Personal Computer Hardware Reference Library

IBM Binary Synchronous Communications Adapter

IBM Binary Synchronous Communications Adapter

6361499

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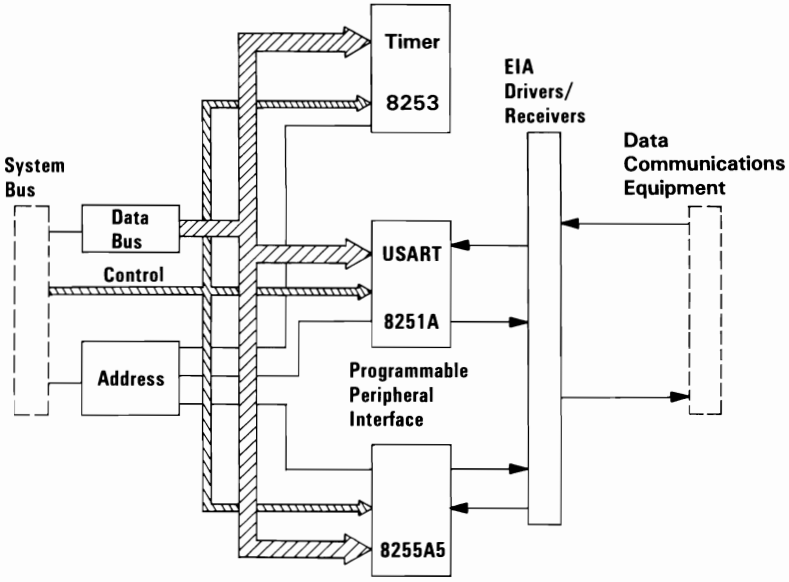
Description

The IBM Binary Synchronous Communications (BSC) Adapter provides an RS-232C-compatible communications interface for the IBM Personal Computer family of products. All system control, voltage, and data signals are provided through a 2- by 31-position card-edge connector. External interface is in the form of Electronic Industries Association (EIA) drivers and receivers connected to an RS-232C, standard 25-pin, D-shell connector.

The adapter is programmed to operate in a binary synchronous mode. Maximum transmission rate is 9600 bits per second (bps). The main feature of the adapter is an Intel 8251A Universal Synchronous/Asynchronous Receiver/Transmitter (USART). An Intel 8255A-5 Programmable Peripheral Interface (PPI) also is used for expanded modem operation, and an Intel 8253-5 Programmable Interval Timer provides time-outs and generates interrupts.

The following is a block diagram of the BSC adapter.



BSC Adapter Block Diagram

2 BSC Adapter

Programming Considerations

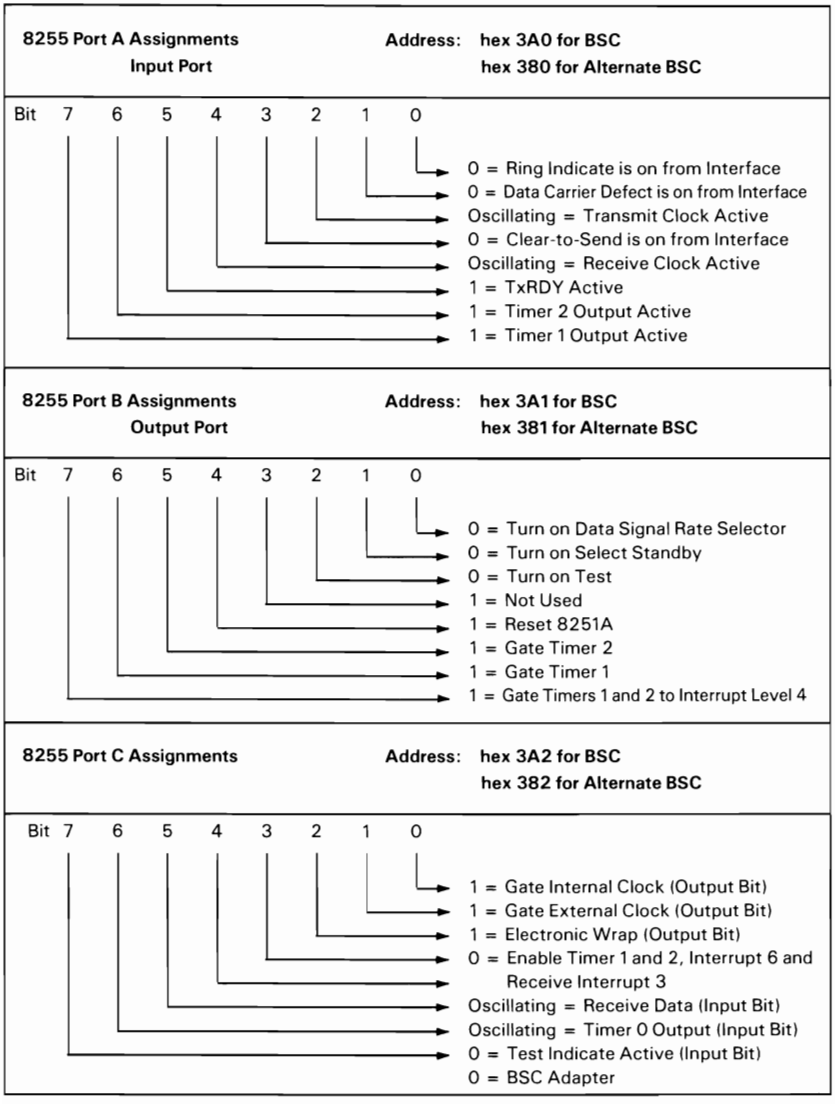
Before starting data transmission or reception, the system unit programs the BSC adapter to define control and gating ports, timer functions and counts, and the communications environment.

Typical Programming Sequence

The 8255A-5 Programmable Peripheral Interface (PPI) is set for the proper mode by selecting address hex 3A3 and writing the control word. This defines port A as an input, port B as an output for modem control and gating, and port C for 4-bit input and 4-bit output. An output to port C sets the adapter to the wrap mode, disallows interrupts, and gates external clocks (address = hex 3A2, data = hex 0D). The adapter is now isolated from the communication interface, and setup continues.

Bit 4 of the PPI's port B brings the USART reset pin high, holds it, then drops it. This resets the internal registers of the USART.

The PPI's port assignments are as follows:



The USART uses the 8253-5 Programmable Interval Timer (PIT) in the synchronous mode for inactivity time-outs to interrupt the system unit after a preselected amount of time has elapsed from the start of a communication operation. Counter 0 is not used for synchronous operation. Counters 1 and 2 connect to

interrupt-level 4 and, being programmed to terminal-count values, provide the desired time delay before generating a level-4 interrupt. These interrupts signal the system that a predetermined amount of time has elapsed without a TxRDY (level 4) or an RxRDY (level 3) interrupt being sent to the system unit.

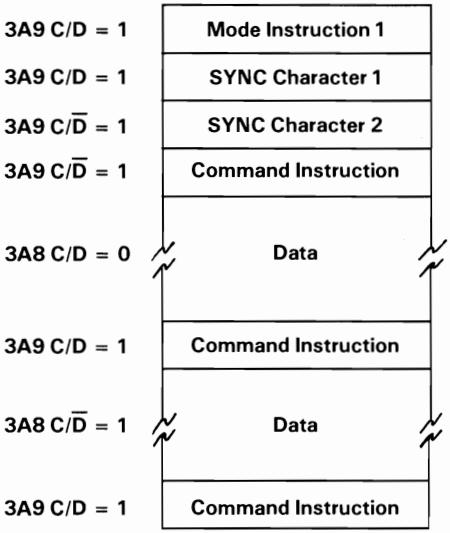
USART Programming

After the support devices on the BSC adapter are programmed, the USART is loaded with a set of control words that defines the communication environment. The control words consist of mode instructions and command instructions.

Both the mode and command instructions must conform to a specified sequence for proper device operation. The mode instruction must be inserted immediately after a reset operation before using the USART for data communications. The required synchronization characters for the defined communication technique are then loaded into the USART (usually hex 32 for BSC). All control words written to the USART after the mode instruction will load the command instruction. Command instructions can be written to the USART in the data block any time during its operation.

To return to the mode instruction, the master reset bit in the command instruction word is set to start an internal reset operation, which places the USART back into the mode instruction. Command instructions must follow the mode instructions or synchronization characters.

The following represents a typical data block and shows the mode instruction and command instruction.



Typical Data Block

The following are the communications interrupt levels.

- Interrupt level 4
  - Transmit
  - Timer 1
  - Timer 2
- Interrupt level 3
  - Receive

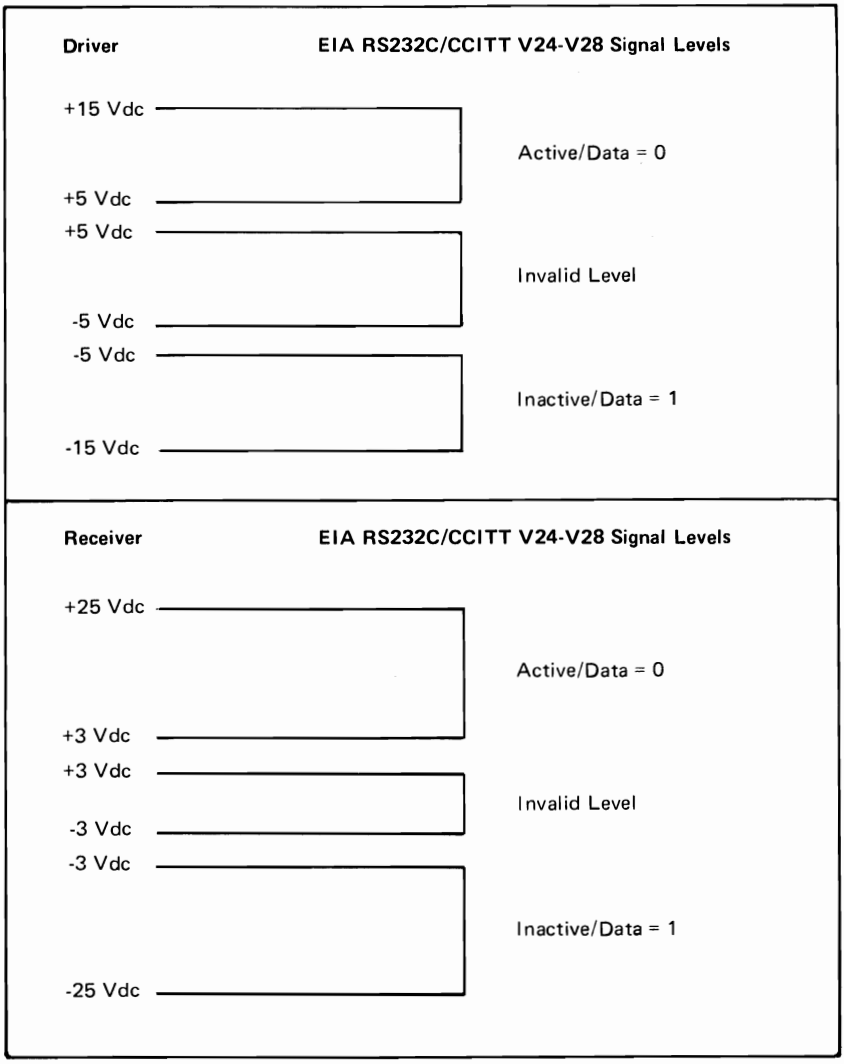
The following are device addresses.

Hex Address		Device	Register Name	Function
Primary	Alternate			
3A0	380	8255	Port A Data	Internal/External Sensing
3A1	381	8255	Port B Data	External Modem Interface
3A2	382	8255	Port C Data	Internal Control
3A3	383	8255	Mode Set	8255 Mode Initialization
3A4	384	8253	Counter 0 LSB	Not Used in Sync. Mode
3A4	384	8253	Counter 0 MSB	Not Used in Sync. Mode
3A5	385	8253	Counter 1 LSB	Inactivity Time Outs
3A5	385	8253	Counter 1 MSB	Inactivity Time Outs
3A6	386	8253	Counter 2 LSB	Inactivity Time Outs
3A6	385	8253	Counter 2 MSB	Inactivity Time Outs
3A7	387	8253	Mode Register	8253 Mode Set
3A8	388	8251	Data Select	Data
3A9	389	8251	Command/Status	USART Status

Device Address Summary

Interface

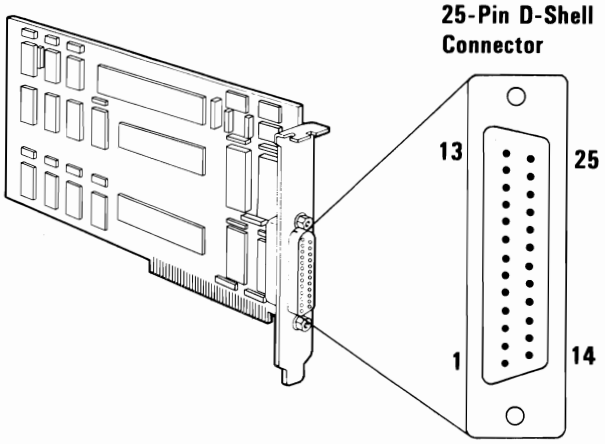
The IBM Binary Synchronous Communications Adapter conforms to interface signal levels standardized by the Electronic Industries Association (EIA) RS-232C Standard. The following figure shows these levels.



Interface Voltage Levels

Pins 11, 18, and 25 on the interface connector are not standardized by the EIA. These lines are designated as 'select standby,' 'test,' and 'test indicate.' 'Select standby' is used to support the switched network backup facility of a modem that provides this option. 'Test' and 'test indicate' support a modem wrap function on modems designated for business-machine, controlled-modem wraps.

Specifications



Signal Name — Description	Pin
No Connection	1
Transmitted Data	2
Received Data	3
Request to Send	4
Clear to Send	5
Data Set Ready	6
Signal Ground	7
Received Line Signal Detector	8
No Connection	9
No Connection	10
Select Standby*	11
No Connection	12
No Connection	13
No Connection	14
Transmitter Signal Element Timing	15
No Connection	16
Receiver Signal Element Timing	17
Test (IBM Modems Only)*	18
No Connection	19
Data Terminal Ready	20
No Connection	21
Ring Indicator	22
Data Signal Rate Selector	23
No Connection	24
Test Indicate (IBM Modems Only)*	25

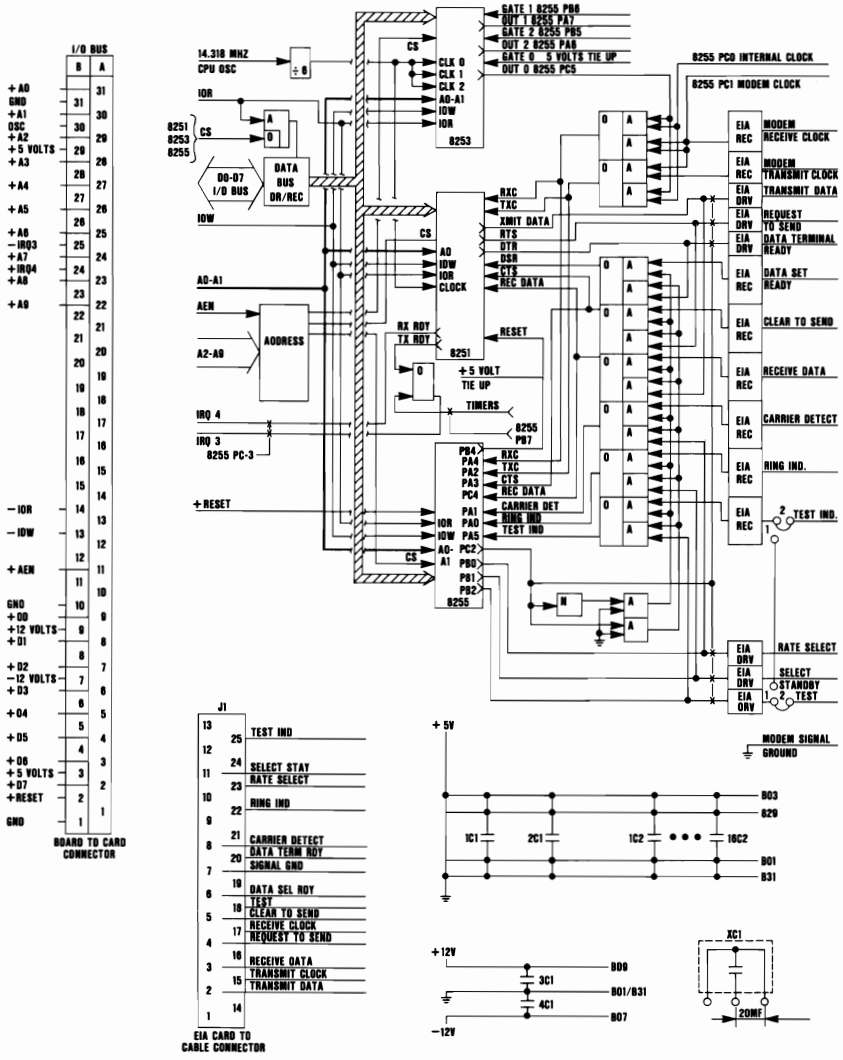
External Device

Binary Synchronous Communications Adapter

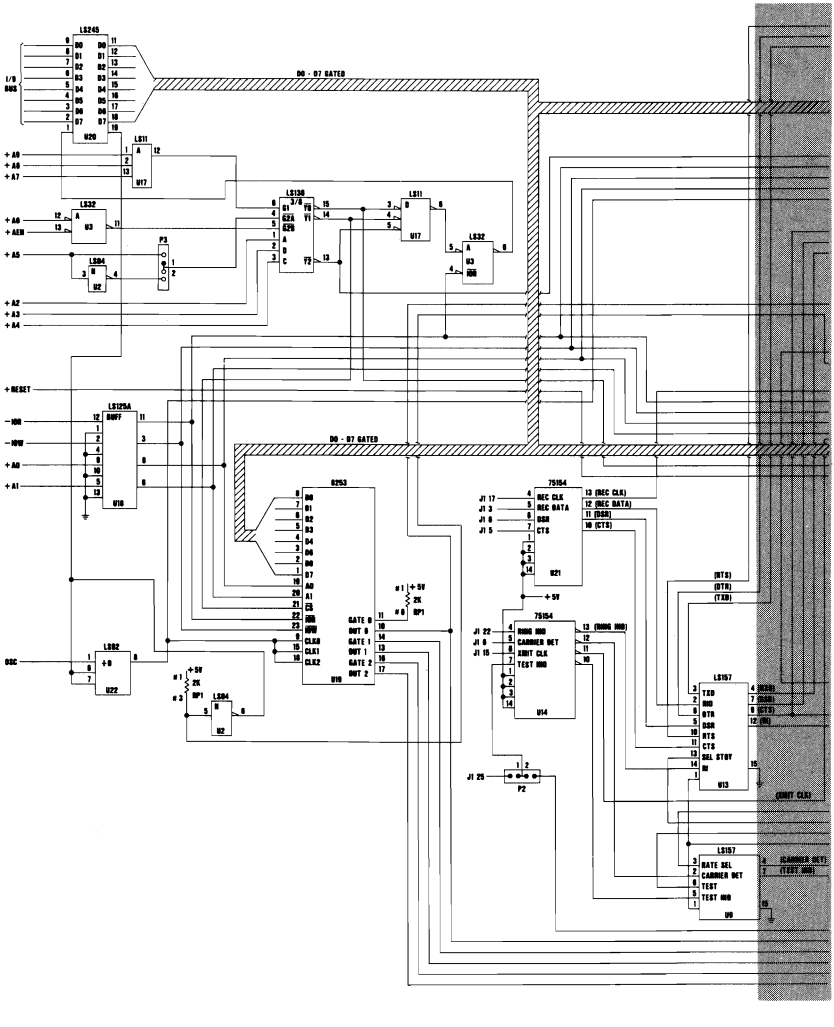
*Not standardized by EIA (Electronic Industries Association).

Connector Specifications

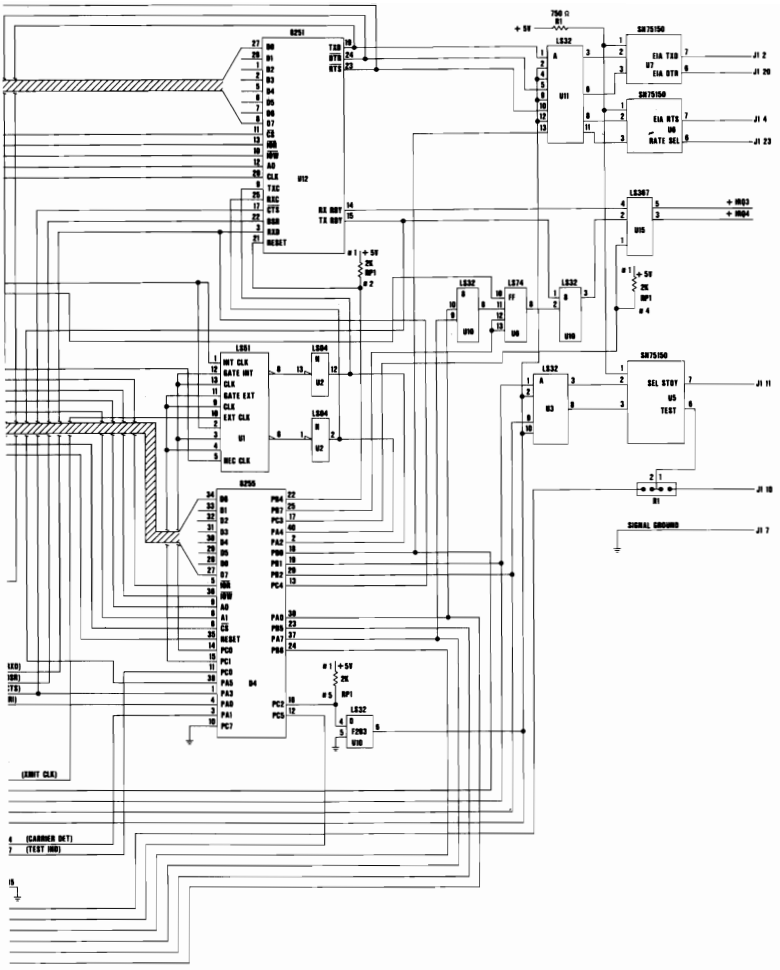
Logic Diagrams



Binary Synchronous Communications Adapter (Sheet 1 of 2)



Binary Synchronous Communications Adapter (Sheet 2 of 2)


8251
8255
LS32
LS367
LS74
LS51
LS04
SN75150
EIA TXD
EIA DTR
EIA RTS
RATE SEL
SEL STBY
TEST
SIGNAL GROUND
RP1
750 Ω
+ 5V
2K
(XMIT CLK)
(CARRIER DET)
(TEST IND)