters, volt-ammeters, thermometers. Shielded. Accuracy within ½ of 1% —available to 2/10 of 1%.

PANEL METERS

A complete panel meter line is available in numerous types, styles and ranges to meet every specification. The many special conveniences developed by HICKOK are: Electrodynamometers, self contained frequency meters, galvanometers, true logarithmic deflections, ruggedized, long scale subminiatures, and taut-band suspensions with sensitivities to as low as ½ of 1 microampere.

THE HICKOK ELECTRICAL INSTRUMENT CO. 10514 DUPONT AVENUE CLEVELAND 5, OHIO

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