DATA COMMUNICATIONS PRODUCTS

Terminal produces hard copy from CRT display

Two new data terminals combine keyboard entry, 2400-baud operation, and a CRT display with the convenience of a paper copy.

Upon command from either the operator or a remote computer, Models 40 and 44 produce a 4.5-x-5-in. copy of the CRT display. The first copy takes five seconds; additional copies (same or different displays) take only two seconds each.

The difference between the terminals is in the display. Model 40 has a 25-line display, with each line having up to 40, 0.125-x-0.150-in. characters. Model 44 produces 12 lines of up to 80 characters each, character size is 0.075 x 0.140 in.

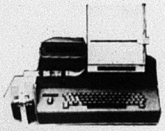
The CRT display on both models has a 9-in. diagonal, and uses 5-x-7 dot matrices to form the characters.

What makes these hard-copy, CRT terminals possible is a company-proprietary process called Quantafax™. This is a high-speed, electro-photographic process that uses a large, uniform, photoconductive sheet to produce high-resolution—10 line pairs/mm—copies on a bond-like paper. The 4.5-x-5-in. copies cost less than a penny each, are archival, and the paper accepts notations in pen or pencil.

Model 40 and Model 44 can replace IBM's 2260/2848 and 2265/2845 display terminals and controllers, and use RS232B (or C) interfaces. Price ranges from under $6600 to $8900, depending on quantity. Leases are available. Photophysics, Inc., 1601 Stierlin Rd., Mountain View, Calif. 94040. (415) 969-9500.

Circle Reader Service #289

ELECTRONIC KEYBOARD



The Electro/Set 450 Editor is designed for speed and economy in making corrections and then producing a clean tape for high speed computerized equipment. The unit includes a floating display which offers 128 different symbols. Fairchild Graphic Equipment Division, 221 Fairchild Ave., Plainview, N.Y. 11803.

Circle Reader Service #290

PROCESSING SYSTEMS

These systems feature a series of building block modules including a micro-processor, video displays, cassette tapes, printers, card readers, disc drives and other hardware. The micro-processor is the heart of the s system and can be programmed for unlimited applications. Sanders Associates, Inc., Daniel Webster Highway, South, Nashua, N.H. 03060.

Circle Reader Service #291

LOW COST MODEM

The 5220 is a low-cost, compact, originate or answer-only modem. It includes power supply and indicating lights for power and carrier detect when supplied. The unit is compatible with the Bell 101, 103, and 113 Series. It will operate full-duplex at speeds up to 300 b/s, is strappable for half-duplex and will interface with Bell couplers. RFL Industries, Inc., Boonton, N.J. 07005.

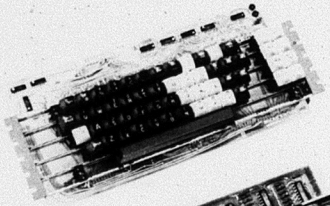
Circle Reader Service #292

CHANNEL QUALITY MONITOR

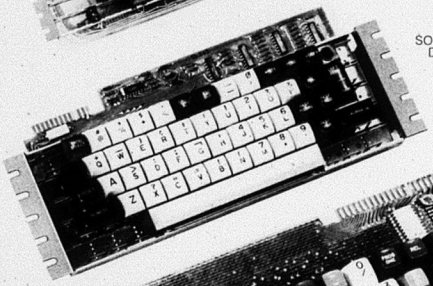
The Model 19017 lets you determine signal quality without interrupting service by breaking into a transmission line. It provides direct, on-line indication of data transmission quality over standard phase-shift modems. Digital Devices, Inc., 12 Spielman Rd., Fairfield, N.J.

Circle Reader Service #293

MEET THE MICRO SWITCH KEYBOARD FAMILY

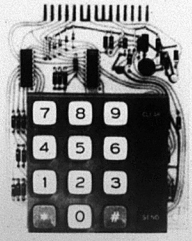


REED SWITCH KEYS
DTL ENCODED



SOLID STATE KEYS
DTL ENCODED

SOLID STATE KEYS
MOS ENCODED
(with two or "n" key rollover)



NW KEYBOARD
(Slow-Make Slow-Break)
DTL ENCODED

	SOLID STATE KEYS MOS ENCODED	SOLID STATE KEYS DTL ENCODED	REED SWITCH KEYS DTL ENCODED	NW (SLOW-MAKE SLOW-BREAK) DTL ENCODED
USASCII CODE	✓	✓	✓	✓
EBCDIC CODE	✓	✓	✓	✓
BCD CODE	✓	✓	✓	✓
EXCESS THREE CODE	✓	✓	✓	✓
SYSTEM THREE CODE	✓	✓	✓	✓
AVAILABLE WITHOUT ENCODING	✓	✓	✓	✓
MONO-MODE OPERATION	✓	✓	✓	✓
DUAL-MODE OPERATION	✓	✓	✓	
TRI-MODE OPERATION	✓	✓	✓	
FOUR-MODE OPERATION	✓	✓	✓	
NONE LOGICAL CODE PAIRINGS	✓			
TWO-KEY ROLLOVER	✓	✓	✓	✓
"N" KEY ROLLOVER	✓			
CHOICE OF BUTTON COLORS	✓	✓	✓	✓
CHOICE OF LEGEND COLORS	✓	✓	✓	✓
MULTIPLE UNIT BUTTONS	✓	✓	✓	✓
SCULPTURED BUTTONS	✓	✓	✓	
TRI-SHOT BUTTONS	✓	✓	✓	
STROBE OUTPUT	✓	✓	✓	✓
OFFSET ARRAYS	✓	✓	✓	
OFFSET-PLUS BLOCK ARRAYS	✓	✓	✓	
BLOCK ARRAYS	✓	✓	✓	✓
ALTERNATE-ACTION SHIFT LOCK	✓	✓	✓	
ELECTRONIC SHIFT LOCK WITH LIGHTED KEY	✓	✓	✓	
SLOPED KEY ROWS	✓	✓	✓	✓
STEPPED KEY ROWS	✓	✓	✓	
ENCLOSURE	✓	✓	✓	
SYSTEM CONTROL	✓	✓	✓	
ONE-CHARACTER STORAGE	✓			
DATA KEY IDLE SIGNAL	✓			
ERROR SIGNAL	✓			
FUNCTION KEY OUTPUTS	✓	✓	✓	✓
OUTPUT ENABLE	✓			

For more information contact MICRO SWITCH Freeport, Illinois.

THE ELECTRONIC ENGINEER
Magazine

KEYBOARD SELECTION GUIDE

THE ELECTRONIC ENGINEER
Magazine

Compiled by the Editors of THE ELECTRONIC ENGINEER with the assistance of MICRO SWITCH

• One Decker Square, Bala-Cynwyd, Pa. 19004 • Price $1.00

COMMON TERMS

Encoding: Keyboards are required to generate a variety of codes ranging from 4-bit binary-coded-decimal (BCD) which is common to numeric devices, to the 12-bit Hollerith card punch code. Other commonly used codes are:

ASCII—7-bits, primarily for communications terminals.

EBCDIC—8-bits, IBM 360/370 code.

Additional bits may be generated to cover tagging of certain keys for special functions and/or controls.

Shift/modes: Many applications today require two, three or four levels or modes of keyboard encoding. Often the modes require random or non-logical shifting of bits from one mode to another. These modes may be accessible by shift keys or system shift signals. Control of the shifts may be located in the keyboard or in the system or a combination of the two.

Strobe: This is a signal indicating valid key depression and is used for synchronizing with external equipment.

Repeat: Generally an electronic simulation of repeated depression of same key by gating the strobe signal on and off at a given rate after a key has been depressed for some given length of time. Options are that all keys have this capability or special function keys control the automatic repeat. Bi-level switches provide a repeat signal when key is depressed three or four times normal pressure.

Interlock: An electronic means of preventing error generation due to the actuation of more than one key at any one time.

Electrical Monitor Detector (EMD): A current or voltage sensing circuit to enable detection of the number of keys depressed at one time.

Two-Key Rollover (2KRO): An extension of the EMD detection circuits, where, if a second key is depressed before the first key is released, both keys will be registered. The second key, however, is registered only after the first is released.

NKRO: Is more than an extension of 2KRO to any number of keys, in that registration is in order of depression regardless of release sequence.

Error Detection: An invalid key depression is commonly detected by use of tag bits. A tag bit is added to the encoding matrix and comes true when an invalid key is depressed. This turns on the error detect circuit which alerts the operator.

Parity checking, though less common today with electronic keyboards, is another means of detecting errors. If odd parity, then the sum of all the ones in the binary code including parity bit must be odd, similarly an even parity system requires the sum of all the ones to be even.

Data key idle (DKI) enable detection of a two-key-down condition. This type of error detection is common in two-key rollover interlock systems. It is not needed in n-key rollover interlocks.

Key array: The physical or appearance aspects of a keyboard are determined by the operators' environment. Available in skew/offset configurations, the keys can be grouped in blocks, they can be stepped much as in a mechanical typewriter or, in the same plane, sloped as in some of the electric typewriter systems. Keyboards can use different color keys to make it easy to spot which groups of keys do what general functions.

USASCII CODE

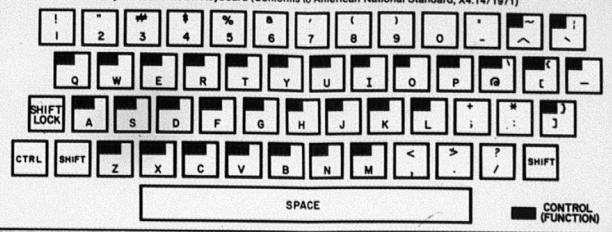
U.S.A. Standard Code for Information Interchange

Bits b_4 b_3 b_2 b_1	Column 0	1	2	3	4	5	6	7
0 0 0 0	0	NUL	DLE	SP	0	@		p
0 0 0 1	1	SOH	DC1	!	1		a	q
0 0 1 0	2	STX	DC2	"	2		b	r
0 0 1 1	3	ETX	DC3	#	3		c	s
0 1 0 0	4	EOT	DC4	$	4		d	t
0 1 0 1	5	ENQ	NAK	%	5		e	u
0 1 1 0	6	ACK	SYN	&	6		f	v
0 1 1 1	7	BEL	ETB	'	7		g	w
1 0 0 0	8	BS	CAN	(	8		h	x
1 0 0 1	9	HT	EM	)	9		i	y
1 0 1 0	10	LF	SUB	*	:		j	z
1 0 1 1	11	VT	ESC	+	;	[	k	
1 1 0 0	12	FF	FS	,	<	\	l	
1 1 0 1	13	CR	GS	-	=	]	m	
1 1 1 0	14	SO	RS	.	>	^	n	
1 1 1 1	15	SI	US	/	?	_	o	DEL

UNSHIFTED SHIFTED CONTROL (FUNCTION)

KEYBOARDS AND SWITCHES

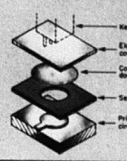
53 Key Tri-mode ASCII Keyboard (Conforms to American National Standard, X4.14/1971)



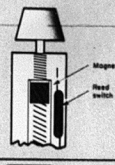
KEYBOARD SWITCHES

While there may be various versions of switch methods used for keyboards, they will generally fall into one of the types shown.

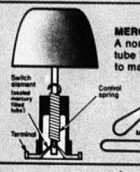
MECHANICAL CONTACTING TYPES



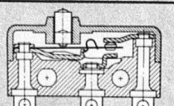
ELASTOMERIC Uses printed circuit board land as stationary contacts which are closed by a moveable contact key.



REED Glass-sealed ferro-magnetic alloy members close when magnetized, thereby closing an electric current path.



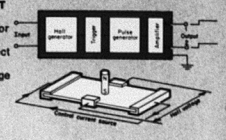
MERCURY A normally pinched-off mercury tube is opened by key depression to make a circuit closure.



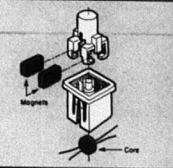
CONTACT Electrical circuit is completed when fixed and moveable contacts touch. Actual contact can be from bumps on arms, or wires touching.

SOLID STATE TYPES

HALL-EFFECT (BSK) Semiconductor transducer uses hall effect to induce a voltage change from the movement of a magnet.



SATURATED CORE Wired array has oscillator and coded sense wires which are coupled when a ferrite core is unsaturated or closed.



CAPACITIVE Switches either generate or couple pulses when the key changes dielectric distance between metal plates.

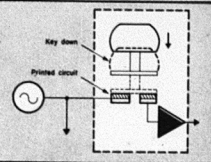
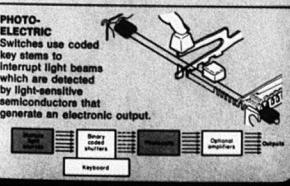


PHOTO-ELECTRIC Switches use coded key stems to interrupt light beams which are detected by light-sensitive semiconductors that generate an electronic output.



CHECKLIST FOR KEYBOARDS

Interlocks
- ☐ EMD
- ☐ 2KRO
- ☐ NKRO

Shift
- ☐ None/Mono-Mode
- ☐ Dual-Mode
- ☐ Tri-Mode
- ☐ Quad-Mode
- ☐ Shift keys
- ☐ External or system control

Error Detection
- ☐ Tag Bits/Error Sig.
- ☐ Parity
- ☐ Data Key Idle

Error Lock-Out
- ☐ Self-correcting
- ☐ Internal
- ☐ External

Encoding
- ☐ Basic Code
- ☐ Additional Bits
- ☐ Function Keys

Shift Lock
- ☐ Mech. latch
- ☐ Electronic
- ☐ Alternate Action Switch

Keyboard System Interface
- ☐ Pos/Neg.
- ☐ DTL
- ☐ TTL
- ☐ MOS
- ☐ Supply voltage
- ☐ Inputs
- ☐ Outputs
- ☐ Lamp Drivers
- ☐ Line Drivers
- ☐ Keyboard Inhibit

Special Functions
- ☐ Alternate Action Keys
- ☐ Lighted Keys
- ☐ Indicators

Repeat
- ☐ Clock Rates
- ☐ All Keys
  - ☐ Separate key
  - ☐ Timed repeat
- ☐ Selected Keys
  - ☐ Timed repeat
  - ☐ Bi-level key

Strobe
- ☐ Level
- ☐ Pulsed

Strobe Control
- ☐ Internal
- ☐ External

Key Array
- ☐ Skew/offset
- ☐ Blocks
- ☐ Stepped
- ☐ Sloped

Key Tops
- ☐ Special shapes
- ☐ Legends
- ☐ Colors
- ☐ Tri-color
- ☐ Re-Legendable

Button Configuration
- ☐ Truncated
- ☐ Round
- ☐ Square
- ☐ Sculptured

Special Features
- ☐ Enclosure
- ☐ Cabling
- ☐ Connector

Switching
- ☐ Type

Environment

Reliability

Human Engineering

EBCDIC CODE

Extended Binary Coded Decimal Interchange Code

Bit Positions → 01 / 23 / 4567	00	01	10	11	00	01	10	11	00	01	10	11	00	01	10	11
0000	NUL	DLE	DS		SP	&	-									0
0001	SOH	DC1	SOS				/			a	j	~		A	J	1
0010	STX	DC2	FS							b	k	s		B	K	S	2
0011	ETX	DC3								c	l	t		C	L	T	3
0100	PF	RES	BYP	PN						d	m	u		D	M	U	4
0101	HT	NL	LF	RS						e	n	v		E	N	V	5
0110	LC	BS	EOB	UC						f	o	w		F	O	W	6
0111	DEL	IDL	PRE	EOT						g	p	x		G	P	X	7
1000		CAN								h	q	y		H	Q	Y	8
1001	RLF	EM								i	r	z		I	R	Z	9
1010	SMM	CC	SM					\	¢	!	¦	:				LVM
1011	VT	CU1	CU2	CU3					.	$	,	#				
1100	FF	IFS		DC4					<	*	%	@				
1101	CR	IGS	ENQ	NAK					(	)	—	'				
1110	SO	IRS	ACK						+	;	>	=				
1111	SI	IUS	BEL	SUB					!	¬	?	"				

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