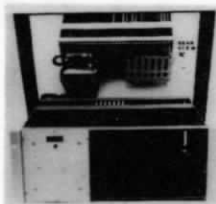


### ASCII American Standard Code for Information Interchange

b7 b6 b5 b4 b3 b2 b1 ROW	COLUMN								
	0 0	0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1	
	0	1	2	3	4	5	6	7	
0 0 0 0	0	NUL	DLE	SP	0	@	P	\	p
0 0 0 1	1	SOH	DC1	!	1	A	Q	o	q
0 0 1 0	2	STX	DC2	"	2	B	R	b	r
0 0 1 1	3	ETX	DC3	#	3	C	S	c	s
0 1 0 0	4	EOT	DC4	\$	4	D	T	d	t
0 1 0 1	5	ENQ	NAK	%	5	E	U	e	u
0 1 1 0	6	ACK	SYN	&	6	F	V	f	v
0 1 1 1	7	BEL	ETB	/	7	G	W	g	w
1 0 0 0	8	BS	CAN	(	8	H	X	h	x
1 0 0 1	9	HT	EM	)	9	I	Y	i	y
1 0 1 0	10	LF	SUB	*	:	J	Z	j	z
1 0 1 1	11	VT	ESC	+	;	K	[	k	{
1 1 0 0	12	FF	FS	,	<	L	\	l	
1 1 0 1	13	CR	GS	-	=	M	]	m	}
1 1 1 0	14	SO	RS	.	>	N	^	n	~
1 1 1 1	15	SI	US	/	?	O	_	o	DEL



- 722 BUFFER/CONVERTER**
- Speed and/or Code Conversion
  - Serial <-> Parallel Conversion
  - 56,000 Character Buffer



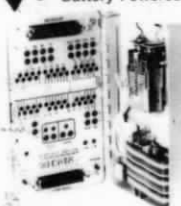
- T26M TÉLEX I, II AND DDD INTERFACE**
- Stand alone & Multi-line

Hex to Binary Conversion				
Hex	Binary			
	MSB*			LSB**
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
A	1	0	1	0
B	1	0	1	1
C	1	1	0	0
D	1	1	0	1
E	1	1	1	0
F	1	1	1	1

\*Most Significant Bit  
\*\*Least Significant Bit

### 921-T4 EIA RS 232 Interface Tester

- High Impedance
- Bi-Color LEDs
- Battery Powered



### BAUDOT

FIGURES	1	2	3	4	5	6	7	8	9	0	1	4	5	7	2	6	"	BLANK	FIGURES	SPACE	LETTERS	LINE FEED				
LETTERS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1	•																									
2		•																								
3			•																							
4				•																						
5					•																					

FREQUENCY	MODEM MODE	
	ORIGINATE	ANSWER
SEND Mark	1270	2225
Space	1070	2025
REC Mark	2225	1270
Space	2025	1070

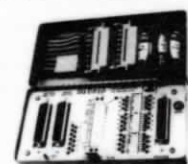
### Standard DTMF tone frequencies for Touch Tone® dialing

Character	2-out-of-8 Signal Frequencies	
	Low Group, (Hz)	High Group (Hz)
1	697	1209
2	697	1336
3	697	1477
4	770	1209
5	770	1336
6	770	1477
7	852	1209
8	852	1336
9	852	1477
0	941	1336
*	941	1209
#	941	1477
A	697	1633
B	770	1633
C	852	1633
D	941	1633

### TTL-PARALLEL CENTRONICS® COMPATIBLE INTERFACE

SIGNAL NAME	INTERFACE	CONN.	SOURCE
DATA STROBE (N)		Pins 1, 19	Input Device
DATA 1		2, 20	Input Device
DATA 2		3, 21	Input Device
DATA 3		4, 22	Input Device
DATA 4		5, 23	Input Device
DATA 5		6, 24	Input Device
DATA 6		7, 25	Input Device
DATA 7		8, 26	Input Device
DATA 8		9, 27	Input Device
ACKNLG (N)		10, 28	Printer
BUSY		11, 29	Printer
PE		12	Printer
SLCT		13	Printer
±OV		14	Printer
OSCXT		15	Printer
±OV		16	
Chassis Gnd		17	Printer
+5V		18	Printer
INPUT PRIME (N)		31, 30	Input Device
FAULT (N)		32	Printer
(Note 3)		33-36	

- NOTES:
1. Second pin number indicates twisted pair return (±OV)
  2. Active low signals are specified by the notation (N) after the signal name. Active high signals have no notation.
  3. Function of pins 33-36 vary with printer model. Consult manufacturers specification.



- 936-TTL PARALLEL INTERFACE TESTER**
- Centronics® compatible
  - AC/BATT/Printer powered
  - 20 monitor LEDs
  - 2 ± pulse traps
  - Ground loop test



- AB/ABDE SWITCHES**
- 25 pin 36 pin  
Smart Switches  
Remote Switches

### R319/12 MULTI-LINE EIA TO NEUTRAL LOOP CONVERTER

- 20/60 ma operation
- EIA to Loop Isolation
- 2 miles distance



160 EIA TO LOOP CONVERTER



108 SERIES 0-300 BAUD MODEMS





RS232C EIA MODEM-TERMINAL INTERFACE						
PIN	NAME	TO TERM	TO MOD	FUNCTION	EIA RS232C CIRCUIT	CCITT V.24 CIRCUIT
1	FG			Frame Grd	(AA)	101
2	TD			Xmitted Data	(BA)	103
3	RD	↑	↓	Received Data	(BB)	104
4	RTS		↓	Req to Send	(CA)	105
5	CTS	↑↑		Clear to Send	(CB)	106
6	DSR	↑↑		Data Set Ready	(CC)	107
7	SG			Signal Grd	(AB)	102
8	DCD	↑↑↑		Data Carr. Det.	(CF)	109
9				+DC Tst. Voltage		
10		↑↑↑		-DC Tst. Voltage		
11				Unassigned		
12	(S)(DCD)	↑↑		Sec. Data Carr. Det.	(SCF)	122
13	(S)(CTS)	↑↑		Sec. Cl To Send	(SCB)	121
14	(S)(TD)	↑↑	↓	Sec. Xmitted Data	(SBA)	118
15	TC	↑↑↑		Xmitter Clock	(DB)	114
16	(S)(RD)	↑↑↑		Sec. Rcvd Data	(SBB)	119
17	RC	↑↑↑		Receiver Clock	(DD)	115
18			↓	Rcvr Dbit Clk		
19	(S)(RTS)	↑↑	↓	Sec. Req To Send	(SCA)	120
20	DTR	↑↑	↓	Data Term Rdy.	(CD)	108.2
21	SO	↑↑		Sig Qual Det	(CG)	110
22	RI	↑↑		Ring Indicator	(CE)	125
23			↓	Data Rate Sel	(CH/CI)	111/112
24	(TC)		↓	Ext Xmitter Clk.	(DA)	113
25			↓	Busy		

\*Positive voltage equals binary zero, space on  
 \*Negative voltage equals binary one, mark, off

RS449 INTERFACE CONNECTIONS						
PIN	NAME	PIN	NAME	*CAT	SOURCE	FUNCTION
1	SHIELD					
2	SI(A)			II	DCE	Signal Rate Inq.
3	SPARE					
4	SD(A)	20	RC	II	DCE	Receive Common
5	ST(A)	22	SD(B)	I	DTE	Send Data
6	RD(A)	23	ST(B)	I	DCE	Send Timing
7	RS(A)	24	RD(B)	I	DCE	Receive Data
8	RT(A)	25	RS(B)	I	DTE	Request to Send
9	CS(A)	26	RT(B)	I	DCE	Receive Timing
10	LL(A)	27	CS(B)	I	DCE	Clear to Send
11	DM(A)	28	IS(A)	II	DTE	Local Loopback
12	TR(A)	29	DM(B)	I	DTE	Terminal in Svc.
13	RR(A)	30	TR(B)	I	DTE	Terminal Ready
14	RL(A)	31	RR(B)	I	DCE	Receive Ready
15	IC(A)	32	SS(A)	II	DTE	Remote Loopback
16	SF(A)/SR(A)	33	SQ(A)	II	DCE	Select Standby
17	TT(A)	34	NS(A)	II	DCE	Incoming Call
18	TM(A)	35	TT(B)	I	DTE	Signal Quality
19	SG	36	SB(A)	II	DTE	Sel Frq/Sig Rte
		37	SC	I	DCE	New Signal
					DTE	Terminal Timing
					DCE	Test Mode
					DCE	Standby Ind.
					DTE	Signal Ground
					DTE	Send Common

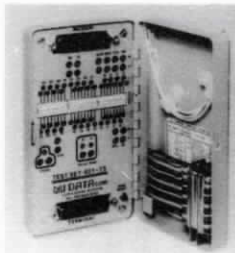
\*Circuit Category - I balanced - II unbalanced

- 160L - 161  
 AC powered - Interface powered  
 LIMITED DISTANCE MODEMS
- Up to 6 miles at 9600 bps
  - Up to 3 miles at 19.2K bps
  - Modem/Terminal configurations



COPPER WIRE	
AWG B&S GAUGE	OHM PER 1000 FT. @68°F(20°C)
30	103.2
28	64.9
26	40.8
24	25.7
22	16.1
20	10.2
18	6.4
16	4.0

- 144A  
 SYNCHRONOUS  
 LIMITED DISTANCE  
 MODEM
- Point-to-Point
  - Multi-Drop
  - 3270 compatible



- 921-R-2-F BERT/BLERT  
 RS232C INTERFACE TESTER
- Programmable baud rate
  - Operation to 76K baud
  - 511/2047/DOT patterns
  - Multi-Lang FOX generator
  - Onboard breakout box

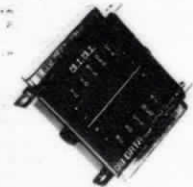


WORD PER MINUTE TO BAUD EQUIVALENT RATE			
WORD PER MIN	TOTAL BITS	BAUD RATE	BIT TIME MS
61.35 (60)	7.42	45.55	22
66.6 (75)	7.42	50	20
76.6 (100)	7.42	54.86	17.59
100 (100)	7.42	74.2	13.47
100 (100)	7.5	75	13.33
100 (100)	11	110	9.09

922MX PORTABLE ASYNC  
 CQMM DATA TEST SET

- Distortion Gen/Analysis
- Multi-lang FOX generator
- RS232/MIL 188/20-60 ma loop
- Programmable baud and format
- IBM-PC parallel output
- 2200Series plug-in modules

MINI-RS232C MINIATURE  
 INTERCONNECT MONITOR  
 INTERFACE TESTER



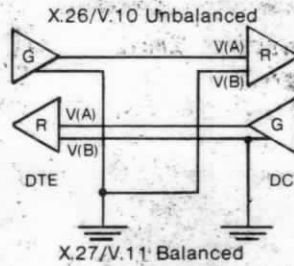
Notation	RS 232C Interchange Voltage			Units
	Negative	Positive	Undefined	
Binary State	1	0		
Signal/Data	Marking	Spacing		
Control	Off	On		
Receiver Specification	-3 to -25	+3 to +25	-3 to +3	Volts
Driver Specification	-5 to -15	+5 to +15	-5 to +5	Volts



- .750  
 RS-232 <-> RS-422 Converter
- Sync or Async
  - DTE/DCE selectable



- 915-X20/X21, 15 PIN  
 INTERFACE TESTER
- X26/X27 compatible
  - 2 pulse traps
  - 2 spare ± detectors
  - Xmit level verification



- 937 - RS449, 37 PIN  
 INTERFACE TESTER
- RS422/RS423 compatible
  - Pulse trap
  - 2 spare ± detectors

PIN NUMBER	INTERCHANGE CIRCUIT ASSIGNMENT					Source
	X.26	X.27	X.26	X.27	X.27	
1	Shield	Shield	Shield	Shield	Shield	DTE
2	T	T(A)	T	T(A)	T(A)	DTE
3			C	C(A)	C(A)	DCE
4	R	R(A)	R(A)	R(A)	R(A)	DCE
5			I(A)	I(A)	I(A)	DCE
6			S(A)	S(A)	S(A)	DCE
7			B(A)	B(A)	B(A)	DCE
8	G	G	G	G	G	DTE
9	Ga	T(B)	Ga	T(B)	T(B)	DTE
10			Ga	C(B)	C(B)	DCE
11	Gb	R(B)	R(B)	R(B)	R(B)	DCE
12			I(B)	I(B)	I(B)	DCE
13			S(B)	S(B)	S(B)	DCE
14			B(B)	B(B)	B(B)	DCE
15						Reserved for future international use

NOTATION	RS 449 INTERCHANGE VOLTAGE			Units
	Negative	Positive	Undefined	
Binary State	1	0		
Signal/Data	Marking	Spacing		
Control	Off	On		
Receiver Specification	VA-VB < -0.3	VA-VB > +0.3	VA-VB = -0.3 to +0.3	Volts
Driver Specification	VA-VB = -4 to -6	VA-VB = 4 to 6	VA-VB = -4 to +4	Volts



# ASCII (7-Bit) Reference Chart

AlphaNumerics				Symbols				Controls			
Standard Characters	Decimal	Hexadecimal	Binary	Symbol Characters	Decimal	Hexadecimal	Binary	Non-Printing Controls	Decimal	Hexadecimal	Binary
A	65	41	1000001	SP	32	20	0100000	ACK	6	06	0000110
B	66	42	1000010	!	33	21	0100001	BEL	7	07	0000111
C	67	43	1000011	"	34	22	0100010	BS	8	08	0001000
D	68	44	1000100	#	35	23	0100011	CAN	24	18	0011000
E	69	45	1000101	\$	36	24	0100100	CR	13	0D	0001101
F	70	46	1000110	%	37	25	0100101	DC1	17	11	0010001
G	71	47	1000111	&	38	26	0100110	DC2	18	12	0010010
H	72	48	1001000	'	39	27	0100111	DC3	19	13	0010011
I	73	49	1001001	(	40	28	0101000	DC4	20	14	0010100
J	74	4A	1001010	)	41	29	0101001	DEL	127	7F	1111111
K	75	4B	1001011	*	42	2A	0101010	DLE	16	10	0010000
L	76	4C	1001100	+	43	2B	0101011	EM	25	19	0011001
M	77	4D	1001101	,	44	2C	0101100	ENQ	5	05	0000101
N	78	4E	1001110	-	45	2D	0101101	EOT	4	04	0000100
O	79	4F	1001111	.	46	2E	0101110	ESC	27	1B	0011011
P	80	50	1010000	/	47	2F	0101111	ETB	23	17	0010111
Q	81	51	1010001	:	58	3A	0111010	ETX	3	03	0000011
R	82	52	1010010	;	59	3B	0111011	FF	12	0C	0001100
S	83	53	1010011	<	60	3C	0111100	FS	28	1C	0011100
T	84	54	1010100	=	61	3D	0111101	GS	29	1D	0011101
U	85	55	1010101	>	62	3E	0111110	HT	9	09	0001001
V	86	56	1010110	?	63	3F	0111111	LF	10	0A	0001010
W	87	57	1010111	@	64	40	1000000	NAK	21	15	0010101
X	88	58	1011000	[	91	5B	1011011	NUL	0	00	0000000
Y	89	59	1011001	\	92	5C	1011100	RS	30	1E	0011110
Z	90	5A	1011010	]	93	5D	1011101	SI	15	0F	0001111
a	97	61	1100001	^	94	5E	1011110	SO	14	0E	0001110
b	98	62	1100010	_	95	5F	1011111	SOH	1	01	0000001
c	99	63	1100011	{	123	7B	1111010	STX	2	02	0000010
d	100	64	1100100		124	7C	1111100	SUB	26	1A	0011010
e	101	65	1100101	}	125	7D	1111101	SYN	22	16	0010110
f	102	66	1100110	~	126	7E	1111110	US	31	1F	0011111
g	103	67	1100111					VT	11	0B	0001011
h	104	68	1101000								
i	105	69	1101001								
j	106	6A	1101010								
k	107	6B	1101011								
l	108	6C	1101100								
m	109	6D	1101101								
n	110	6E	1101110								
o	111	6F	1101111								
p	112	70	1110000								
q	113	71	1110001								
r	114	72	1110010								
s	115	73	1110011								
t	116	74	1110100								
u	117	75	1110101								
v	118	76	1110110								
w	119	77	1110111								
x	120	78	1111000								
y	121	79	1111001								
z	122	7A	1111010								
0	48	30	0110000								
1	49	31	0110001								
2	50	32	0110010								
3	51	33	0110011								
4	52	34	0110100								
5	53	35	0110101								
6	54	36	0110110								
7	55	37	0110111								
8	56	38	0111000								
9	57	39	0111001								



## Quick Interface Reference Card

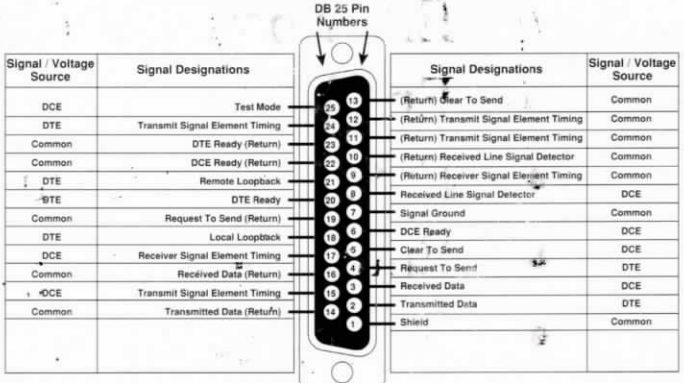
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Featuring The Latest Data Communications Products

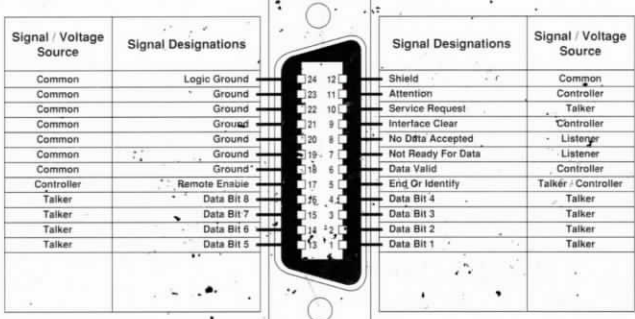
- Test Equipment and Tools
- Interface Conversion
- Modems and Line Drivers
- Manual and Auto Switches
- Cables and Connectors
- Buffers and Spoolers
- Fiber Optics and Video
- Modular Patch Panels

FREE Technical Support  
Custom Design and Manufacturing

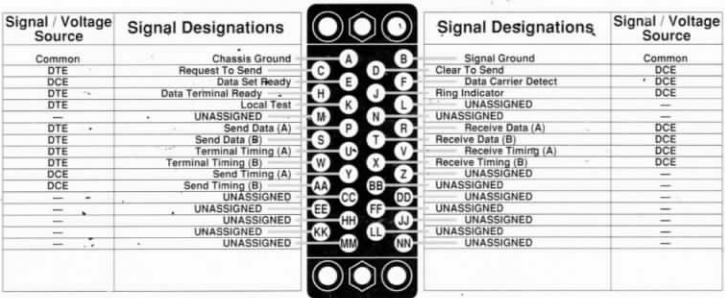
### EIA-530 Interface Reference



### IEEE 488 Interface Reference



### V.35 Interface Reference



Prefix	Symbol	Multiplier
Atto	a	.000 000 000 000 000 001
Femto	f	.000 000 000 000 001
Pico	p	.000 000 000 001
Nano	n	.000 000 001
Micro	μ	.000 001
Milli	m	.001
Centi	c	.01
Deci	d	.1
Deka	da	10
Hecto	h	100
Kilo	k	1,000
Mega	M	1,000,000
Giga	G	1,000,000,000
Tera	T	1,000,000,000,000
Peta	P	1,000,000,000,000,000
Exa	E	1,000,000,000,000,000,000

**Metric Prefixes**

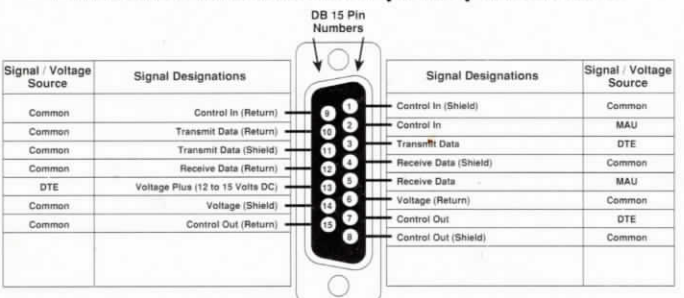
### Decimal Equivalents

1/64 to 1/4	17/64 to 1/2	33/64 to 3/4	49/64 to 1
1/64 = .015625	17/64 = .265625	33/64 = .515625	49/64 = .765625
1/32 = .031250	9/32 = .281250	17/32 = .531250	25/32 = .781250
3/64 = .046875	19/64 = .296875	35/64 = .546875	51/64 = .796875
1/16 = .062500	5/16 = .312500	9/16 = .562500	13/16 = .812500
5/64 = .078125	21/64 = .328125	37/64 = .578125	53/64 = .828125
3/32 = .093750	11/32 = .343750	19/32 = .593750	27/32 = .843750
7/64 = .109375	23/64 = .359375	39/64 = .609375	55/64 = .859375
1/8 = .125000	3/8 = .375000	5/8 = .625000	7/8 = .875000
9/64 = .140625	25/64 = .390625	41/64 = .640625	57/64 = .890625
5/32 = .156250	13/32 = .406250	21/32 = .656250	29/32 = .906250
11/64 = .171875	27/64 = .421875	43/64 = .671875	59/64 = .921875
3/16 = .187500	7/16 = .437500	11/16 = .687500	15/16 = .937500
13/64 = .203125	29/64 = .453125	45/64 = .703125	61/64 = .953125
7/32 = .218750	15/32 = .468750	23/32 = .718750	31/32 = .968750
15/64 = .234375	31/64 = .484375	47/64 = .734375	63/64 = .984375
1/4 = .250000	1/2 = .500000	3/4 = .750000	1 = 1

### Metric «—» English Conversions

DIVIDE BY	From «—» To «—»	MULTIPLY BY
0.3937	«—» μm «—» mils	» 0.3937
0.0155	«—» μm «—» in	» 0.0155
0.3937	«—» mm «—» in	» 0.3937
39.37	«—» cm «—» in	» 39.37
3.2808	«—» m «—» ft	» 3.2808
1.0936	«—» m «—» yd	» 1.0936
3280.8	«—» km «—» ft	» 3280.8
62137	«—» km «—» mi	» 62137
0.3527	«—» gm «—» oz	» 0.3527
2.2046	«—» kg «—» lbs	» 2.2046

### Ethernet Transceiver (MAU) Interface

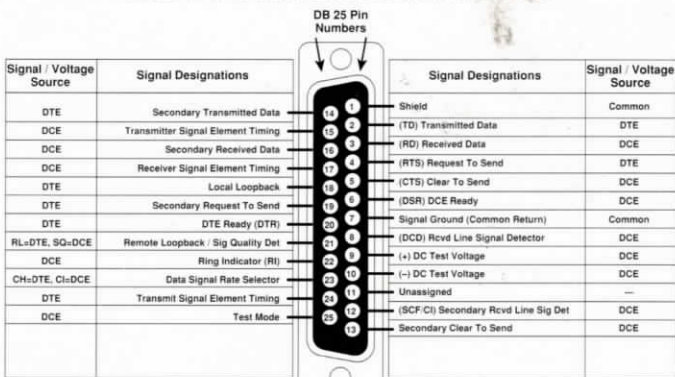


Centimeters 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

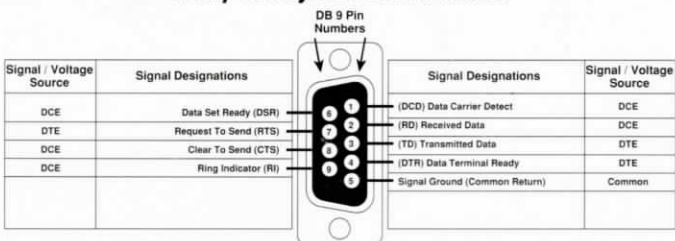


## Quick Interface Reference Card

### EIA-232 Interface Reference



### IBM / AT Style RS-232 Interface



### IBM PC Keyboard Interface

5 Pin DIN Connector

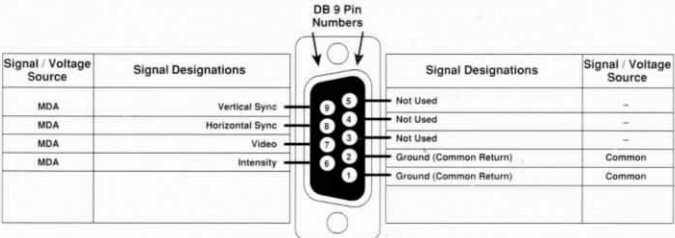


### IBM PS/2 Keyboard Interface

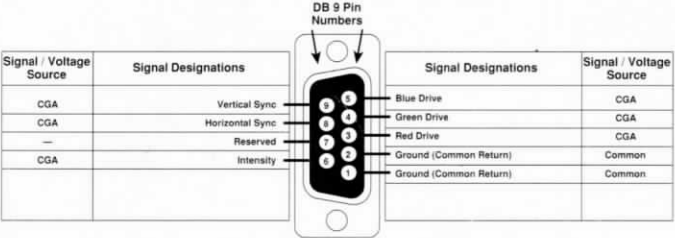
6 Pin Mini DIN Connector



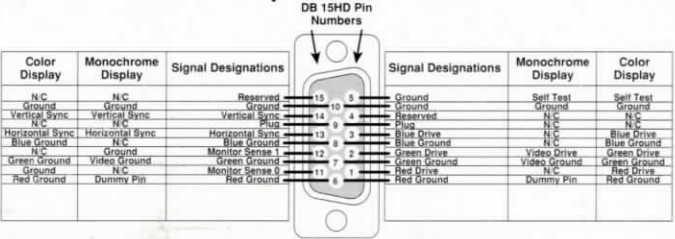
### IBM PC Monochrome Monitor Interface



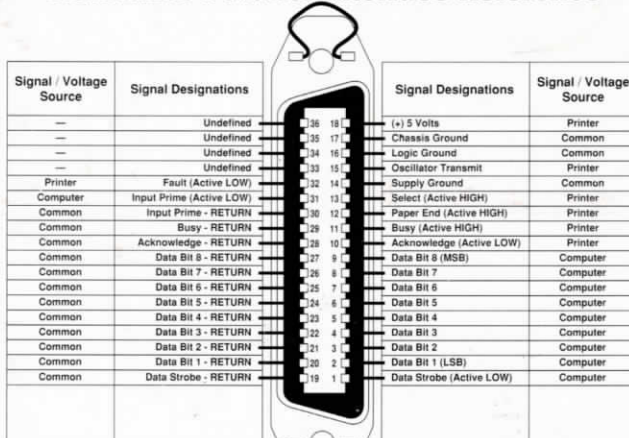
### IBM PC Color Monitor Interface



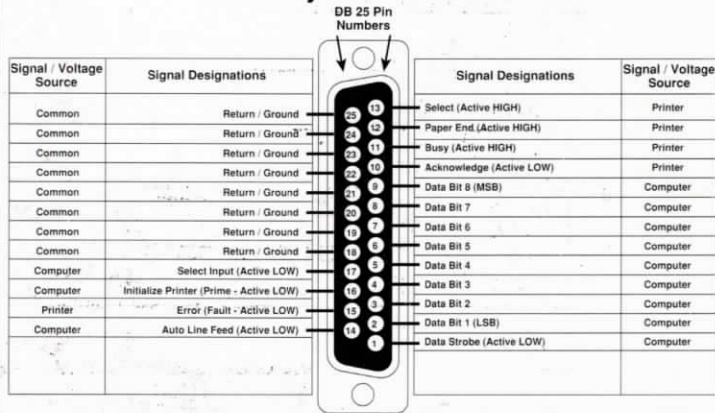
### IBM PS/2 Monitor Interface



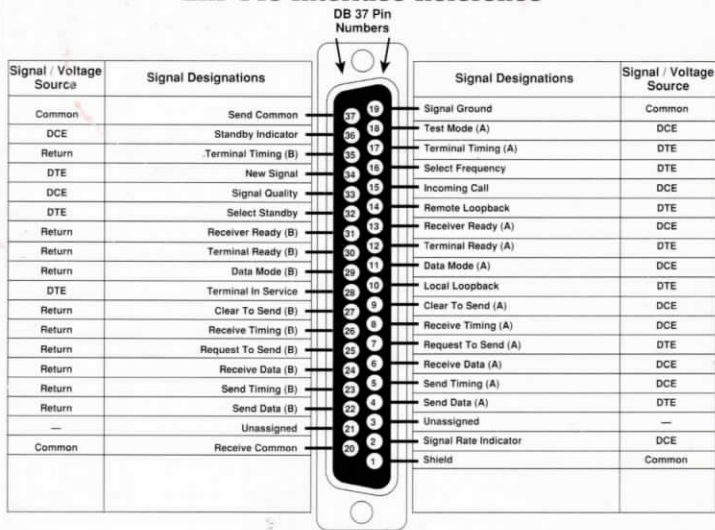
### Centronics Parallel Interface Reference



### IBM PC Style Parallel Interface



### EIA-449 Interface Reference



### EIA-449 Secondary Interface

