HARRIS

HD-0165
Keyboard Encoder

FEATURES

- STROBE OUTPUT

- KEY ROLLOVER OUTPUT

- EXPANDABLE: 2 PACKAGES REQUIRED FOR FULL TELETYPEWRITER, EIGHT-BIT ENCODING

- SINGLE +5.0V SUPPLY REQUIRED

- DTL/TTL OUTPUTS

- MONOLITHIC RELIABILITY
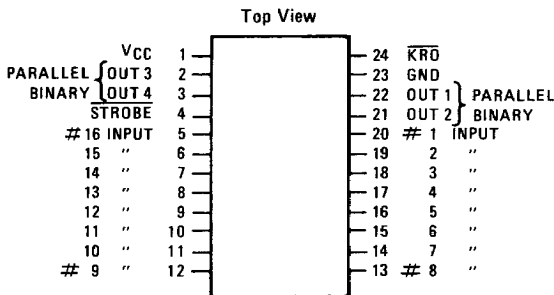
APPLICATIONS

- MICROPROCESSOR DATA ENTRY (16 KEY TO HEX CODE)

- BCD DATA ENTRY

- TYPEWRITER TYPE KEYBOARDS
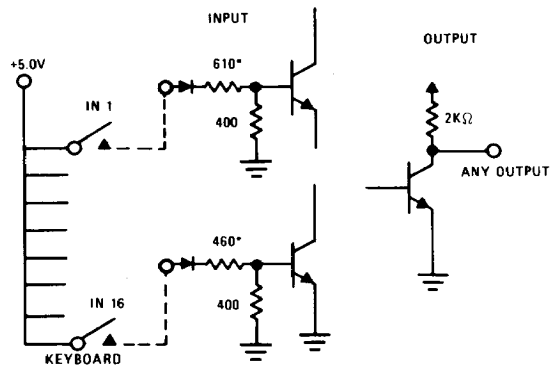
- CONTROL PANELS

DESCRIPTION

The HD-0165 Keyboard Encoder is a 16 line to four-bit parallel encoder intended for use with manual data entry devices such as calculator or typewriter keyboards. In addition to the encoding function, there is a Strobe output and a Key Rollover output which energizes whenever two or more inputs are energized simultaneously. Any four-bit code can be implemented by proper wiring of the input lines. Inputs are normally wired through the key switches to the +5.0V power supply. Full typewriter keyboard encoding up to eight bits can be accomplished with two Encoder circuits by the use of double pole key switches or single pole switches with two isolation diodes per key. Outputs will interface with all popular DTL and TTL logic families. The circuit is packaged in a hermetic 24-pin dual-in-line package and operates over the temperature range of 0°C to +75°C.

PINOUT

Section 11 for Packaging

Top View

VCC	1		24	KRO
PARALLEL {OUT 3	2		23	GND
BINARY {OUT 4	3		22	OUT 1 } PARALLEL
STROBE	4		21	OUT 2 } BINARY
# 16 INPUT	5		20	# 1 INPUT
15 "	6		19	2 "
14 "	7		18	3 "
13 "	8		17	4 "
12 "	9		16	5 "
11 "	10		15	6 "
10 "	11		14	7 "
# 9 "	12		13	# 8 "

EQUIVALENT CIRCUITS

INPUT

OUTPUT

* EQUIVALENT RESISTORS FOR OTHER INPUTS ARE BETWEEN THESE TWO VALUES

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ABSOLUTE MAXIMUM RATINGS

Supply Voltage	+7.0V	Output Current	30mA
Input Voltage	+5.5V	Storage Temperature	-65° to $+150^\circ$C
Output Voltage	+5.5V	Operating Temperature (Case)	0°C to $+75^\circ$C

ELECTRICAL CHARACTERISTICS

Test Conditions: $V_{CC} = +5.0V \pm 5\%$
$T_{Case} = 0^\circ$C to $+75^\circ$C
Unless otherwise specified

	PARAMETER		SYM.	LIMITS			UNITS	TEST CONDITIONS
				MIN.	TYP.	MAX.		
D.C.	Input Current	"1"	I_{IH}			17	mA	$V_{IN} = +5.0V$
	Output Voltage	"0"	V_{OL}		+0.2	+0.4	V	$V_{IH} = +4.5V \quad I_{OL} = 10mA$
						+0.4		$V_{IH} = +3.5V \quad I_{OL} = 3.2mA$
		"1"	V_{OH}	+2.4	+4.0			V_{IL} = Open Circuit, $I_{OH} = -240\,\mu A$
	Power Supply Current	Operating	I_{CC}			52	mA	One Input at +5.25V
		Maximum	I_{CCM}			88	mA	All Inputs at +5.25V
A.C.	Skew Time (Note 1)		T_{SK}		80	200	ns	$T_{Case} = 25^\circ$C $V_{CC} = V_{IN} = +5.0V$ $C_L < 50pF$

NOTE: (1) Skew time is the maximum time differential between propagation delay times of any outputs including strobe and $\overline{K_{RO}}$.

TRUTH TABLE

						INPUTS										OUTPUTS					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3	4	St.	$\overline{K_{RO}}$
L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H
H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	L	H
L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	L	H
L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	H	H	L	H
L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	L	H
L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	H	H	L	H	L	H
L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	H	L	H	L	H
L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	H	L	L	H	L	H
L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	H	L	H
L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	H	H	L	L	H
L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	H	L	L	H
L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	H	L	H	L	L	H
L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	H	L	L	H
L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	H	H	L	L	L	H
L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	H	L	L	L	H
L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	H	L	L	L	L	H
L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	H
ANY TWO OR MORE HIGH																X	X	X	X	L	L

INPUTS: L = Open Circuit or < +1.0V H = > +4.5V Current Source
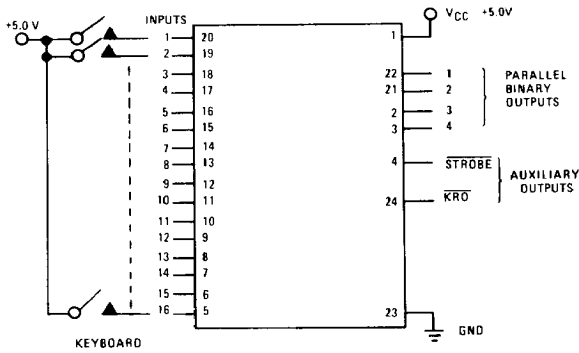OUTPUTS: L = < +0.4V H = > +2.4V X = Erroneous Data

Figure 1. GENERAL CONFIGURATION FOR ENCODING TWO TO SIXTEEN KEYS

The Truth Table is used to determine wiring from the key switches to Encoder inputs to produce desired output codes.
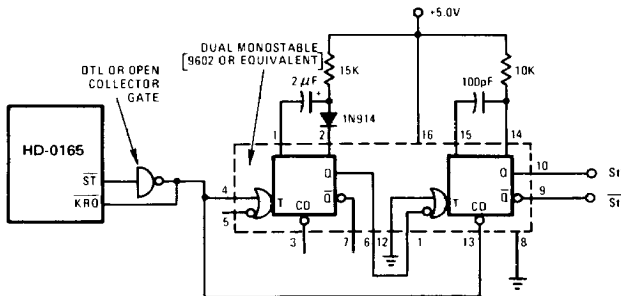

Figure 2. SWITCH BOUNCE ELIMINATION

This circuit generates a delayed Strobe pulse (ST'). Delay time is determined by first monostable and should be about 10ms. Pulse width is determined by second monostable and should be set according to system requirements. Effect of switch bounce or arcing on make or break is positively eliminated and proper encoding will take place under two key rollover conditions
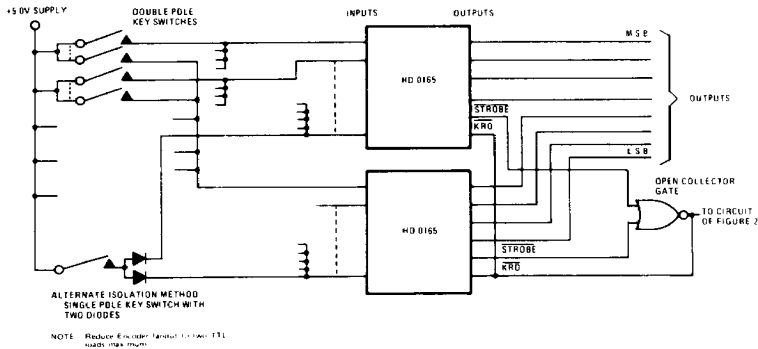

Figure 3. ENCODING UP TO 256 KEYS

Use upper Encoder to produce the four most significant output bits; the lower to produce the least significant bits. Use Truth Table and required output codes to determine wiring from each key to the two Encoders.

SHIFT and CONTROL functions can be implemented by logic gates in series with the output lines.