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## Communication Interface

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(Rev. Feb. 87)

### FEATURES

- Input/output as standard 20 milliamperere signals, TTL signals, and EIA RS-232C (CCITT V.24) signals
- 15 transmission speeds for transmit and receive from 50 to 9600 Baud
- On/off control of paper tape reader or TTY motor
- Modem control signals
- Programmable echo
- Optional 128-character FIFO buffers for input and output
- Parity generation and checking
- Selectable-control character recognition

### APPLICATIONS

- Interface for a teletypewriter
- Interface for a CRT terminal
- Interface for modem communication link
- Data link between two CAMAC systems
- Interface for character-oriented serial equipment

### GENERAL DESCRIPTION

The Model 3340 is a single-width CAMAC module interfacing the CAMAC Dataway directly to terminals, teletypewriters, modems, printers, etc. Characters are transmitted and received as 20 milliamperes and TTL signals on one front-panel connector and as EIA RS-232C signals on the other. Fifteen data rates are available: 50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, and 9600 Baud. Input and output data rates are independently adjustable via board-mounted switches. The number of data bits in a character is switch-selectable from five to eight. Another switch option allows the choice of one or two stop bits. Parity error checking is also switch-selectable.

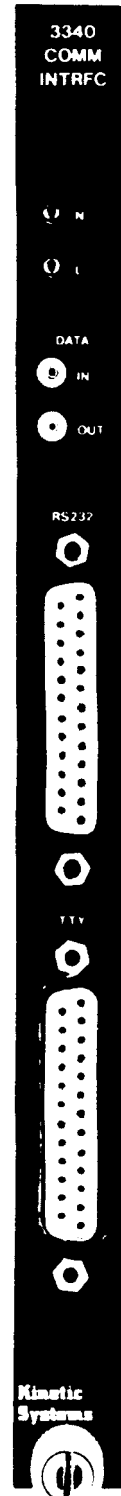
A relay control signal provides on/off control for a paper tape reader, a teletypewriter motor, or other load. The output is open collector and can drive loads up to 24 volts and 100 milliamperes. A fused +24 volt output is provided for use with this circuit. Modem control flags establish an automatic communication link through a modem via the EIA RS-232C connector.

Two optional 128-character buffers are available, one for input and one for output. These buffers provide an elastic buffer between the Dataway and the 3340 I/O ports. Under program control, the input can be echoed back to the output as well as to the computer.

End-Of-Block characters are selected for input and output (eight switches for input and eight switches for output). The End-Of-Block character detection is enabled and disabled by command.

On output block transfers, the buffer is filled by doing Write commands until  $Q = 0$  is detected. A  $Q = 0$  response means that the output buffer is full or the End-Of-Block character was written. The module will then continue to transmit the block of data at its selected Baud rate until the output buffer is empty.

On input block transfers, the input buffer is filled and a LAM is set, meaning that the input buffer is full or the End-Of-Block character has been written into the input buffer. The LAM is detected by the computer, and it reads the input buffer until  $Q = 0$  is detected. A  $Q = 0$  response means that the input buffer is empty or that the End-Of-Block character has been read.



**FUNCTION CODES**

Command		Q	Action
F(0)·A(0)	RD1	BE	Reads the Input register and clears LAM 2 and LAM 7. (See Note 1.)
F(1)·A(0)	RD2	1	Reads the Status register.
F(1)·A(12)	RD2	1	Reads the LAM Status register.
F(1)·A(14)	RD2	1	Reads the LAM Request register.
F(8)·A(15)	TLM	LR	Tests whether a LAM request is present.
F(9)·A(0)	CL1	1	Clears the buffer memories and UART.
F(16)·A(0)	WT1	BF	Writes the Output register and clears LAM 1. (See Note 2.)
F(17)·A(0)	WT2	1	Writes the Mode register.
F(17)·A(13)	WT2	1	Writes the LAM Mask register.
F(23)·A(12)	SC2	1	Selectively clears the LAM Status register.
Z	CZ	0	Clears LAM Status register, LAM Mask register, buffer memories, Mode register, and UART.

**Notes:** 1. Q = 0 for Buffer Empty or selected input EOB character read. Q = 1 otherwise.  
2. Q = 0 for Buffer Full or selected output EOB character written. Q = 1 otherwise.  
3. X = 1 for all valid addressed commands.

**LAM REGISTER**

Bit	Label	Description
11	OR	Input buffer overrun (character has been lost)
10	FRA	Input character framing error detected
9	PAR	Input character parity error detected
8	N/U	Not used
7	CP	Input character is available
6	CNP	Carrier Not Present (signal from data set)
5	CTS	Clear To Send (signal from data set)
4	DSR	Data Set Ready (signal from data set)
3	RI	Ring Indicator (signal from data set)
2	FULL	Input buffer full or End-Of-Block character detected on input to the input buffer (buffer option only)
1	EMP	Output buffer empty or Output register empty

**Note:** These bits represent edge-triggered latches and thus indicate that the condition occurred at least once since the last time a bit was cleared.

**POWER REQUIREMENTS**

<b>Model 3340-D1A</b>	+ 6 volts — 900 mA	<b>Model 3340-D1B</b>	+ 6 volts — 1100 mA
	+ 24 volts — 40 mA		+ 24 volts — 40 mA
	- 24 volts — 40 mA		- 24 volts — 80 mA

**ORDERING INFORMATION**

Weight: .54 kg. (1 lb. 2 oz.)

<b>Model 3340-D1A</b>	—	Communication Interface without FIFO Buffers
<b>Model 3340-D1B</b>	—	Communication Interface with FIFO Buffers
<b>Accessories</b>	—	Model 5933-Z1A Mating Connector Model 5860-A50J Cable Assembly

ASCII 7-BIT CODE

Octal Code	Char.	Octal Code	Char.	Octal Code	Char.	Octal Code	Char.
000	NUL	040	SP	100	@	140	`
001	SOH	041	!	101	A	141	a
002	STX	042	"	102	B	142	b
003	ETX	043	#	103	C	143	c
004	EOT	044	\$	104	D	144	d
005	ENQ	045	%	105	E	145	e
006	ACK	046	&	106	F	146	f
007	BEL	047	'	107	G	147	g
010	BS	050	(	110	H	150	h
011	HT	051	)	111	I	151	i
012	LF	052	*	112	J	152	j
013	VT	053	+	113	K	153	k
014	FF	054	,	114	L	154	l
015	CR	055	-	115	M	155	m
016	SO	056	.	116	N	156	n
017	SI	057	/	117	O	157	o
020	DLE	060	0	120	P	160	p
021	DC1	061	1	121	Q	161	q
022	DC2	062	2	122	R	162	r
023	DC3	063	3	123	S	163	s
024	DC4	064	4	124	T	164	t
025	NAK	065	5	125	U	165	u
026	SYN	066	6	126	V	166	v
027	ETB	067	7	127	W	167	w
030	CAN	070	8	130	X	170	x
031	EM	071	9	131	Y	171	y
032	SUB	072	:	132	Z	172	z
033	ESC	073	;	133	[	173	{
034	FS	074	<	134	\	174	
035	GS	075	=	135	]	175	}
036	RS	076	>	136	↑	176	~
037	US	077	?	137	←	177	DEL

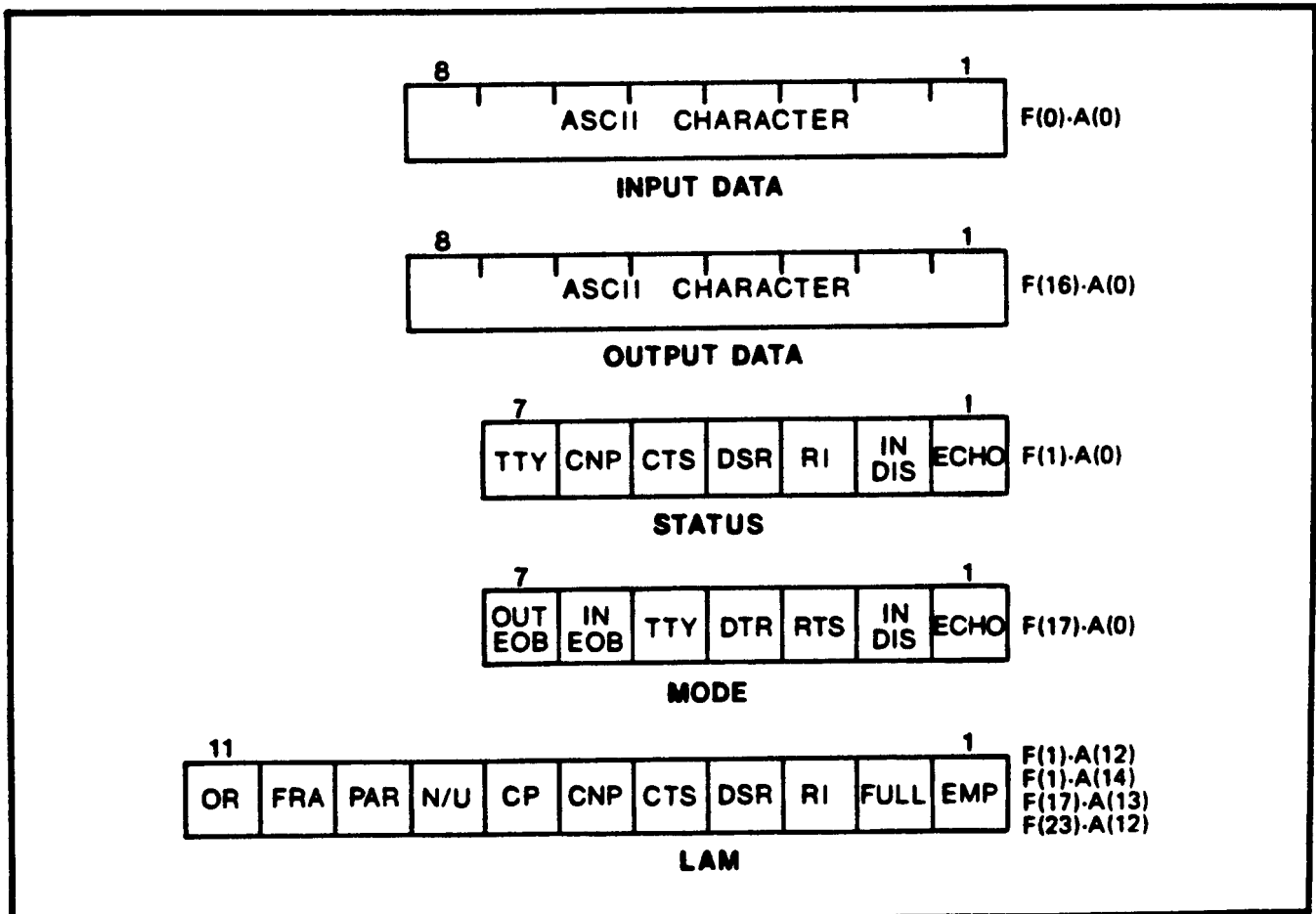
**MODE REGISTER (write only)**

Bit	Label	Description
7	OUT EOB	Enables output End-Of-Block character detection.
6	IN EOB	Enables input End-Of-Block character detection.
5	TTY	Enables TTY control signal.
4	DTR	Data Terminal Ready (signal to data set).
3	RTS	Request To Send (signal to data set).
2	IN DIS	Disables input data.
1	ECHO	Enables echo of data input to output.

**STATUS REGISTER (read only)**

Bit	Label	Description
7	TTY	TTY control signal enabled.
6	CNP	Carrier Not Present (signal from data set).
5	CTS	Clear to Send (signal from data set).
4	DSR	Data Set Ready (signal from data set).
3	RI	Ring Indicator (signal from data set).
2	IN DIS	Input data disabled.
1	ECHO	Echo of data input to output enabled.

**REGISTERS**



### INPUT/OUTPUT CONNECTORS

#### RS232 CONNECTOR

(Socket: type DB-25S)

- 1 • Protective Ground
- 2 • Transmitted Data (Out)
- 3 • Received Data (In)
- 4 • Request To Send (Out)
- 5 • Clear To Send (In)
- 6 • Data Set Ready (In)
- 7 • Signal Ground
- 8 • Carrier Present (In)
- 9 •
- 10 •
- 11 •
- 12 •
- 13 •
- 14 •
- 15 •
- 16 •
- 17 •
- 18 •
- 19 •
- 20 • Data Terminal Ready (Out)
- 21 •
- 22 • Ring Indicator (In)
- 23 •
- 24 •
- 25 •

Mating Connector: DB-25P

Note: These signals are as specified by EIA RS232C or CCITT Recommendation V.24.

#### TTY CONNECTOR

(Socket: type DB-25S)

- 1 • Protective Ground
- 2 • 20 mA Receive Data (In +)
- 3 • 20 mA Transmit Data (Out +)
- 4 •
- 5 •
- 6 •
- 7 • Signal Ground
- 8 • Relay Control Signal (Out)
- 9 •
- 10 •
- 11 • TTL Receive Data (In)
- 12 •
- 13 • TTL Transmit Data (Out)
- 14 •
- 15 • External X16 Transmit Clock (In)
- 16 •
- 17 • 20 mA Receive Data Return (In -)
- 18 •
- 19 •
- 20 • 20 mA Transmit Data Return (Out -)
- 21 • Fused +24 V (Out)
- 22 •
- 23 •
- 24 •
- 25 •

Mating Connector: DB-25P

Note: TTL Receive Data and TTL Transmit Data are not factory strapped. To use these signals, install straps as indicated under STRAP SELECTABLE OPTIONS.

### STRAP SELECTABLE OPTIONS

#### 20 mA Driver Source or Sink Current

Source Current	Strap AA to BB
	Strap CC to DD
	Strap EE to FF
Sink Current	Strap AA to DD
	Strap CC to FF

#### 20 mA Receiver Source or Sink Current

Source Current	Strap A to B
	Strap C to D
	Strap E to F
Sink Current	Strap A to D
	Strap C to F

#### Transmit Clock

Internal Clock	Strap I
External Clock	Strap E

#### TTL In

Strap TTL IN in order to use TTL input data.

#### TTL Out

Strap TTL OUT in order to use TTL output data.

**FRONT PANEL**

<b>LED Indicators</b>	
<b>N</b>	Flashes when the module is addressed.
<b>L</b>	On when the L signal is true.
<b>I/O Connectors</b>	
<b>RS232</b>	D type connector 25-way cannon type DBC-25S or equivalent.
<b>TTY</b>	D type connector 25-way cannon type DBC-25S or equivalent.

**SWITCH SELECTABLE OPTIONS**

**TRANSMIT/RECEIVE BAUD RATES (S2 - S1) 4 BITS**

BAUD RATE	A	B	C	D
50	0	0	0	0
75	1	0	0	0
110	0	1	0	0
134.5	1	1	0	0
150	0	0	1	0
300	1	0	1	0
600	0	1	1	0
1200	1	1	1	0
1800	0	0	0	1
2000	1	0	0	1
2400	0	1	0	1
3600	1	1	0	1
4800	0	0	1	1
7200	1	0	1	1
9600	0	1	1	1

Note: Transmit and Receive Baud Rate Selection is completely separate.

**OUTPUT END-OF-BLOCK CHARACTER (S3) 8 BITS**

EXAMPLE:

CHAR	8	7	6	5	4	3	2	1
EOT	0	0	0	0	0	1	0	0

EOT = ASCII 004

**INPUT END-OF-BLOCK CHARACTER (S4) 8 BITS**

EXAMPLE:

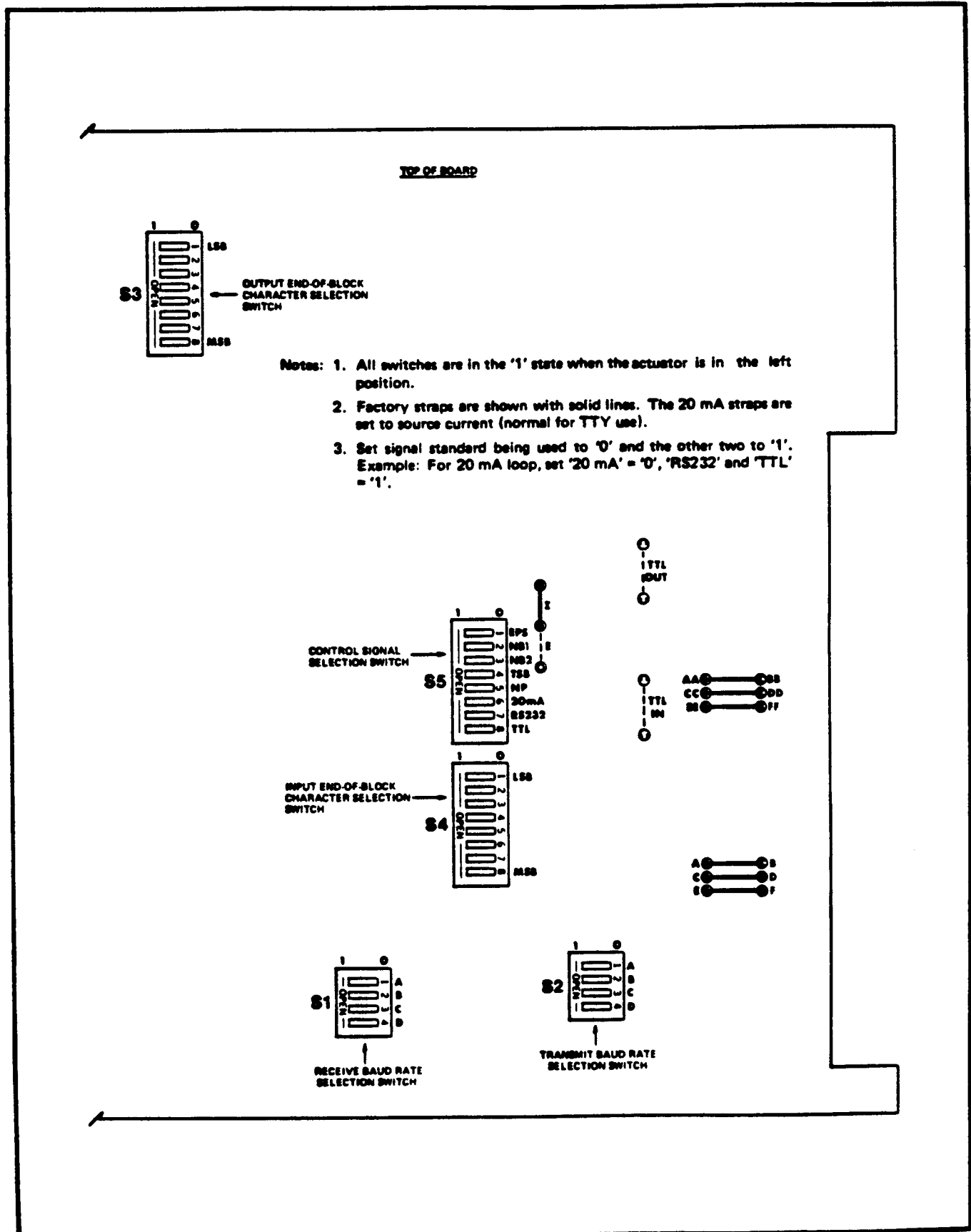
CHAR	8	7	6	5	4	3	2	1
CR	0	0	0	0	1	1	0	1

CR = ASCII 015

**CONTROL SIGNALS (S5) 8 BITS**

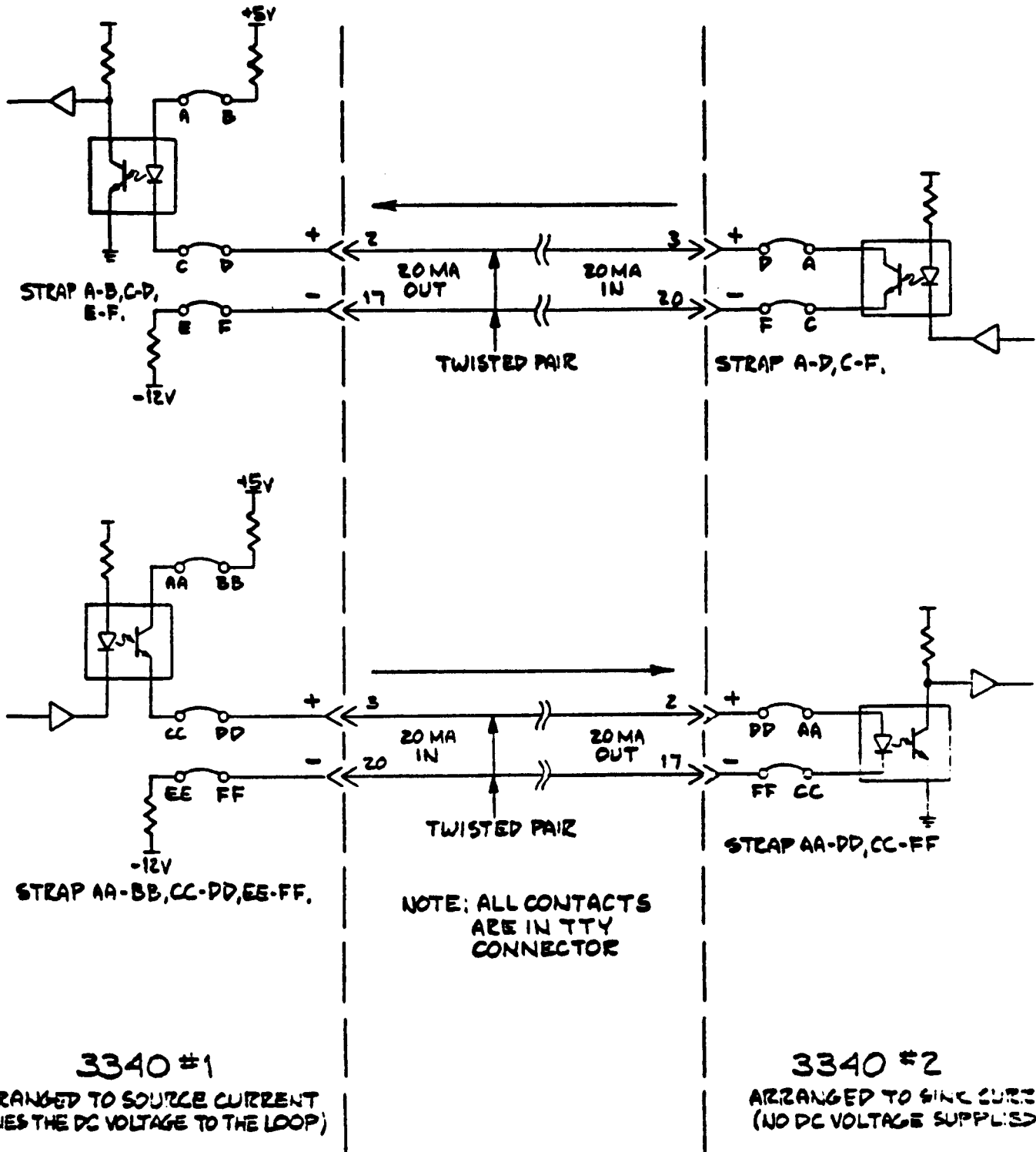
Name	Symbol	Selection															
Odd/Even Parity Select	EPS	1 = Even parity 0 = Odd parity															
Number of Bits/Character	NB1 NB2	<table border="1"> <tr> <td>NB2</td> <td>NB1</td> <td>Bits/Character</td> </tr> <tr> <td>0</td> <td>0</td> <td>5</td> </tr> <tr> <td>0</td> <td>1</td> <td>6</td> </tr> <tr> <td>1</td> <td>0</td> <td>7</td> </tr> <tr> <td>1</td> <td>1</td> <td>8</td> </tr> </table>	NB2	NB1	Bits/Character	0	0	5	0	1	6	1	0	7	1	1	8
NB2	NB1	Bits/Character															
0	0	5															
0	1	6															
1	0	7															
1	1	8															
Number of Stop Bits	TSS	1 = Two stop bits/character 0 = One stop bit/character															
No Parity	NP	1 = Parity eliminated TX and RX 0 = Normal parity TX and RX															
Input/Output Signal Standards	20 mA RS232 TTL	Set the switch for the signal standard being used = 0, the other two switches = 1.															

LOCATION OF OPTIONS ON BOARD

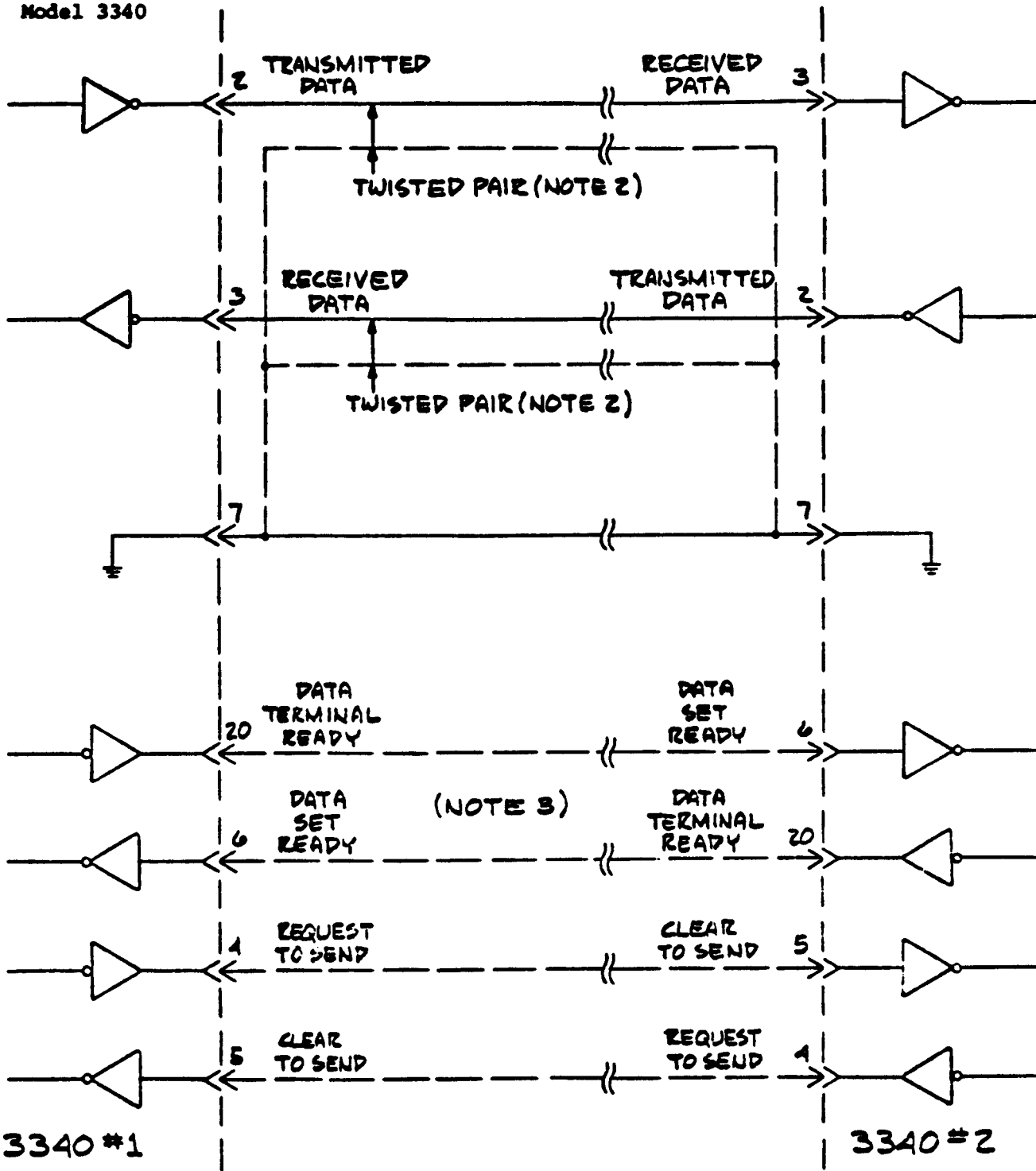








INTERCONNECTION OF TWO MODEL 3340(3) COMMUNICATION INTERFACE MODULES VIA 20 MA LOOPS



NOTES: 1. ALL CONTACTS ARE IN RS232 CONNECTOR.

2. OPTIONAL TWISTED PAIR SHOWN WILL REDUCE CROSSTALK BETWEEN SIGNAL PATHS FOR VERY LONG RUNS.

3. HANDSHAKING (DATA TERMINAL READY, ETC.) MAY BE PROVIDED

**INTERCONNECTION OF TWO MODEL 3340(B) COMMUNICATION INTERFACE MODULES VIA RS232 SIGNAL PATHS**