MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

ALLEN-BRADLEY

1784-KT/B

SERIES B ISA COMMUNICATION INTERFACE CARD

Used with the applicable Allen-Bradley 1784-KT configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Allen-Bradley Communication Interface Module Installation Data, Publication 1784-2.31, August 1993; Cat. No. 1784-KT/B; pages 1-22.

ALLEN-BRADLEY

Communication Interface Module

Cat. No. 1784-KT/B

Installation Data

Introducing the 1784-KT/B Communication Interface Module

The 1784-KT/B Communication Interface Module allows personal computers, workstations or terminals to communicate with Allen-Bradley processors and controllers, either through direct connections or over Data Highway Plus networks. For information about using the 1784-KT/B with a specific device, see the device's user documentation.

ATTENTION: The following provides information for Allen-Bradley Industrial Computer and Communication Group (ICCG) products that have been verified to meet the Electromagnetic Interference (EMI) requirements of the Federal Communication Commission (FCC) and the Canadian Department of Communications for use in a commercial environment:

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

ATTENTION: This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

We will refer to the 1784-KT/B Communication Interface Module as simply the 1784-KT throughout this document.

What This Document Contains

This document contains the following sections:

- Introducing the 1784-KT Communication Interface Module
- Important User Information
- Features of the 1784-KT
- Compatibility
- How the 1784-KT Operates
- Handling the 1784-KT Module
- 1784-KT Configuration Information
- Installing the 1784-KT into a Computer
- Connecting Your 1784-KT
- Ordering Information
- The Loopback Test Plug
- System Memory and Interrupts
- Specifications

Important User Information

Because of the variety of uses for products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, “Safety Guidelines for the Application, Installation and Maintenance of Solid State Control” (available from your local Allen-Bradley office) describes some important differences between solid-state equipment and electromechanical devices which should be taken into consideration when applying products such as those described in this publication.

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ATTENTION: With any complex communication system you need to identify potential application-related communication problems and make provisions in the system design to prevent hazardous or undesired consequences if a problem occurs. These problems include, but are not necessarily limited to, the possibility of:

- unexpected loss of communication
- erroneous or incomplete data being supplied to the network and passed on to your application

Features of the 1784-KT

Your 1784-KT Communication Interface Module is an ISA half-size 8-bit card that can be inserted into any 8- or 16-bit ISA expansion slot. The 1784-KT provides the following features:

- Makes your personal computer an active node on Data Highway Plus networks
- Increases application response time by removing the RS-232 bottleneck
- Provides single cable connection to a PLC-2®, PLC- 3®, or PLC-5™ family programmable controller
- Is address selectable; may be used with other option boards installed in your personal computer
- When combined with 6001-F1E software or INTERCHANGE™ software, allows you to create your own custom interface to Data Highway Plus networks
- Supported by the following software:
  - 6001-FIE software
  - 6200 software
  - INTERCHANGE™ software
  - Advisor PC™ (series E or later)
  - ControlView™ software

Compatibility

Operation of the 1784-KT has been verified with the following:

Company:	Model:
Allen-Bradley	• 1771 Information Processor (1771-DSX2) (requires KT Expander Module 1771-DXKT) • 1784-T35 Industrial Terminal • 1784-T50 Industrial Terminal • Allen-Bradley 6121 • Allen-Bradley 6122 • T53 Industrial Programming Terminal 6160-T53 • T60 Industrial Workstation 6160-PCD2, -PCN2, -PCD4, -PCN4 • T70 Industrial Workstation 6170 series
IBM®	• IBM PC-XT/AT™
Compaq®	• Compaq Portable™ 286 • Compaq Portable II • Compaq Portable III • Compaq Deskpro™ 286 • Compaq Deskpro 386
Dell®	• Dell 316 386SX
Samsung	• Samsung S550 • Samsung 386
Hewlett-Packard®	• HP 9000™/700 series

How the 1784-KT Operates

The 1784-KT allows you to:

- directly connect to:
  - PLC-2 processors
  - PLC-3 processors
- communicate with nodes on Data Highway Plus networks (including PLC-5 and PLC-5/250 processors)
- communicate with SLC™ processors (requires 1785-KA5 bridge)

The 1784-KT performs data transmission, management, and local Data Highway Plus diagnostics. The interface to the host processor is through a board-resident dual-port memory that passes preformatted Data Highway Plus packets.

When the host powers up and downloads module code, it runs diagnostics to verify the 1784-KT module's operation. Allen-Bradley interface software (including 6001-F1E, 6200, Interchange, Advisor PC, and ControlView) manages data transmission and reception through the board-resident dual-port memory.

Handling the 1784-KT Module

The 1784-KT utilizes CMOS technology, which is highly sensitive to Electro Static Discharge (ESD). ESD may be present whenever you are handling the 1784-KT. Handling the 1784-KT without any ESD protection can cause internal circuit damage that may not be apparent during installation or initial use. A grounding wrist strap has been shipped with the 1784-KT to be worn during the installation procedure. Instructions for use of the strap are found on the back of its package.

ATTENTION: The following is a list of precautions to guard against ESD damage:

1. Before handling the module, be sure to wear the provided static strap and touch a grounded object to discharge any built-up static charge.
2. When selecting your memory and interrupt options, avoid touching other components on the 1784-KT.
3. Avoid touching the back plane connector or interface connector pins located on the 1784-KT.
4. If the module is not in use, store the 1784-KT in the static bag that the module was shipped in.

1784-KT Configuration Information

Important: Do not change the (factory set) configuration settings until you have read this section.

The 1784-KT comes with preset memory location (D400) and no interrupt. This may not be appropriate for your application. See the section "Installing the 1784-KT into a Computer", which begins on page 6, for information on memory locations and interrupt settings.

ATTENTION: When selecting configuration settings, check for conflicts with other interface cards and system memory. If there is a conflict, the system will not operate properly.

Installing the 1784-KT into a Computer

The following steps outline how to install the 1784-KT into a terminal, workstation or computer. Refer to the terminal's, workstation's or computer's hardware user manual for further assistance.

1. Turn off the computer and disconnect the ac power cord.

2. Remove all covers necessary to gain access to the computer's expansion slot area. The industrial terminals may have retainer brackets. Consult the user manual for access procedures.



ATTENTION: If you are not wearing the grounding wrist strap, put it on at this time.

3. Remove the expansion slot bracket that covers the computer I/O opening.

4. Remove the 1784-KT from the static bag.

5. Verify the configuration settings for your system. Use the worksheets that begin on page 15 for assistance.

Important: If another card is already using your desired switch settings, you will have to change the card's switch settings to an open memory location.

If you are using the default settings, go to step 10.

If you are not using the default settings, go to step 6.

6. Select a memory location. Table A shows the recommended memory locations for Allen-Bradley terminals, workstations and computers. Table B shows all the available memory locations and switch settings for the card.

Table A
Recommended memory settings

Equipment:	Preferred Memory Location:
1784-T35	C800
1784-T50	C000
T53 Industrial Programming Terminal	D400
T60 Industrial Workstations	D000, D400, or D800
T70 Industrial Workstations	D400

Table B
Selecting a memory location

Memory Address (Hex) MSB LSB	PCB Board Switch Settings A14 (switch 1)	A15 (switch 2)	A16 (switch 3)	A17 (switch 4)	A18 (switch 5)	A19 (switch 6)	Switch Settings[2] LSB MSB
A000:0000	up	up	up	down	up	down	000101
A400:0000	down	up	up	down	up	down	100101
A800:0000	up	down	up	down	up	down	010101
AC00:0000	down	down	up	down	up	down	110101
B000:0000	up	up	down	down	up	down	001101
B400:0000	down	up	down	down	up	down	101101
B800:0000	up	down	down	down	up	down	011101
C000:0000	up	up	up	up	down	down	000011
C400:0000	down	up	up	up	down	down	100011
C800:0000	up	down	up	up	down	down	010011
CC00:0000	down	down	up	up	down	down	110011
D000:0000	up	up	down	up	down	down	001011
[1] D400:0000	down	up	down	up	down	down	101011
D800:0000	up	down	down	up	down	down	011011

[1] This is the factory-set address and is the recommended setting. Some system peripherals (such as VGA cards) may require a different address. Check your system peripheral's documentation to see if it requires different settings.
[2] This is the 6200 software online configuration setting for the 1784-KT.
up = 0
down = 1

7. Select an interrupt setting. Your choices are:

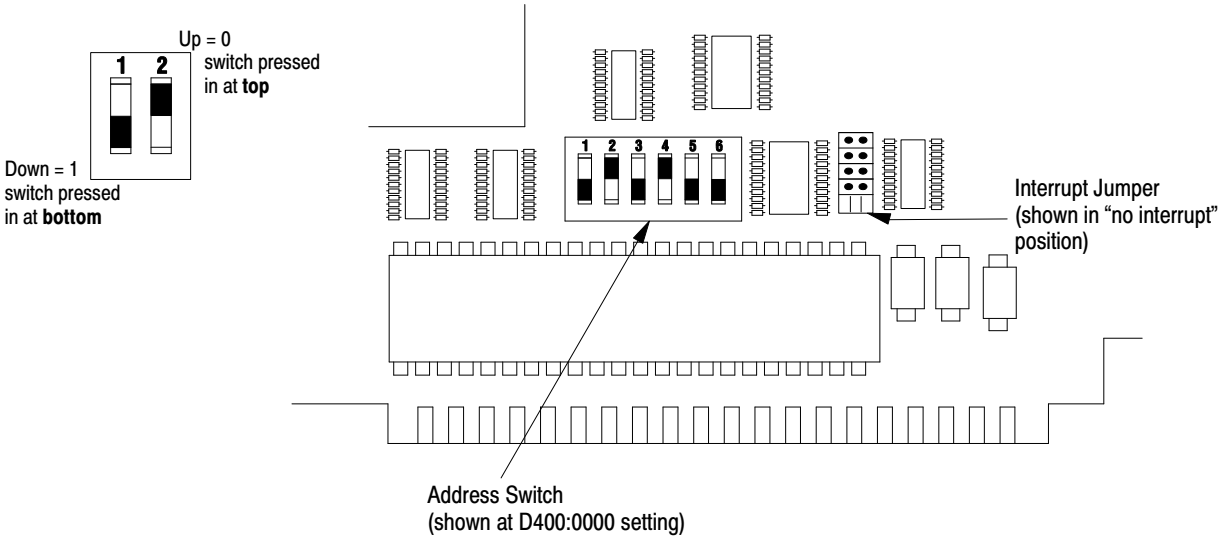
- IRQ3
- IRQ4
- IRQ5
- IRQ7
- no interrupt

Table C shows the recommended interrupt settings for Allen-Bradley industrial terminals, workstations and computers that use the 1784-KT.

Table C
Recommended interrupt settings

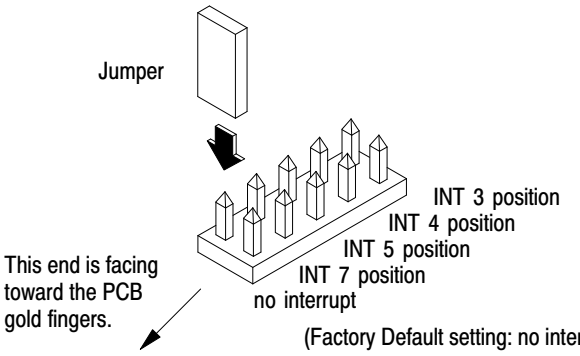
Equipment:	Preferred Interrupt:
1784-T35	IRQ5
1784-T50	IRQ5
T53 Industrial Programming Terminal	no interrupt
T60 Industrial Workstations	
T70 Industrial Workstations	

8. Set the memory location address, by pushing the switches in at either the top or bottom, to reflect the selected address of the memory location.



9. Set the interrupt by placing the provided jumper in the proper location.

Remove the jumper and place it on the two pins that correspond to the interrupt of your choice. If an interrupt is not required by your software program, place the jumper in the "no interrupt" position.



Jumper Selection	Interrupt Selection
INT 3	IRQ3
INT 4	IRQ4
INT 5	IRQ5
INT 7	IRQ7
no interrupt	

10. With a hand on each end of the board, slowly slide the 1784-KT into the I/O expansion slot. Firmly insert the edge card connector into the I/O expansion slot connector.

11. Install the retaining screw into the retaining bracket and tighten.

12. Install all brackets (if applicable) and covers removed in step 2.

Connecting Your 1784-KT

Different configurations require different procedures for connecting the 1784-KT to a PLC. The procedures begin on page 10. Before you make the connections, make sure you have the correct cables. Cables for various PLCs are listed below.

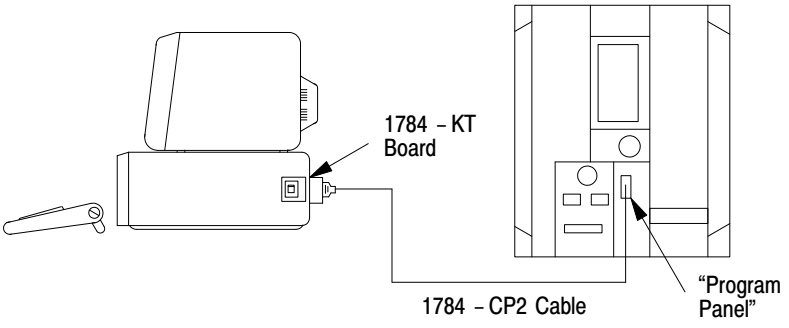
For:	Use Cable with Cat. No.:	See Page:
PLC-2 Family Programmable Controllers	1784-CP2	10
PLC-3 Family Programmable Controllers	1784-CP3	11
PLC-5/10, -5/12, -5/15,-5/25, -5/VME (6008-LTV), and PLC-5/250 Programmable Controllers	1784-CP	12
PLC-5/11, -5/20, -5/30, -5/40, -5/60, -5/80, and -5/VME (1784-V40) Programmable Controllers	1784-CP6 (refer to publication 1784-2.26) or 1784-CP7 Adapter with 1784-CP Cable (refer to publication 1784-2.29)	

ATTENTION: To avoid personal injury, always disconnect the ac power before making the cable connection.

Connecting Your 1784-KT to a PLC-2

To connect the 1784-KT to a PLC-2, follow the steps below:

1. Plug the 62-pin connector end of the 1784-CP2 cable into the 1784-KT and secure with captive screws.

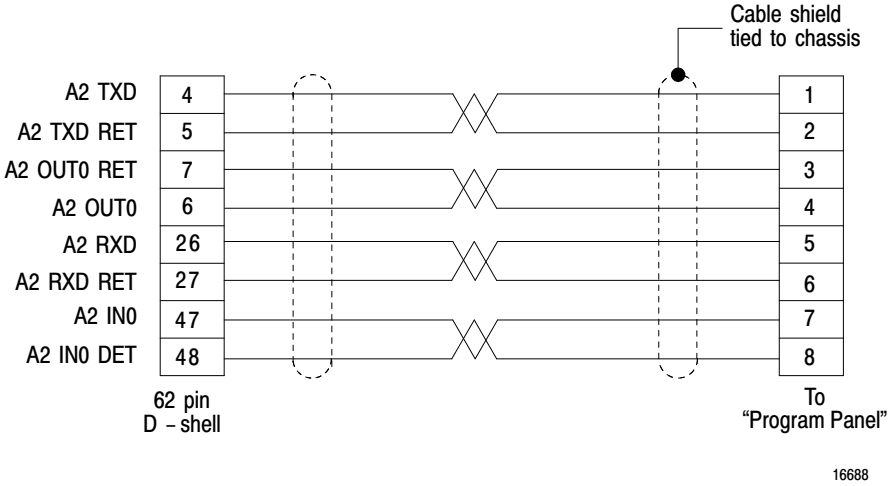


2. Connect the opposite end of the 1784-CP2 cable into the PROGRAM PANEL connector on the PLC-2.

3. Reinstall the ac power cord and turn on the computer.

Figure 1 shows cable pinouts for the 1784-CP2 cable.

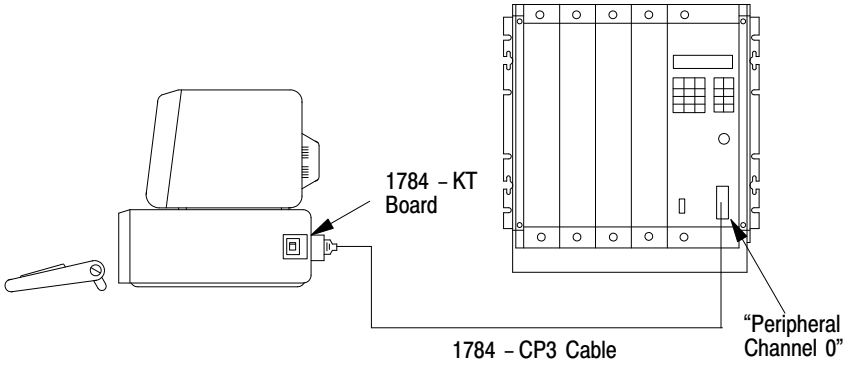
Figure 1
Cable Pinouts for the 1784-CP2 Cable



Connecting Your 1784-KT to a PLC-3

To connect the 1784-KT to a PLC-3, follow the steps below:

1. Plug the 62-pin connector end of the 1784-CP3 cable into the 1784-KT and secure with captive screws.

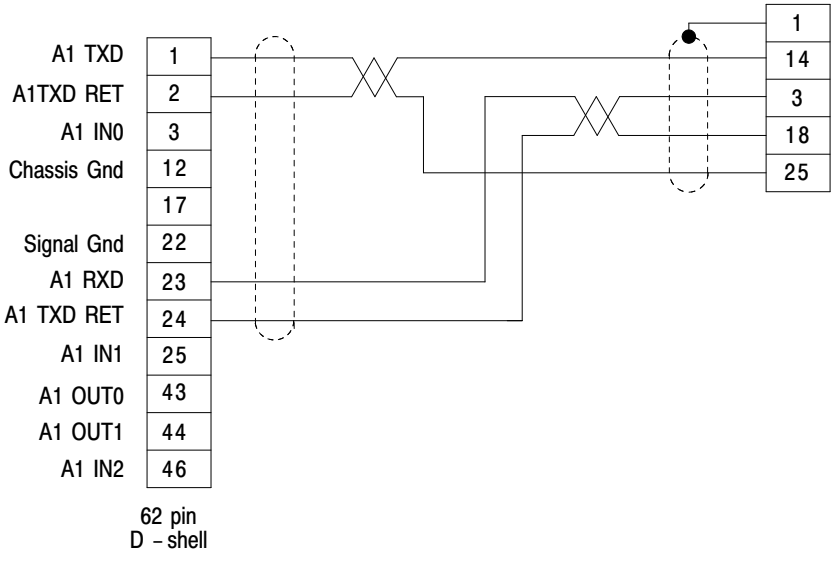


2. Connect the opposite end of the 1784-CP3 cable (labeled "Industrial Terminal End") into the PERIPHERAL CHANNEL 0 connector on the PLC-3.

3. Reinstall the ac power cord and turn on the computer.

Figure 2 shows cable pinouts for the 1784-CP3 cable.

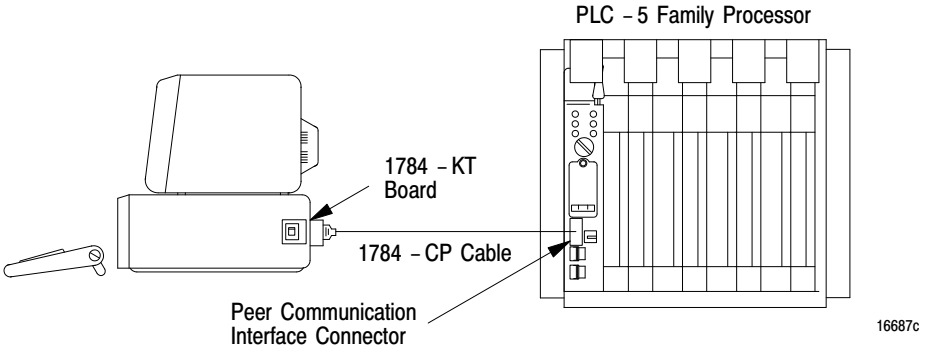
Figure 2
Cable Pinouts for the 1784-CP3 Cable



Connecting Your 1784-KT to a PLC-5 (Data Highway Plus)

To connect the 1784-KT to a PLC-5, follow the steps below:

1. Plug the 62-pin connector end of the 1784-CP cable into the 1784-KT and secure with captive screws.



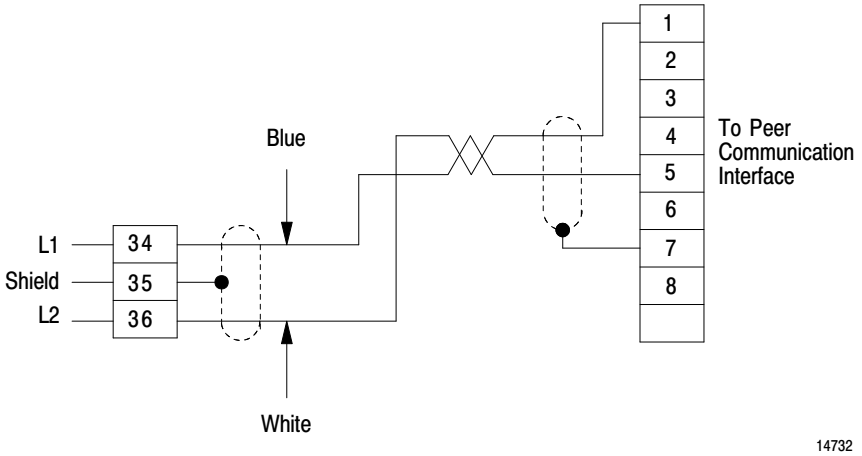
2. Connect the opposite end of the 1784-CP cable into the PEER COMM INTFC connector on the PLC-5.

3. Reinstall the ac power cord and turn on the computer.

Important: To allow communication between PLC-5s and other Data Highway Plus nodes, you must be connected to a PLC-5 using a 1784-CP cable. The Data Highway Plus network is connected to the PLC-5.

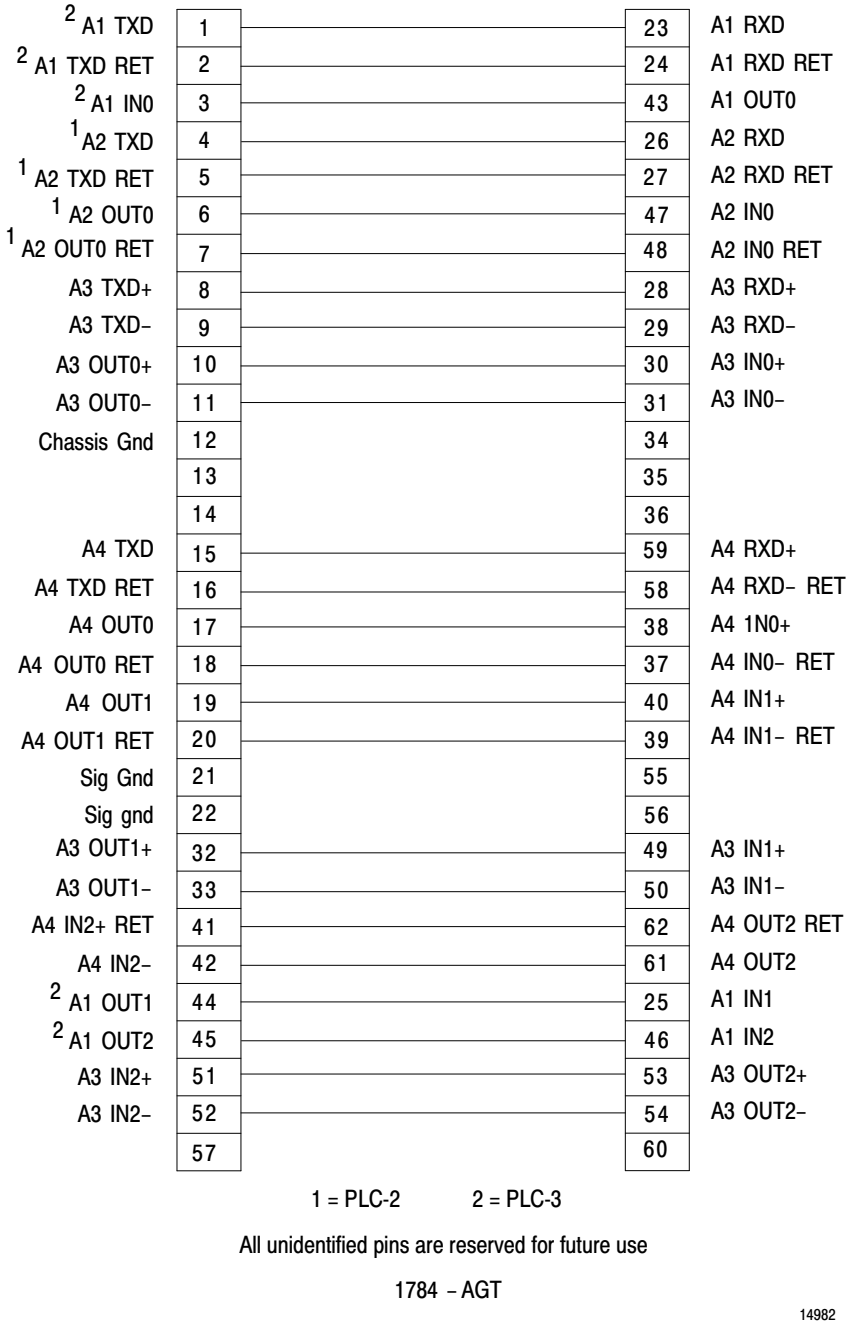
Figure 3 shows cable pinouts for the 1784-CP cable.

Figure 3
Cable Pinouts for the 1784-CP Cable



The Loopback Test Plug

The 1784-AGT Test Plug is available for diagnostic testing of the 1784-KT. Its internal wiring is shown below.



System Memory and Interrupts

Information is passed between the computer system and the 1784-KT through 2 Kbytes of memory located in the interface module. This 2 Kbyte memory is memory mapped into an open memory location in your computer system. The definition of “open” is a location that has not been configured for another optional interface card or system. The 1784-KT address decoding allocates a 16 Kbyte memory location. So, when selecting an open memory location, make sure there is a 16 Kbyte block. Also, the definition of open applies to hardware system interrupts. Depending on the interface card you have installed into your computer, only a few select interrupts may be open for the 1784-KT.

Let’s say the targeted computer for installing a 1784-KT is an IBM PC-AT with the following options:

640 K System Memory	00000:0000-09000:FFFF	-	-
EGA Card	0A000:0000-0A000:FFFF	-	-
Color Monitor	0B000:0000-0B000:FFFF	-	-
Diskette Drive	-	3F0-3F7	IRQ 6
Hard Drive	-	1F0-1FF	IRQ 14
Serial Port Card	-	2F8-2FF	IRQ 4
(Configured for port 1)			

The memory map for this system would be what is documented in the “System Memory Allocation Worksheet” (see page 15) for the IBM PC-AT. Open memory for a 1784-KT would be from 0B800:0000 to 0DF00:0FFF. By using the memory default setting, the 1784-KT would fit into this open memory at locations 0D400:0000 to 0D700:0FFF.

The 1784-KT supports four interrupts: IRQ3, IRQ4, IRQ5, and IRQ7. Refer to the “Hardware Interrupt Allocation Worksheet” (page 17) for the IBM PC-AT for possible open interrupts. Only IRQ4 is used for the serial port card configured for port 1. The 1784-KT uses the “no interrupt” setting as the default.

Use the following worksheets to help manage your system’s memory, I/O, and interrupt assignments. The IBM PC-AT and IBM PC-XT system assignments have been chosen as a reference. These IBM assignments are available in their respective IBM Technical Manuals and are subject to change by IBM.

Important: The 1784-KT does not require a system I/O address. The 1784-KT only uses addressable memory and an interrupt. The I/O map is provided so that you can document your entire computer system.

To use the worksheets, enter your computer’s memory, I/O, and interrupt assignments in the column labeled “Your System” .

IBM PC AT System Memory Allocation Worksheet

System Memory	IBM PC AT Assignments	Your System
0000:0000- 07000:FFFF	512K Read/Write Memory on System Board	
8000:0000- 09000:FFFF	128K Read/Write Memory Expansion in I/O Channel	
A000:0000-		
	E.G.A.	
A400:0000-		
A800:0000-		
AC00:0000-		
B000:0000-	Color/Graphics	
B400:0000-		
B800:0000-		
BC00:0000-		
C000:0000-		
C400:0000-		
C800:0000-		
CC00:0000-		
D000:0000-		
D400:0000-		
D800:0000-		
E000:0000- E00:FFFF	64K ROM Reserved on System Board	
F000:0000- F000:FFFF	64K ROM Reserved on System Board	
10000:0000- FD000:FFFF	I/O Channel Expansion Memory Maximum Memory 15 Mb	
FE000:0000- FE00:FFFF	64K ROM Reserved on System Board	
FF000:0000- FF000:FFFF	64K ROM Reserved on System Board	

IBM PC AT System I/O Allocation Worksheet

I/O Address	IBM PC AT Assignments	Your System
000-0FF	System Board I/O	
100-		
110-		
120-		
130-		
140-		
150-		
160-		
170-		
180-		
190-		
1A0-		
1B0-		
1C0-		
1D0-		
1E0-		
1F0-	Fixed Disk Control	
200-	Game I/O	
210-		
220-		
230-		
240-		
250-		
260-		
270-	278 – 27F: Parallel Printer Port 1	
280-		
290-		
2A0-2B0-		
2C0-		
2D0-		
2E0-		
2F0-	2F8 – 2FF: Serial Port 1	
300-		
310-		
320-		
330-		
340-		
350-		
360-		
370-	378 – 37F:Parallel Printer Port 1	
380-	SDLC, Bisynchronous 2	
390-		
3A0-		
3B0-	Monochrome	
3C0-		
3D0-	Color/Graphics Monitor Adapter	
3E0-		
3F0-	Diskette Controller & Serial Port 1	

Hardware Interrupt Allocation Worksheet
IBM PC AT

Interrupts		IBM PC AT Assignments	Your System
	IRQ 0	Timer Output	
	IRQ 1	Keyboard (Output Buffer Full)	
IRQ 2		Interrupt from CTLR 2	
	IRQ 3	Serial Port 2	
	IRQ 4	Serial Port 1	
	IRQ 5	Parallel Port 2	
	IRQ 6	Diskette Controller	
	IRQ 7	Parallel Port 1	
CTLR 2	IRQ 8	Real-time Clock Interrupt	
	IRQ 9	Software Redirected to INT 0AH (IRQ2)	
	IRQ 10	Reserved	
	IRQ 11	Reserved	
	IRQ 12	Reserved	
	IRQ 13	Co-processor	
	IRQ 14	Fixed Disk Controller	
	IRQ 15	Reserved	

Shaded Interrupts are supported by the 1784-KT

IBM PC XT System Memory Allocation Worksheet

Memory Address	IBM PC XT Assignments	Your System
0000:0000- 3F00:0FFF	128-256K Read/Write Memory on System Board	
4000:0000- 9F00:0FFF	384K Read/Write Memory Expansion in I/O Channel	
A000:0000-		
A400:0000-		
A800:0000-		
AC00:0000-		
B000:0000-	Monochrome	
B400:0000-		
B800:0000-	Color/Graphics	
BC00:0000-		
C000:0000-		
C400:0000-		
C800:0000-	Fixed Disk Control	
CC00:0000-		
D000:0000-		
D400:0000-		
D800:0000-		
E000:0000-		
E400:0000-		
E800:0000-		
EC00:0000-		
F000:0000- FF00:0FFF	64K Base System ROM BIOS and BASIC	

IBM PC XT System I/O Allocation Worksheet

I/O Address	IBM PC XT Assignments	Your System
000-0FF	System Board I/O	
100-1FF	Reserved	
200-	Game I/O	
210-	Expansion Unit	
220-		
230-		
240-		
250-		
260-		
270-		
280-		
290-		
2A0-		
2B0-		
2C0-		
2D0-		
2E0-		
2F0-	2F8 – 2FF: Async Com (2)	
300-		
310-		
320-	Fixed Disk	
330-		
340-		
350-		
360-		
370-	378 – 37F: Printer	
380-	SDLC or Bisynchronous Com 2	
390-		
3A0-	Bisynchronous Com 1	
3B0-	Monochrome Display/Printer	
3C0-		
3D0-	Color Graphics	
3E0-		
3F0-	Diskette/Async Com (1)	

Hardware Interrupt Allocation Worksheet
IBM PC XT

Interrupts	IBM PC XT Assignments	Your System
IRQ 0	Timer	
IRQ 1	Keyboard	
IRQ 2		
IRQ 3	COM2	
IRQ 4	COM1	
IRQ 5	Hard Disk	
IRQ 6	Floppy Disk	
IRQ 7	Printer	

Shaded Interrupts are supported by the 1784-KT

Specifications

Specifications for the 1784-KT are listed below.

Module Location
- The 1784-KT/B can be installed in any slot that supports ISA 8-bit cards

Module Output Connector
- 62 Pin D-shell

Outputs
- PLC-2 Serial Interface
- PLC-3 Serial Interface
- Data Highway Plus

Module Compatibility
- Allen-Bradley 1771 Information Processor (1771-DSX2) (requires KT Expander Module 1771-DXKT)
- Allen-Bradley 1784-T35 Industrial Terminal
- Allen-Bradley 1784-T50 Industrial Terminal
- Allen-Bradley 6121
- Allen-Bradley 6122
- Allen-Bradley T53 Industrial Programming Terminal 6160-T53
- Allen-Bradley T60 Industrial Workstation 6160-PCD2, -PCN2, -PCD4, -PCN4
- Allen-Bradley T70 Industrial Workstation 6170 series
- IBM-XT/AT, or Compatible
- Compaq Portable 286
- Compaq Portable II
- Compaq Portable III
- Compaq Deskpro 286
- Compaq Deskpro 386
- Dell 316 386SX
- Samsung S550
- Samsung 386
- Hewlett-Packard HP 9000/700 series

Hardware Interrupts
- IRQ3 (Com2)
- IRQ4
- IRQ5
- IRQ7

Baud Rate
- Asynchronous (PLC-2 and PLC-3 Controllers):
  9600
  19.2 K
- Synchronous (Data Highway Plus):
  57.6 K
- PLC-2: 10 ft (3m)
- PLC-3: 10 ft (3m)
- Data Highway Plus
- PLC-3 and PLC-5: 10,000 ft (3,050m) @ 57.6 Kb

Power Requirements
- +5V DC @ .4A (2W)
- ±12V DC @ .04 (.48W) respectively

Operating Temperature
- 32 to 130^0F (0 to 55^0C)

Humidity
- 5 to 95% Noncondensing

Installation Data
Communication Interface Module
Cat. No. 1784-KT/B

The following are registered trademarks of Allen-Bradley Company, Inc.: PLC, PLC-2, PLC-2/15, PLC-3.
The following are trademarks of Allen-Bradley Company, Inc.: Data Highway Plus, PLC-5, ControlView, Interchange
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