

Coax Adapter

***User's Guide &
Reference Manual***

Federal Communications Commission Statement

Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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Fourth Edition (October 1992)

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This limited warranty gives you specific legal rights; you may also have other rights which vary from state to state.

This limited warranty is extended only to the original purchaser of the Coax Adapter and is valid only with respect to purchasers within the United States of America. Subject to the following conditions, should this product prove defective by reason of improper workmanship or material:

- During a period of (12) twelve months from the date of original purchase, Forvus Research, Inc. will repair or, at its option, replace the product without charge for parts or labor.

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The Forvus Research Coax Adapter provides the user with a high performance 3270 coaxial attachment interface. The Coax Adapter contains a 20 MHZ processor to efficiently handle all coax functions. Also provided with the Coax Adapter is a microcode program that is loaded by the operator to offer compatibility with the IBM® and IRMA™ standards that many third party vendors support.

When the Coax Adapter is coupled with OPTIONAL emulation packages offered by Forvus Research, extra capabilities are possible. For instance, when the Forvus Emulator is used with the adapter, all screen formatting, attribute translation and other tasks normally handled by the system unit are “offloaded” to the Coax Adapter. Contact your authorized dealer for more information about the Forvus Research emulation packages.

The Forvus Research Coax adapter is available in both ISA and MicroChannel® versions.

Other features the Coax Adapter provide:

- Attaches to various control units with your choice of RG-62 coax or Type 3 twisted pair cable - without the use of expensive baluns.
- Low power requirements - .67 amps +5 Volts, .02 amps +12 Volts.
- Provided with IBM® and IRMA™ emulation firmware, complete with self executing diagnostics.

System Requirements

The Coax Adapter is available in two different versions. The ISA Coax Adapter is designed for use in an IBM PC, XT, AT or PS/2 Model 30 or compatible system. The MCA Coax Adapter is designed for use in an IBM PS/2 Model 50,60, 70 or 80 or other MicroChannel[®] compatible system. The minimum system unit requirements to install the adapter are listed below:

- One floppy disk drive.
- Either PC-DOS or MS-DOS operating system, Version 3.1 or higher.
- One Spare Hardware Slot for the Coax Adapter.

Inside this Manual

The following sections of this manual will provide you with the information you will need to install and operate the Coax Adapter. It contains five chapters, four appendices, and an index.

- **Chapter 1**, “Introduction” - provides general information about specifications and features of the Coax Adapter.
- **Chapter 2**, “ISA Installation” - provides the steps necessary to install the PC 92/472 Coax Adapter into the system unit.
- **Chapter 3**, “MCA Installation” - provides the steps necessary to install the MC 472 Coax Adapter into the system unit.
- **Chapter 4**, “Loading the Adapter for IBM[®]/IRMA[™] Emulation” - provides instructions for utilizing the Coax Adapter with third party software.
- **Chapter 5**, “Problem Determination” - provides tips and information in case of problems.
- **Appendix A**, “IBM 3278/79 Adapter Compatibility” - provides technical interface information about the IBM emulation.

- **Appendix B**, “IRMA™ Compatibility” - provides technical interface information about the IRMA™ emulation.
- **Appendix C**, “Error Messages” - contains error explanations and solutions to isolate problems with the Coax Adapter.

README.DOC

Should your Diskettes contain the file README.DOC, it contains important information that was not available when this manual went to press. Please review this information before beginning installation of the Coax Adapter.

Conventions

This manual uses the following conventions:



NOTE Notes contain important information that is set off from the text.



CAUTION Caution messages appear before procedures which, if not observed, could result in damage to equipment.



WARNING Warning messages indicate when, if a specific procedure or practice is not followed correctly, personal injury could occur.

Coax Adapter Specifications

Size:	ISA	MCA
Length	7.0 in	11.5 in
Height	4.2 in	3.5 in

Power Requirements:

+ 5V \pm 5%	0.67 amps
+12V \pm 5%	0.01 amps
- 12V \pm 5%	0.01 amps

Coaxial Connector:

Type	TPA-1 Dual Purpose Connector
------	---------------------------------

Coaxial Cable Requirements:

Type	RG-62 A/U
Max. Length	1500 meters

ISA Installation

This section will guide you through the steps necessary to install the ISA Coax Adapter in an IBM PC,XT,AT or PS/2 Model 30. Please take a moment to read these steps before you begin.

Note: If you are installing an MCA Coax Adapter in an IBM PS/2 Model 50, 60, 80 or other MicroChannel™ machine, refer to Chapter 3.



WARNING: Hazardous voltages exist inside the cover of your system unit! Always remove the power cord from your system unit when installing or removing components from the inside.



CAUTION: Devices used on the Coax Adapter and others found inside your system unit are Static Sensitive Devices. Be sure to ground yourself to the metal part of the system unit *before* installing the Coax Adapter!

Step 1. Adapter Installation

1. Make sure that the Coax Adapter does not interfere with the I/O and address space of other cards in your system unit. The Coax Adapter uses the following system unit resources:

- Memory Address Range - CE000H through CFFFFH
- Interrupt Level - IRQ2 (shared)
- I/O ports - 220H through 22FH (IRMA™ ports)
2D0H through 2DFH (IBM® ports)

2. Remove all power from your system unit. Remove the cover and locate a spare slot to install the Coax Adapter.

XT Users Note: The Coax Adapter must be installed in slots 1-7 of the system unit. Slot 8 (next to power supply) will not function with the Coax Adapter.

3. Hold the adapter by the edges and slide it into the unused slot, making sure the connector is aligned with the edge of the adapter's "gold-fingers".

4. Secure the adapter to the frame by inserting a screw through the bracket and tighten securely.



WARNING: Failure to complete this step will defeat the lightning discharge protection provided by the Coax Adapter!

5. Re-install the cover on your system unit and plug the power cord into the rear of the system unit. Insure that all other cables are firmly attached to their respective connectors.

6. Apply power to the system unit and verify its normal operation. Should your system unit not function as it normally does, remove all non-essential cards and re-insert them one at a time until you find a conflicting card. Refer to that card's instructions to change to another address or I/O space.

Step 2. Attaching the Communication Cable



WARNING: Do not attempt to install or remove this cable during a thunderstorm as lightning may cause a severe injury should it strike this cable!

The Coax Adapter is capable of attaching either an RG-62 type Coaxial Cable or a Type 3 twisted pair cable with an ADC #4-26539-0140 type connector. Contact your system supervisor if the cable is not provided.

Locate the communication cable you will be installing to the Coax Adapter and attach it to the connector at the rear of the system unit.

Step 3. Expanded Memory?

If your system unit contains **EXPANDED** memory, you will need to inform your expanded memory manager to exclude the memory space (CE000H through CFFFFH). Without this exclusion, the expanded memory driver may “overlay” its address space on top of the Coax Adapter - destroying the contents of the adapter’s communication buffer.

Refer to your expanded memory driver user’s guide for instructions if your system unit contains **EXPANDED** memory.

If your system does **NOT** have **EXPANDED** memory, proceed with Step 4.

Step 4. What Type Emulation?

This step involves what **TYPE** emulation you will be using the Coax Adapter with.

- If you will be using the Coax Adapter with the Forvus Emulator, proceed to **Step 5A**.
- If you will be using the Coax Adapter with third party vendor’s software (IBM[®], IRMA[™]), proceed to **Step 5B**.

Step 5A. Use with Forvus Programs

If you will be using the emulation packages provided by Forvus Research, it is not necessary to “pre-load” the adapter, as these packages will automatically provide microcode loading of the Coax Adapter upon execution. Refer to the user’s manuals for the particular package you will be using.

Step 5B. Use with IBM® or IRMA™ Emulation

If you will be using the IBM® or IRMA™ standard type interface, the Coax Adapter is now ready to accept the microcode for the particular installation you desire. The microcode to be loaded informs the Coax Adapter of the emulation to be provided. The following types of emulation adapters are available with the utility diskette provided with the Coax Adapter:

- IBM® 3278/9 adapter support
- IRMA™ adapter support

Refer to **Chapter 4** “Loading the Adapter for IBM®/IRMA™ Emulation” if you will be using a third party vendor emulation package.

MCA Installation

This section will guide you through the steps necessary to install the MCA Coax Adapter in an IBM PS/2 Model 50, 60, 80 or other MicroChannel machine. Please take a moment to read these steps before you begin.



If you are installing an ISA Coax Adapter in an IBM PC, XT, AT or PS/2 Model 30, refer to Chapter 2.

Step 1. Copy ADF Files

When any adapter card is added or removed from an IBM PS/2, the PS/2 must be reconfigured using the System Configuration Utility provided on the PS/2 Reference Diskette. The Configuration Utility uses Adapter Description Files (ADF) to provide information about the system resources used by each installed adapter card. ADF files for the MCA Coax Adapter are included on a diskette provided with the adapter. Before you can install the Coax Adapter, these files must be transferred to a working copy of your PS/2 Reference Diskette.

Use the following steps to transfer these files.

- a. Follow the instructions in your PS/2 Quick Reference Manual to create a working copy of your PS/2 Reference Diskette. Do not try to copy files to your original PS/2 Reference Diskette.
- b. Turn on your PS/2 and follow your normal procedure to get to the DOS prompt.
- c. To copy the appropriate ADF files, insert the diskette provided

with your Coax Adapter into Drive A of your PS/2, and type the following:

A:

Then press the Enter key.

COPYADF

Then press the Enter key again.

Messages on the screen will prompt you to remove the MC 472 diskette and insert your working copy of the PS/2 Reference diskette. The appropriate files will be copied to your working copy the PS/2 Reference diskette.

Step 2. Adapter Installation



WARNING: Hazardous voltages exist inside the cover of your system unit! Always remove the power cord from your system unit when installing or removing components from the inside.



CAUTION: Devices used on the Coax Adapter and others found inside your system unit are Static Sensitive Devices. Be sure to ground yourself to the metal part of the system unit *before* installing the Coax Adapter!

- a. Remove all power from your system unit. Then, following the instructions in your PS/2 Quick Reference, remove the cover from your PS/2.
- b. Locate a spare expansion slot to install the Coax Adapter.

Loosen the bracket retaining screw and remove the expansion slot cover.

c. Hold the adapter by the edges and slide it into the unused slot, making sure the connector is aligned with the edge of the adapter's "gold-fingers".

d. Tighten the bracket retaining screw to secure the adapter to the frame.



WARNING: Failure to complete the above step will defeat the lightning discharge protection provided by the Coax Adapter!

e. Re-install the cover on your system unit and plug the power cord into the rear of the system unit. Insure that all other cables are firmly attached to their respective connectors.

Step 3. Run the Configuration Utility

a. Apply power to the system unit. The unit should run its memory and system tests and then display a "165" error message. This message indicates that an adapter card has been inserted or removed and reconfiguration is required. If you do not get this error message, and your machine is not already configured for a coax board, return to step 2 and recheck all connections.

b. Insert the working copy of your PS/2 Reference Diskette into Drive A. Be sure to use the diskette with the ADF files you copied in step 1.

c. Press the "F1" key to boot from the reference diskette. Follow

the instructions on the screen to perform automatic configuration. When the configuration has been successfully completed proceed to Step 4.

d. If the automatic configuration fails because of a resource conflict with another adapter, you must reconfigure or remove the conflicting adapter. The MCA Coax Adapter requires the following system unit resources:

- Memory Address Range - CE000H through CFFFFH
- Interrupt Level - IRQ2 (shared)
- I/O ports - 220H through 22FH (IRMA™ ports)
 2D0H through 2DFH (IBM® ports)

Step 4. Attaching the Communication Cable



WARNING: Do not attempt to install or remove this cable during a thunderstorm as lightning may cause a severe injury should it strike this cable!

The Coax Adapter is capable of attaching either an RG-62 type Coaxial Cable or a Type 3 twisted pair cable with an ADC #4-26539-0140 type connector. Contact your system supervisor if the cable is not provided.

Locate the communication cable you will be installing to the Coax Adapter and attach it to the connector at the rear of the system unit.

Step 5. What Type Emulation?

This step involves the TYPE emulation program you will be using with the Coax Adapter.

- If you will be using the Coax Adapter with the Forvus Research family of emulation products, proceed to **Step 6A**.
- If you will be using the Coax Adapter with third party vendor's software (IBM[®], IRMA[™]), proceed to **Step 6B**.

Step 6A. Use with Forvus products

If you will be using the emulation packages provided by Forvus Research, it is not necessary to “pre-load” the adapter, as these packages will automatically provide microcode loading of the Coax Adapter upon execution. Refer to the user's manuals for the particular package you will be using.

Step 6B. Use with IBM[®] or IRMA[™] Emulation

If you will be using the IBM[®] or IRMA[™] standard type interface, the Coax Adapter must be loaded with microcode to enable it to emulate these adapters. Microcode is provided to allow the MCA Coax Adapter to emulate the following adapters:

- IBM[®] 3278/9 adapter support
- IRMA[™] adapter support

Refer to **Chapter 4 “Loading the Adapter for IBM[®]/IRMA[™] Emulation”** if you will be using a third party vendor emulation package.

Notes:

Loading the Adapter for IBM®/IRMA™ Emulation

The Coax Adapter is capable of emulating either the IBM 3278/79 Adapter or the IRMA Adapter for use with other emulation programs. This will enable the user to install the Coax Adapter and support various emulation programs without switching hardware adapters. The following steps will guide you through loading the Coax Adapter for use with third party vendor programs.

Loading the Coax Adapter

Before you will be able to use third party vendor's programs (IBM,IRMA) with the Coax Adapter, you will have to "load" the adapter with the microcode to emulate the IBM or IRMA type adapters. The command to start this process is in the following format:

```
d:\path\COAXDRVR
```

Where:

- | | |
|----------|--|
| d: | This is the drive that contains the file COAXDRVR.EXE. Optional if COAXDRVR.EXE is on current drive. |
| path | The SUBDIRECTORY that contains COAXDRVR.EXE. Optional if COAXDRVR.EXE is in current directory. |
| COAXDRVR | This is the filename of the emulation firmware (COAXDRVR.EXE) that is loaded to the Coax Adapter. |



There are NO spaces between the drive, path or filename of this command.

Example Load

An example microcode load is listed below:

At the DOS prompt enter:

```
C>coaxdrv
```

The following response will appear on your display.

```
C>coaxdrv  
Coax Loader Version X.XX
```

At this time the loader program is executing the diagnostics on the Coax Adapter. Should an error message appear at this time, it will be displayed below. Refer to Appendix C, "Error Messages" should one appear.

After completion, the screen will appear as below.

```
C>coaxdrv  
  
Coax Loader Version X.XX  
(c) Forvus Research, 1992 - All Rights Re-  
served  
IBM Port 0XXXXH  
IRMA Port 0XXXXH  
Coax Segment XXXXH  
C>
```

Where:

IBM Port 0XXXXH - is the beginning port address that the adapter uses to emulate the IBM adapter.

Irma Port 0XXXXH - is the beginning port address that the

adapter uses to emulate the IRMA adapter.

Coax Segment XXXXH - is the segment address that the adapter uses to contain its memory space.

The Coax Adapter microcode is now loaded and executing.

After you have loaded the Coax Adapter with the emulation microcode, you may now execute the program that will use the adapter.



The above step must be performed each time you “reboot” or power up your system. You may wish to place the LOAD statement in your AUTOEXEC.BAT file, which will load the Coax Adapter each time the system unit is powered on or restarted.

Refer to Appendix A for more information on the IBM Adapter Compatibility or Appendix B for more information on the IRMA Adapter Compatibility.

Notes:

Problem Determination

This section of the manual is provided to assist you with problems you may have while using the Coax Adapter.

If you are having problems other than communicating with your host, follow the steps below to further assist you with solving the problem.

Initial Checks

1. If your system unit does not power up as it normally does, check that power is available to both your monitor and system unit. If power is available to both units proceed to step 2.
2. Check all connections to the system unit (keyboard, monitor, and any other connections).
3. Check the contrast and brightness controls on the monitor. Should the screen appear, re-adjust to a comfortable level.
4. If your system is equipped with diagnostics (power on diagnostics, memory test, alarm "beeps") make sure these tests pass normally. If these diagnostics "fail", refer to your system unit user's manual to further identify the system problem.

Adapter Does Not Load

1. Is the Coax Adapter installed correctly in the system unit? Make sure the adapter card is firmly seated in the system unit's Main board.
2. The loader program displays an error message while trying to load the microcode files- Refer to Appendix C, "Error Messages" for further information.
3. Check the current directory for loader files, if the files are under another directory, make sure the PATH statement contains the correct pathname for the directory.

4. Make sure the disk that contain the loader files has not been corrupted. If so, reload them from your original diskette.

Adapter Loads. . . Does Not Communicate with the Host

1. Make sure the communication cable is properly attached to the Coax Adapter. (loose wires, frayed cable, etc.)

2. Are other devices communicating with the same control unit? If not, the control unit may be malfunctioning. Check with your system operator.

3. If possible, have your system operator restart the line that you are communicating with. If the host is operational and other devices are functioning normally, power your system off and back on to retry the operation.

Product support

If you have a question that isn't answered in this manual, our Product Support Department can help. Free telephone support is provided for 90 days to you as a new user when you return the enclosed registration card. Many questions can be answered in this manual. However, if you've checked your manual and still need assistance, please have your computer powered on and the following information handy:

- your name and address
- your Coax Adapter serial number
- your computer make and model, the amount of RAM installed, the type and capacity of your hard disk and floppy drives, the display adapter and monitor type, the coax adapter manufacturer, printer name and model number, and list of attached peripherals
- DOS version number
- contents of your CONFIG.SYS and AUTOEXEC.BAT files
- a clear description of your problem

Call Product Support at (919) 954-8380 between 9 am and 5 pm EST (excluding holidays). We will be happy to assist you.

Defective items

If you find a defect in your coax adapter, diskettes or manual within 1 year of the date of purchase, you may return the defective item for a replacement. Proof of purchase is required.

IBM 3278/79 Adapter Compatibility

The Coax Adapter is capable of executing programs that utilize the IBM 3278/79 Emulation Adapter. This gives the user the capability to use existing software until upgrading to the Workstation Program. The following text is provided as a reference only; refer to the *IBM Technical Reference for the Advanced Adapter* for a more detailed description.

IBM 3278 Interface Registers

Hex I/O Address	Register Description	PC Reads	PC Writes
02D0	Interrupt Status	Data	1=Clear Bit
02D1	Visual/Sound	Data	Resets Alarm
02D2	Cursor Address Low	Data	Ignored
02D3	Cursor Address High	Data	Ignored
02D4	Adapter Control	Data	Data
02D5	Keyboard Scan Code	Invalid	Data
02D6	Terminal ID	Invalid	Data
02D7	Segment	Data	Ignored *
02D8	Page Change Low	Data	1=Clear Bit
02D9	Page Change High	Data	1=Clear Bit
02DA	3287 Status	Data	1=Clear Bit
02DB	Reserved	—	—
02DC	Reserved	—	—
02DD	Reserved	—	—
02DE	Reserved	—	—
02DF	Reserved (Coax Adapter)	—	—

* The Coax Adapter will ignore the change segment command, Address CE00H is the only valid segment used.

Register Description

INTERRUPT STATUS REGISTER (02D0H)

BIT 0 **KEYSTROKE ACCEPTED (3278)**
START OPERATION (DFT & 3287)
In 3278 mode this bit is set when the control unit acknowledges the previous SCAN CODE that was placed in register 02D5H.

In DFT and 3287 modes, this bit is set when the control unit has decoded a START OPERATION command.

BIT 1 **RESET COMMAND (DFT, 3278, & 3287)**
This bit is set when the adapter decodes a RESET command from the control unit. The adapter will set the cursor address registers depending on the mode selected and reset the visual/sound register to 00H upon acceptance of this command.

BIT 2 **VISUAL/SOUND UPDATE (3278)**
DISABLE POLL (3287)
DIAGNOSTIC RESET (DFT)
In 3278 mode, this bit is set when the control unit sends a LOAD CONTROL REGISTER command or either an ENABLE, DISABLE, or ALARM POLL command.
In 3287 mode, this bit is set when the control unit sends a DISABLE POLL. command
In DFT mode, this bit is set when the control unit sends a DIAGNOSTIC RESET command.

- BIT 3** **READ TERMINAL ID (DFT only)**
This bit is set when the control unit sends a READ TERMINAL ID command.
- BIT 4** **BUFFER CHANGE COMPLETE (3278 only)**
In 3278 mode, this bit is set when the WRITE DATA, INSERT, and CLEAR commands have completed their operation.
- BIT 5** **CURSOR ADDRESS CHANGED**
This bit is set whenever the control unit modifies either the Cursor HIGH or LOW Address registers. This bit will generate an INTERRUPT if:
 The interrupt is NOT masked, and
 Inhibit Cursor is OFF or,
 Inhibit Cursor is ON and Conditional Interrupt Disable is OFF.
- BIT 6** **BUFFER BEING CHANGED (3278 only)**
This bit is set at the beginning of a CLEAR, INSERT, or a WRITE DATA command. When the end of these commands are detected, this bit is reset and BUFFER CHANGE COMPLETE is set.
- BIT 7** **INTERRUPT PENDING**
This bit is set if any one of bits 0-5 of this register is set to a "1" and the interrupt mask is not set. It is reset when the PC services the bits causing the interrupt by writing them to a "0".

VISUAL/SOUND REGISTER

This register is loaded when the control unit sends the adapter either a LOAD CONTROL REGISTER or an ENABLE, DISABLE or ALARM POLL. The setting and resetting of these bits are "owned" by the control unit with the exception of BIT 6, SOUND ALARM. This bit is reset when the PC writes this register (Data=Don't Care).

- BIT 0 NUMBER OF CHARACTERS/ROW
 "0" = 80 characters per row
 "1" = 132 characters per row
- BIT 1 INHIBIT FEATURE STEP
 This bit is used by the control unit to "inhibit" the address counter from auto-incrementing.
- BIT 2 INHIBIT DISPLAY
 This bit is sent by the control unit to "blank" the display.
- BIT 3 INHIBIT CURSOR
 This bit is sent by the control unit to "blank" the cursor.
- BIT 4 REVERSE CURSOR
 This bit is sent by the control unit to change the cursor state, from BLOCK to UNDERLINE or UNDERLINE to BLOCK.
- BIT 5 BLINK CURSOR
 This bit is sent by the control unit to set the cursor to "blink".
- BIT 6 SOUND ALARM
 This bit set when the adapter decodes a SOUND ALARM Poll.
- BIT 7 CLICK ENABLE
 This bit is updated when the adapter decodes an ENABLE or DISABLE poll from the control unit.

CURSOR ADDRESS LOW REGISTER (02D2H)

This register is the current state of the Cursor Address lower 8 bits. In 3278 mode, when the control unit changes the state of this register, BIT 5 will be set in the Interrupt Status Register (02D0H). Data written to this register from the PC will be ignored.

CURSOR ADDRESS HIGH REGISTER (02D3H)

This register is the current state of the Cursor Address higher 8 bits. The High Order 3 bits are always set to 0, maintaining a maximum address capability of 8K Bits. In 3278 mode, when the control unit changes the state of this register, BIT 5 will be set in the Interrupt Status Register (02D0H). Data written to this register from the PC will be ignored.

ADAPTER CONTROL REGISTER (02D4H)

BIT 0 INTERFACE ENABLED

This bit is set by the PC when it desires to start communications with the control unit. It may be reset by either the control unit or the PC whenever either desires to disconnect the interface. After this bit is set by the PC, the FIRST Poll response to the control unit will be POR.

BIT 1 CUT/DFT MODE

When this bit is set to a "1", the adapter will operate in DFT mode. When this bit is set to a "0", the adapter will operate in CUT mode (3278, 3287).

BIT 2 3278/3287 MODE

When CUT Mode is set, the setting of this bit to a "0" will place the adapter in 3278 Mode. When this bit is set to a "1", the adapter will enter 3287 mode. This bit is ignored if the adapter is placed in DFT mode.

BIT 3 SCAN CODE AVAILABLE

This bit is set by the PC when it desires to send the control unit a SCAN CODE from the keyboard. This bit

is reset by the control unit when the adapter receives either a POLL ACKNOWLEDGE or a RESET.

BIT 4 STATUS TRANSITION
This bit is set by the PC to request the control unit to acknowledge a status change that occurred in the adapter. It is reset by the control unit when it sends a POLL ACKNOWLEDGE.

BIT 5 TEST
This bit is ignored by the adapter.

BIT 6 CONDITIONAL INTERRUPT (3278 mode)
RESET CURSOR (3287 mode)
In 3278 mode, the setting of this bit will inhibit the interrupt that will occur if the Cursor Address Register changes and the INHIBIT CURSOR bit is set. In 3287 mode, the setting of this bit will set the Cursor Address Register to 0000H.

BIT 7 DISABLE INTERRUPTS
This bit is set when the adapter is powered on or by the PC under program control. When this bit is set, all interrupts the adapter can place are DISABLED.

SCAN CODE REGISTER (02D5H)

This register is used to hold the SCAN CODE the PC wishes to send to the control unit. Once this register is loaded, it should *NOT* be changed until the control unit resets the SCAN CODE AVAILABLE bit. The adapter will send the 1's complement (INVERTED) of this register to the control unit.

TERMINAL ID REGISTER (02D6H)

This register is used to hold the TERMINAL ID of the adapter. It should be set before the PC enable the interface to the control unit. The contents of this register are the 1's complement (INVERTED) of the data that is sent to the control unit.

For the 3287 and DFT modes this register should be loaded with a Hex 'FE'. (sends 01H).

For the 3278 mode of operation the bits are defined as followed:

BITS 7-4	KEYBOARD ID
BITS 3-1	101 = Model 2
	100 = Model 3
	000 =Model 4
	001 =Model 5
BIT 0	Must be set to 1

SEGMENT REGISTER (02D7H)

The Coax Adapter will always return a Hex 'CE'. The segment addressing cannot be changed on the Coax Adapter.

PAGE CHANGE LOW (02D8H)

This register is used to notify the PC of a change of data in the lower 2 K buffer space inside the adapter. Each bit inside this register corresponds to a 256 byte "page" that has been modified by the control unit. The bits are defined as follows:

BIT 0	Page 0 Change	0-00FFH
BIT 1	Page 1 Change	0100H-01FFH
BIT 2	Page 2 Change	0200H-02FFH
BIT 3	Page 3 Change	0300H-03FFH
BIT 4	Page 4 Change	0400H-04FFH
BIT 5	Page 5 Change	0500H-05FFH
BIT 6	Page 6 Change	0600H-06FFH
BIT 7	Page 7 Change	0700H-07FFH

PAGE CHANGE HIGH (02D9H)

This register is used to notify the PC of a change of data in the higher 2 K buffer space inside the adapter. Each bit inside this register corresponds to a 256 byte "page" that has been modified by the control unit. The bits are defined as follows:

BIT 0	Page 8 Change	0800H-08FFH
BIT 1	Page 9 Change	0900H-09FFH
BIT 2	Page 10 Change	0A00H-0AFFH
BIT 3	Page 11 Change	0B00H-0BFFH
BIT 4	Page 12 Change	0C00H-0CFFH
BIT 5	Page 13 Change	0D00H-0DFFH
BIT 6	Page 14 Change	0E00H-0EFFH
BIT 7	Page 15 Change	0F00H-0FFFH

3287 STATUS REGISTER

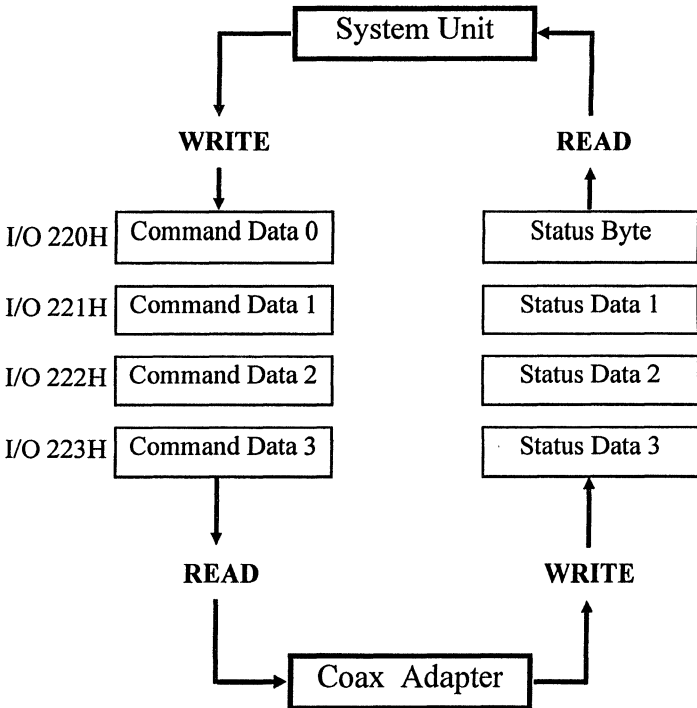
This register is used for the 3287 mode of operation only. The bits are set by the control unit and are reset by the PC. The bits are defined as follows:

- BITS 4-0 Undefined
- BIT 5 3287 Sound Alarm
This bit is set when the adapter decodes a SOUND ALARM poll from the control unit.
- BIT 6 3287 Disable Poll
This bit is set when the adapter decodes a DISABLE POLL from the control unit.
- BIT 7 3287 Enable Poll
This bit is set when the adapter decodes an ENABLE POLL from the control unit.

IRMA™ Compatibility

The Coax Adapter is capable of executing emulation programs that utilize the IRMA™ Interface. This gives the user the capability to use existing software provided by third party vendors. The following information is given for reference only; a more detailed explanation may be found in the *IRMA User's Guide*.

The Coax Adapter communicates to the system unit using four bytes of I/O space for READ registers and four bytes of I/O space for WRITE registers. These register sets share the same I/O locations, 0220H-0223H. These registers are set in the following configuration:



The system unit issues commands to the adapter by writing a command byte to I/O register 220H with the data arguments being written to I/O registers 221H-223H. The system unit then sets the COMMAND REQUEST flag by performing an I/O write to register 226H. When the command has been executed, the adapter will place the return status to the system unit in I/O register 220H, with any data to follow in registers 221H-223H. The adapter will then clear the COMMAND REQUEST flag alerting the system unit that the command has been completed.

Should the adapter need to pass asynchronous status to the system unit, BIT 7 in I/O register 227H, will be set notifying the system unit to service the status request. After the status has been processed, the system unit performs an I/O write to register 227H, to clear the status request.

IRMA™ Status Registers

The adapter contains two status registers, Main and Auxiliary. The Main status register may be read from I/O register 220H whenever the adapter completes a system unit command. The Auxiliary register may be read by executing a READ STATUS/CURSOR POSITION command (CMD 02H). The status registers are defined as follows:

MAIN STATUS REGISTER (I/O 220H)

- | | |
|---------------|--|
| BIT 0* | CURSOR ADDRESS LOADED
This bit is set when the control unit changes the cursor address registers inside the adapter. |
| BIT 1* | BUFFER MODIFIED
This bit is set when the control unit executes a write type command that changes the contents of the adapter buffer. |
| BIT 2 | NOT USED
This bit is not used by the Coax Adapter. |

BIT 3*	RESET RECEIVED This bit is set when the control unit sends the adapter a RESET command.
BIT 4	NOT USED This bit is not used by the Coax Adapter.
BIT 5	KEY BUFFER EMPTY This bit is set when the control unit has accepted the keyboard scan code that was loaded by the system unit.
BIT 6*	TRIGGER OCCURED This bit is set when the adapter detects a match of the parameters that are set using the LOAD TRIGGER ADDRESS and DATA commands.
BIT 7*	AUXILIARY STATUS CHANGED This bit is set by the adapter when it detects that the Auxiliary Status register has changed.

* These bits may be reset by the system unit by executing command 03H (CLEAR MAIN STATUS).

AUXILIARY STATUS REGISTER (I/O 223H)

BIT 0*	CLICK ENABLE This bit is set when the control unit issues an ENABLE POLL to the adapter. It is reset when the control unit sends a DISABLE POLL.
BIT 1*	CURSOR BLINK ENABLE This bit is set when the control unit receives a LOAD CONTROL REGISTER with BIT 0 set to a '1'. It is reset when the control unit sends a LOAD CONTROL REGISTER with BIT 0 set to a '0'.
BIT 2*	REVERSE CURSOR ENABLE This bit is set when the adapter receives a LOAD CONTROL REGISTER command with BIT 1 set to a

'1'. It is reset when the control unit sends a LOAD CONTROL REGISTER command with BIT 1 set to a '0'.

BIT 3*

INHIBIT CURSOR

This bit is set when the adapter receives a LOAD CONTROL REGISTER command with BIT 2 set to a '1'. It is reset when the control unit sends a LOAD CONTROL REGISTER command with BIT 2 set to a '0'.

BIT 4*

INHIBIT DISPLAY

This bit is set when the adapter receives a LOAD CONTROL REGISTER command with BIT 3 set to a '1'. It is reset when the control unit sends a LOAD CONTROL REGISTER command with BIT 3 set to a '0'.

BIT 5*

SOUND ALARM

This bit is set when the control unit sends a SOUND ALARM POLL to the adapter.

BIT 6

UNIT POLLED SINCE STATUS READ

This bit is set when the adapter receives a POLL command and the system unit has not executed a STATUS READ command. It may be reset by the system unit.

BIT 7

NOT USED

This bit is not used by the Coax Adapter.

* These bits can only be set and reset by the control unit.

IRMA™ Command Description

Code	Command Description
0	Read Data from Buffer
1	Write Data to Buffer
2	Read Status/Cursor Position
3	Clear Main Status Register
4	Send Scan Code
5	Send Light Pen Location
6	Execute POR Sequence
7	Load Trigger Data/Mask
8	Load Trigger Address
9	Load Attention Mask
A	Set Terminal Type
B	No Operation
C	Read Terminal Information
D	No Operation
E	Return Revision ID & OEM Number
F	No Operation

READ DATA from BUFFER (Cmd 0)

This command is used to extract data one byte at a time from the BASE and EAB buffers inside the adapter.

Command 0

Register	Write Data	Read Data
I/O 220H	Command 0	Main Status
I/O 221H	Buffer Address Low	----
I/O 222H	Buffer Address High	Attribute Data
I/O 223H	----	Base Data

WRITE DATA to BUFFER (Cmd 1)

This command is used to write one byte of data to the BASE buffer.

Command 1

Register	Write Data	Read Data
I/O 220H	Command 1	Main Status
I/O 221H	Buffer Address Low	----
I/O 222H	Buffer Address High	----
I/O 223H	Write Data	----

READ STATUS/CURSOR POSITION

This command reads the current Cursor Address, the Main and Auxiliary Status registers from the adapter.

Command 2

Register	Write Data	Read Data
I/O 220H	Command 2	Main Status
I/O 221H	----	Cursor Address Low
I/O 222H	----	Cursor Address High
I/O 223H	----	Auxiliary Status

CLEAR MAIN STATUS REGISTER (Cmd 3)

This command is used to clear the 5 MAIN status bits in the adapter. These bits are cleared under control of the data byte that is received following this command. The bit position that corresponds to a '1' is cleared, while bits containing a '0' are left unchanged. The MAIN status register is updated AFTER this command has been executed.

Command 3

Register	Write Data	Read Data
I/O 220H	Command 3	Main Status
I/O 221H	-----	-----
I/O 222H	-----	-----
I/O 223H	Bit Mask	-----

SEND SCAN CODE (Cmd 4)

This command is used to send a SCAN CODE to the control unit. Writing this register will reset the KEY BUFFER EMPTY bit in the Main status register.

Command 4

Register	Write Data	Read Data
I/O 220H	Command 4	Main Status
I/O 221H	-----	-----
I/O 222H	-----	-----
I/O 223H	Scan Code	-----

SEND LIGHT PEN LOCATION (Cmd 5)

This command is used to send the LIGHT PEN ROW and FIELD count to the control unit. This is the position that the system unit detected a "light-pen" hit on the display.

Command 5

Register	Write Data	Read Data
I/O 220H	Command 5	Main Status
I/O 221H	Light Pen Row	----
I/O 222H	Light Pen Field	----
I/O 223H	----	----

EXECUTE POR SEQUENCE (Cmd 6)

This command is used to send a POR response to the control unit. This will force the control unit to re-initialize the adapter to a "start-up" state.

Command 6

Register	Write Data	Read Data
I/O 220H	Command 6	Main Status
I/O 221H	----	----
I/O 222H	----	----
I/O 223H	----	----

LOAD TRIGGER DATA/MASK (Cmd 7)

This command is used to load the trigger DATA and MASK registers. The DATA byte compared in the buffer is compared “under mask”, whereas, the bits in the MASK register are the only bits used in the compare operation.

Command 7

Register	Write Data	Read Data
I/O 220H	Command 7	Main Status
I/O 221H	Trigger Data	----
I/O 222H	Trigger Mask	----
I/O 223H	----	----

LOAD TRIGGER ADDRESS (Cmd 8)

This command is used to load the trigger ADDRESS. This is the address that the DATA and MASK byte are checked in the buffer. When the ADDRESS, DATA and MASK meets the parameters read from the buffer, the TRIGGER OCCURED bit will be set. The TRIGGER OCCURED bit will be reset when this command is loaded.

Command 8

Register	Write Data	Read Data
I/O 220H	Command 8	Main Status
I/O 221H	Trigger Address Low	----
I/O 222H	Trigger Address High	----
I/O 223H	----	----

LOAD ATTENTION MASK (Cmd 9)

This command is used to load the attention MASK to the adapter. When the MAIN status register change (from a '0' to a '1'), the ATTENTION REQUEST flag is set if the corresponding bits are set to a '1' in the attention MASK.

Command 9

Register	Write Data	Read Data
I/O 220H	Command 9	Main Status
I/O 221H	----	----
I/O 222H	----	----
I/O 223H	Attention Mask	----

SET TERMINAL TYPE (Cmd A)

This command is used to load the terminal TYPE to the adapter. This byte is the ID that is sent in response to a READ TERMINAL ID command from the control unit. If the adapter is loaded with a terminal TYPE that is different than the one previously loaded, the adapter will perform the EXECUTE POR sequence, else no action is taken.

Command A

Register	Write Data	Read Data
I/O 220H	Command A	Main Status
I/O 221H	----	----
I/O 222H	----	----
I/O 223H	Terminal Type	----

NO OPERATION (Cmds B,D,F)

These commands perform a “no-operation” to the adapter. Only Main status is returned to the system unit.

Commands B,D,F

Register	Write Data	Read Data
I/O 220H	Commands B,D,F	Main Status
I/O 221H	----	----
I/O 222H	----	----
I/O 223H	----	----

READ TERMINAL INFORMATION (Cmd C)

This command is used to return the adapter information to the system unit. The contents returned are EAB Page Number, Internal Page Number, and the Current Terminal ID.

Command C

Register	Write Data	Read Data
I/O 220H	Command C	Main Status
I/O 221H	----	EAB Page Number
I/O 222H	----	Internal Page Number
I/O 223H	----	Current Terminal ID

RETURN REVISION ID & OEM NUMBER (Cmd E)

This command returns the ID of the adapter to the system unit.

Command E

Register	Write Data	Read Data
I/O 220H	Command E	Main Status
I/O 221H	----	Revision #BCD Low
I/O 222H	----	Revision #BCD High
I/O 223H	----	OEM Number

Fatal Diagnostic Errors

The following error messages are provided as a technical reference for diagnosing problems that may occur with the Coax Adapter. The self executing diagnostic tests assure the user that the Coax Adapter is fully functional before beginning a host session with the attached control unit. The following errors are FATAL error messages; should they appear, the Coax Adapter LOAD program will not continue.

Diagnostic Error , Could not find diagnostic file

This message is displayed when the loader program could not find its diagnostic file on the system disk. Check to make sure the COPY of your utilities disk has not been corrupted.

Diagnostic Error , Coax Adapter Board not present.

This message is displayed when the diagnostic program could not find the Coax Adapter. Make sure the Coax Adapter is firmly seated in the system unit.

Diagnostic Error , Adapter not responding.

This error is displayed when the diagnostic program detected the Coax Adapter, but it failed to communicate properly across the system bus.

Diagnostic Error , Cannot set Program Counter on Adapter.

This message is displayed when the diagnostic program could not gain control of the Coax Adapter's Main Processor.

Diagnostic Error , Instruction memory failed.

This message is displayed when the diagnostics detected a failure of the Coax Adapter's Instruction memory for its Main processor.

Diagnostic Error , Adapter Diagnostic detected error.

After starting the on-board diagnostic program in the Coax

Adapter's Main processor, a self-detected error was reported.

Diagnostic Error , Invalid Registration Number in Adapter

The diagnostic program detected a Registration number that is invalid on the Coax Adapter.

Diagnostic Error , Adapter Data memory failed.

The on-board diagnostic program in the Coax Adapter detected that its system RAM memory failed.

Diagnostic Error , Error Reading Ports 220-22F.

This message is displayed when the diagnostic program detected an I/O error while testing the Ports 220H-22FH.

Diagnostic Error , Error Reading Ports 2D0-2DE.

This message is displayed when the diagnostic program detected an I/O error while testing the Ports 2D0H-2DEH.

Diagnostic Error , CPU Instruction RAM Test timed out.

While the Coax Adapter was executing its internal RAM test, it did not complete its test.

Diagnostic Error , (U12) 32K RAM Test failed.

The Coax Adapter's Main processor detected an error with the 32K RAM used for the Coax Buffer.

Diagnostic Error , (U11) 32K RAM Test failed.

The Coax Adapter's Main processor detected an error with the 32K RAM used for Local storage.

Diagnostic Error , COAX Test timed out.

While the Coax Adapter was executing its Coax test, it took too long to respond to the diagnostics.

Diagnostic Error , XMIT Test failed.

While the Coax Adapter was testing the Coax Transmitter, it detected a failure.

Diagnostic Error , RCV Test failed.

While the Coax Adapter was testing the Coax Receiver, it detected a failure.

Diagnostic Error , IRQ 2 Not Functioning.

The diagnostic program requested the Coax Adapter to generate an IRQ 2 Interrupt. The Adapter failed to respond to this request.

Diagnostic Error , Could not find Load File

This message is displayed when the loader program could not find its system load file on the system disk. Check to make sure the COPY of your utilities disk has not been corrupted.

Notes:





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