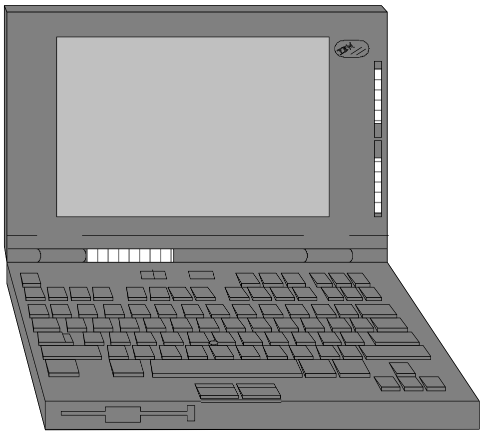
ThinkPad 755 Enhanced

755Ce, 755Cse, 755CD, 755CDV, 755CV, & 755CX



Technical Information, Tips, and Techniques

Version 3.4

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Troubleshooting IBM Thinkpad Hardware Setup Problems

If you should experience problems setting up PCMCIA Cards or ISA Adapters (in the docking station), please follow the procedures listed below:

(1) Please ensure that your ThinkPad is using the latest BIOS release for that system. Later BIOS releases correct problems that users have experienced with the earlier releases. Refer to the ThinkPad BIOS section to determine if you need to update your system's BIOS.

(2) Make sure that your software drivers are at the correct release level and are setup properly. Refer to the ThinkPad PCMCIA Drivers section to see if you need to update your system's PCMCIA device drivers. If you are using Point Enablers, please ensure that they are at the latest release level.

(3) Determine if any upper memory conflicts exist between the areas claimed by ThinkPad BIOS, Card & Socket Services, Point Enablers, the SCSI Adapter found in IBM Docking Stations, and any ISA Adapters installed in the docking station. Refer to the ThinkPad Memory Map and the ThinkPad Dock I & Dock II Memory Map sections.

The Device Driver DICRMU01.SYS /MA=C800-CFFF (DOS PCMCIA Resource Map Utility) sets the upper memory addresses used by Card & Socket Services. The /MA parameter tells Card Services what locations in upper memory can be used by PCMCIA cards or Card Services, and must match or be a subset of an excluded memory range on the EMM386 line of CONFIG.SYS.

(4) Microsoft Windows can overwrite the upper memory address used by Card & Socket Services. To prevent this, add an EmmExclude=XXXX-XXXX statement to the [386 Enh] section of SYSTEM.INI (Where XXXX-XXXX is the same as the memory region as used in the /MA parameter for the DICRMU01.SYS driver). If you are using point enablers, be sure to exclude any upper memory used by the enabler by adding an EmmExclude statement to SYSTEM.INI.

(5) Make sure that no interrupt conflicts exist between ThinkPad devices, PCMCIA Cards, the SCSI Adapter found in the IBM Docking Stations, and any ISA Adapters installed in the docking station. Refer to the ThinkPad Interrupt Assignments section to view the default interrupt assignments. Please note that the ThinkPad System Setup Utility allows you to view and change interrupt assignments for many internal devices.

The Resource Map Utility (DOS - DICRMU01.SYS, OS/2 - ICRMU01.SYS) can automatically detect many IRQs already in use, but may not detect all. Try excluding the IRQ of the onboard SCSI and any ISA Adapters in the Docking Station by adding the /IX=xx parameter to the Resource Map Utility (where xx is the IRQ number to exclude). Multiple IRQs may be specified by separating with a comma.

(6) Ensure that no DMA conflicts exist between internal ThinkPad devices and any ISA Adapters installed in the docking station. Please refer to the ThinkPad DMA Assignments section.

(7) Some ISA Adapters in the IBM DOCK I and DOCK II may require the ISA Adapter Timing Fix. Please download YPTF012.EXE from the IBM BBS.

Troubleshooting IBM Thinkpad MWAVE Modem Problems

If you should experience problems with the MWAVE DSP Modem, please follow the procedures listed below:

(1) If you experience a NO DIALTONE Error, reseat the telephone DAA Module. Disconnect the phone line from the ThinkPad and leave the hatch door open. Lift open the keyboard. Slide the blue switch to the left. This unlocks the DAA Module for removal. From the left side of the ThinkPad, pull the black DAA Module away from the ThinkPad. Firmly press the DAA Module back into the ThinkPad to reseat it. Lock the DAA Module in place by sliding the blue switch all the way to the right.

(2) Please ensure that your ThinkPad is using IBM ThinkPad MWAVE software Version 2.0 (or later). Earlier versions do not provide 28.8KBPS support. Please review the Drivers section of this document for the latest MWAVE code.

(3) Review the communications settings for your modem software:

To Set:	Select highest ranking available setting:
Modem type	1. Mwave modem 2. Generic Hayes-type modem 3. User-defined modem 4. Hayes SmartModem 2400 5. Hayes modem 6. Hayes compatible modem 7. Other (Note: If you select a modem of type "Other," you must include the proper modem initialization string. For most applications, the initialization string "AT&F" will work. See the Mwave Modem online help for more information.)
Baud Rate	57,600 Kbps, or the maximum setting offered by your communications software.
COM Port	COM 2

To determine if communications software configuration is a problem, test the modem using the Windows Terminal program (in the Accessories Folder). Run Terminal. Select COM2. Select Settings, then Modem Commands and make sure that Hayes is selected, then select OK. Next, type atdt at the command line and hit Enter. If you receive a dialtone, then you probably have a software configuration problem with your specific modem software. If you do not receive a dialtone, continue with next step.

(4) Double click on the ThinkPad Setup Icon. The double click on the System Information Icon. Review the IRQ settings to ensure that (a) the DSP device is active (default is IRQ10); (b) the modem device is active (default is IRQ3); and (c) no other devices conflict with the DSP and Modem IRQs. Next, review the DMA settings to ensure that the DSP device is active (default DMA7) and that no other devices conflict with the DSP device.

Troubleshooting IBM Thinkpad MWAVE Modem Problems (continued)

(5) Within the ThinkPad Setup Icon or Folder, double click on the Serial Icon. Please ensure that Serial Ports A & B are disabled or do not conflict with the MWAVE Modem.

(6) Open MWAVE ThinkPad Icon or Folder. Double click on the Modem icon. This enables the MWAVE Modem. This program can be minimized. However, it must remain running while using the MWAVE Modem. (Please Note that this item does not apply to MWAVE 2.0 for Windows or MWAVE 2.1 for Windows 95).

(7) Lotus Notes users should download LOTMWAVE.EXE from the IBM BBS. This file provides Lotus Notes with a MWAVE modem definition.

(8) Microsoft Mail users should download MSMMWAVE.EXE from the IBM BBS. This file provides Microsoft Mail with a MWAVE modem definition.

(9) The MWAVE Device is initialized each time Microsoft Windows is started. This means that a communications session started in DOS would be terminated when Windows is started. Users who need to start the MWAVE Modem in DOS and keep it running while starting Microsoft Windows should use MWAVE Version 1.1 and download MWDOSMOD.EXE. A fix for MWAVE Version 2 should be available shortly.

Installing Windows 95 on the ThinkPad 755Ce, 755Cse, 755CD, 755CDV, 755CV, & 755CX

(1) For complete Windows 95 directions, please download TPWIN95.EXE from the IBM BBS.

(2) If your ThinkPad is still running the original IBM software preload, download WIN95SET.EXE as well. This diskette will prepare an IBM ThinkPad loaded with the IBM software preload for Windows 95. The diskette will check the BIOS level of the system, stop the ThinkPad Welcome Screen from being displayed automatically, and delete OS/2 WARP and any preinstalled OS/2 applications.

(3) It is STRONGLY RECOMMENDED that you update your system BIOS to the latest BIOS release before installing Windows 95 on your system. Early BIOS releases do not support Plug & Play or MWAVE under Windows 95. Refer to the BIOS section for the latest BIOS level for you ThinkPad.

(4) Install Windows 95. On ThinkPad's with internal CD-ROM Drives, Windows 95 comes with a generic ATAPI CD-ROM driver and it will work with the ThinkPad integrated CD-ROM. To make sure that you are using Windows 95 generic ATAPI CD-ROM driver, remove the following driver from CONFIG.SYS: IBMTPCD.SYS.

(5) The ThinkPad Features Program for Windows works on Windows 95. If you install Windows 95 on a blank hard disk or you haven't installed ThinkPad Features Program, follow the instructions of "ThinkPad Features Program - Installing for Windows" in the ThinkPad User's Guide. Please ensure that you are at the latest levels (refer to Driver Levels section of this document).

(6) Windows 95 comes with the integrated PCMCIA support. To use the Windows 95 PCMCIA support functions, refer to the Windows 95 documentation or on-line help. Note: to use PCMCIA function, you must run the PC Card Wizard in Control Panel under My Computer.

If you want to use ThinkPad PC Card Director (or EasyPlaying), you can still use ThinkPad DOS PCMCIA device drivers. Follow the instructions in the ThinkPad User's Guide for "Installing the PCMCIA drivers - Installing for DOS." Make sure that you use the latest PCMCIA drivers.

(7) To install MWAVE Modem and Audio support, obtain the latest MWAVE DOS and MWAVE Windows 95 Drivers from the IBM BBS.

(8) You can use ThinkPad Infrared device driver on Windows 95. If you don't have ThinkPad Infrared device driver version 2.01, you may encounter some problems. Refer to the Driver Levels section of this document.

(9) The ThinkPad 755CD and 755CDV provide Enhanced Video. You can use ThinkPad Enhanced video device driver on Windows 95. If you don't have ThinkPad Utility diskette version 3.10 or later, you may encounter some problems when you change or setup enhanced video functions.

(10) If you are using an IBM PCMCIA Token-Ring Adapter, download TRCC1.EXE for an updated driver for Windows 95.

(11) Windows 95 treats the IBM Ethernet Credit Card Adapter as a Plug & Play Adapter. However, some older versions of this adapter do not support Plug & Play. If you insert this adapter into a system running Windows 95, the system may lock until you remove the adapter. To correctly configure this adapter for Windows 95, boot in Safe Mode, go into Device Manager, and manually configure the adpater for I/O 300, IRQ 9, Mem Address D400.

Installing Windows NT 4.0 on the ThinkPad 755Ce, 755Cse, 755CD, 755CDV, 755CV, & 755CX

(1) Update your system BIOS to the latest BIOS release before installing Windows NT on your system.

(2) Download the latest ThinkPad Windows NT 4.0 Installation Instructions (TPWINT40.TXT) from the IBM BBS or Web site. Also download the latest drivers required for your system (see Drivers for Windows NT section for the files to download)

(3) Install Windows NT on the ThinkPad.

(4) Windows NT 4.0 should automatically detect the ThinkPad 755Ce, 755Cse, 755CD, 755CDV, 755CV, and 755CX video controller and install a Western Digital 90C24A display driver.

(5) Install the ThinkPad Power Management driver. Once you install the ThinkPad Power Management driver, Suspend/Resume and Power Management are supported under Windows NT.

(6) Install the Windows NT version ThinkPad Utilities program. Using this program, you can change your hardware configuration, display the fuel gauge, and set the device stand-by timers (same as in the Windows 3.1 or Windows 95 environments). Logoff and log back on to enable the ThinkPad Utilities.

(7) Windows NT Audio & Modem Support is provided via MWAVE files from the IBM BBS. Before installing MWAVE support, verify that the MWAVE DSP is enabled in the ThinkPad features program. Then, install MWAVE support for Windows NT (for MWAVE systems).

(8) Install ThinkPad infrared support using the file from the IBM BBS.

Currently, the following functions are not supported on Windows NT:

Enhanced video function (755CD, 755CDV) such as video overlay features are not supported.

Hibernation functions are not supported on NTFS partitions.

Windows NT supports the IBM Dock-I and Dock-II. However, hot/warm docking is not supported. To use the device in the Docking station, you must power off the system prior to docking/undocking.

Latest Version of ThinkPad BIOS

ThinkPad Model	Latest BIOS Part Number	Date
755Ce and 755Cse	91G2006	11/07/96
755CD, CV, CDV, CX	91G2006	11/07/96

To view the BIOS Part Number, turn off the computer, press and hold F1, then turn on the computer. Hold F1 until the Easy-Setup menu appears. Select Config followed by SystemBoard.

To get the latest BIOS for the ThinkPad 755Ce, 755Cse, 755CD, 755CDV, 755CV, & 755CX download SYTPE144.EXE from the IBM BBS.

Upgrading The ThinkPad Flash BIOS

- You need an AC adapter and a charged battery pack to update the system program.
- If your computer is attached to a ThinkPad Docking Station or a port replicator, turn off the computer and detach it before proceeding.

(1) Firmly connect the AC adapter to the computer.
(2) Insert the System Program Service Diskette into the diskette drive and turn on the computer.
(3) Select "Update system program" and follow the instructions on the screen.
Warning: Do not turn off or suspend the computer until the update has been completed. IF YOU TURN OFF OR SUSPEND THE COMPUTER WHILE THE UPDATE IS STILL IN PROGRESS, THE SYSTEM BOARD MAY HAVE TO BE REPLACED.

- After the update has been completed, do the following to make the changes effective.

(4) Remove the System Program Service Diskette from the diskette drive and turn off the computer.
(5) Press and hold F1, then turn on the computer. Hold F1 until the Easy-Setup menu appears.
(6) If a password prompt appears, type the correct password.
(7) Select Config, then select Initialize.
(8) Select OK to initialize system.

- Run the diagnostics to make sure that the computer runs with no errors:

(9) Turn off the computer, press and hold F1, then turn on the computer. Hold F1 until the Easy-Setup menu appears.
(10) Select Test, then select Start to run all the basic tests.
(11) Verify that OK appears for all of the devices tested.
(12) Press Esc to exit Test and turn off the computer.

Latest Version of DOS Card & Socket Services Drivers for ThinkPad 755Ce, 755Cse, 755CD, 755CDV, 755CV, & 755CX

File Name	Driver Description	Version	File Date	File Size
IBMDSS01.SYS	DOS PCMCIA Socket Services Driver	1.35	04-05-95	14888
IBMDOSCS.SYS	DOS PCMCIA Card Services Driver	2.21	04-17-95	29535
DICRMU01.SYS	DOS PCMCIA Resource Map Utility	1.16	12-01-94	10806
$ICPMDOS.SYS	DOS PC Card Power Management Driver	2.22	12-01-94	4500
AUTODRV.SYS	DOS PCMCIA PC Card Auto Configurator	1.09	11-11-94	13644

Latest Version of OS/2 Card & Socket Services Drivers for ThinkPad 755Ce, 755Cse, 755CD, 755CDV, 755CV, & 755CX

File Name	Driver Description	Version	File Date	File Size
IBM2SS01.SYS	OS/2 PCMCIA Socket Services Driver	1.35	03-22-95	15997
PCMCIA.SYS	OS/2 PCMCIA Card Services Driver	1.33	03-17-95	47622
VPCMCIA.SYS	OS/2 Virtual Card Services Driver		04-22-93	592
ICRMU01.SYS	OS/2 PCMCIA Resource Map Utility	1.16	12-01-94	8943
$ICPMOS2.SYS	OS/2 PC Card Power Management Driver	1.22	12-01-94	5841
AUTODRV2.SYS	OS/2 PCMCIA PC Card Auto Configurator	1.03	02-16-95	10718

Latest Drivers for ThinkPad 755Ce, 755Cse, 755CD, 755CDV, 755CV, & 755CX

IBM BBS File Name	Driver Description	Version	File Date
Drivers for DOS/Windows 3.1x:			
PCTPX130.EXE	PCMCIA Drivers - DOS, WIN, OS/2	1.30	07-24-95
UTTPG101.EXE	Utility Disk #1 (ThinkPad Utility Programs) - DOS, WIN, OS/2	3.32	06-04-96
UTTPG201EXE	Utility Disk #2 (ThinkPad Utility Programs) - DOS, WIN, OS/2	3.32	06-04-96
VFTPS133.EXE	Video Drivers - Windows 3.1x	1.33	12-05-94
MWD202-1.EXE	MWAVE DOS Drivers (Disk #1)	2.02	06-21-96
MWD202-2.EXE	MWAVE DOS Drivers (Disk #2)	2.02	06-21-96
MWW202-1.EXE	MWAVE Windows Drivers (Disk #1)	2.02	06-21-96
MWW202-2.EXE	MWAVE Windows Drivers (Disk #2)	2.02	06-21-96
IRTPGALL.EXE	Infrared Drivers	3.01	10-15-95
CDTPE120.EXE	CD-ROM Drivers (for 755CD & 755CDV)	1.20	07-25-95
EVTPR120.EXE	Enhanced Video Drivers (755CD & 755CDV)	1.20	06-26-95
ATADO200.EXE	PCMCIA Hard Disk Device Drivers	2.00	03-21-94
Drivers for Windows NT:			
PM75XWNT.EXE	ThinkPad NT Power Management Driver (75X series)	1.00	01-03-97
UTTPGWNT.EXE	ThinkPad Utility Programs - Windows NT	1.00	09-17-96
VF75XWNT.EXE	Windows NT Video Drivers		11-17-95
MWAVENT1.EXE	MWAVE Windows NT (Disk #1)	2.2	11-05-96
MWAVENT2.EXE	MWAVE Windows NT (Disk #2)	2.2	11-05-96
IRTPGWNT.ZIP	Infrared Drivers - Windows NT	1.00	01-06-97

Latest Drivers for ThinkPad 755Ce, 755Cse, 755CD, 755CDV, 755CV, & 755CX

IBM BBS File Name	Driver Description	Version	File Date
Drivers for Windows 95:			
PCTPX130.EXE	PCMCIA Drivers - DOS, WIN, OS/2	1.30	07-24-95
UTTPG101.EXE	Utility Disk #1 (ThinkPad Utility Programs) - DOS, WIN, OS/2	3.32	06-04-96
UTTPG201EXE	Utility Disk #2 (ThinkPad Utility Programs) - DOS, WIN, OS/2	3.32	06-04-96
MW9222A.EXE	MWAVE Windows 95 Drivers (Disk #1)	2.22	10-17-96
MW9222B.EXE	MWAVE Windows 95 Drivers (Disk #2)	2.22	10-17-96
MW9222C.EXE	MWAVE Windows 95 Drivers (Disk #3)	2.22	10-17-96
IRTPGALL.EXE	Infrared Drivers	3.01	10-15-95
CDTPE120.EXE	CD-ROM Drivers (for 755CD & 755CDV)	1.20	07-25-95
EVTPR120.EXE	Enhanced Video Drivers (755CD & 755CDV)	1.20	06-26-95
Drivers for OS/2:			
PCTPX130.EXE	PCMCIA Drivers - DOS, WIN, OS/2	1.30	07-24-95
UTTPG101.EXE	Utility Disk #1 (ThinkPad Utility Programs) - DOS, WIN, OS/2	3.32	06-04-96
UTTPG201EXE	Utility Disk #2 (ThinkPad Utility Programs) - DOS, WIN, OS/2	3.32	06-04-96
VFTPEWD1.EXE	Video Drivers - OS/2		09-17-96
VFTPECX1.EXE	Video Drivers - OS/2 (755CX Only)		09-17-96
MWO202-1.EXE	MWAVE OS/2 WARP Drivers (Disk #1)	2.02	06-21-96
MWO202-2.EXE	MWAVE OS/2 WARP Drivers (Disk #2)	2.02	06-21-96
MWAUDOS2.EXE	MWAVE Audio Driver for OS/2 WARP	2.02	06-04-96
EVTPR120.EXE	Enhanced Video Drivers (755CD & 755CDV)	1.20	06-26-95

ThinkPad 755Ce, 755Cse, 755CD, 755CDV, 755CV, & 755CX Memory Map

Location	Use
0000 - 9FFF	System RAM
A000 - AFFF	Video Graphics
B000 - B7FF	Mono Video
B800 - BFFF	Video Text
C000 - C7FF	Default Video BIOS
C800 - DFFF	Available
E000 - E7FF	Available
E800 - EFFF	Available (Optional Video BIOS)
F000 - FFFF	System BIOS

[1] Available means open for either PCMCIA card usage, ISA Adapter card usage (in Dock I or Dock II), or for mapping as upper memory blocks.

ThinkPad Dock I & Dock II Memory Map

Location of SCSI Adapter ROM in DOCK I

CA00-CBFF	Default
C800-C9FF	Selectable by Switch Setting
CE00-CFFF	Selectable by Switch Setting
DE00-DFFF	Selectable by Switch Setting

Location of SCSI-II Adapter ROM in DOCK II

DC00-DFFF	Default
C800-CBFF	Selectable by Switch Setting
CC00-CFFF	Selectable by Switch Setting
D000-D3FF	Selectable by Switch Setting
D400-D7FF	Selectable by Switch Setting
D800-DBFF	Selectable by Switch Setting

Attaching Devices to the ThinkPad Dock I

Some CD-ROM Drives, SCSI Attached Scanners, and other devices require either an ASPI (Advanced SCSI Programming Interface) or CAM (Common Access Method) driver. This support is provided by the PowerSCSI utility. This utility does not ship with your IBM ThinkPad DOCK I. Please download POWRSCSI.DSK from the IBM BBS.

ThinkPad 755Ce, 755Cse, 755CV, 755CX Interrupt Assignments

	2	3	4	5	7	9	10	11	15
Cascade Interrupt Req From IRQ 8-15	Default								
DSP Modem		Default	Optional						
Serial Port		Optional	Optional						
Infrared		Optional	Default	Optional			Optional	Optional	Optional
DSP Sound Blaster Emulation				Default	Optional		Optional	Optional	
Parallel Port				Optional	Default				
DSP Audio				Optional	Optional		Default	Optional	Optional
DOCK I Internal SCSI		Optional		Optional			Optional	Default	Optional
DOCK II Internal SCSI						Optional	Optional	Default	
PCMCIA Cards		Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
ISA Adapters (In Docking Station)		Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional

Note 1
The following interrupts are used by the system: IRQ 0 (Timer), IRQ 1 (Keyboard), IRQ 6 (Floppy Diskette Drive), IRQ 8 (Real-time Clock), IRQ 12 (Mouse/Trackpoint), IRQ 13 (Math Coprocessor), and IRQ 14 (Hard Disk Drive).

Note 2
Those models of the 755CX without the MWAVE DSP would not have IRQ3, IRQ5, and IRQ10 used.

ThinkPad 755Ce, 755Cse, 755CV, 755CX DMA Channel Assignments

DMA	Default Assignment	Other Possible Uses
DRQ0	Infrared	MWAVE DSP, Sound Blaster Audio
DRQ1	Sound Blaster Audio (Except 755CX models with no DSP)	MWAVE DSP
DRQ2	Diskette Drive	
DRQ3	Infrared	
DRQ4	Cascade	
DRQ5	Unused	
DRQ6	Unused	MWAVE DSP, Sound Blaster Audio
DRQ7	MWAVE DSP (Except 755CX models with no DSP)	Sound Blaster Audio

ThinkPad 755CD, 755CDV Interrupt Assignments

	2	3	4	5	7	9	10	11	15
Cascade Interrupt Req From IRQ 8-15	Default								
DSP Modem		Default	Optional						
Serial Port		Optional	Optional						
Infrared		Optional	Default	Optional			Optional	Optional	
DSP Sound Blaster Emulation				Default	Optional		Optional	Optional	
Parallel Port				Optional	Default				
DSP Audio				Optional	Optional		Default	Optional	
DOCK I Internal SCSI		Optional		Optional			Optional	Default	
DOCK II Internal SCSI						Optional	Optional	Default	
Internal CD-ROM									Default
Enhanced Video				Optional	Optional	Optional	Optional	Optional	
PCMCIA Cards		Optional	Optional	Optional	Optional	Optional	Optional	Optional	
ISA Adapters (In Docking Station)		Optional	Optional	Optional	Optional	Optional	Optional	Optional	

Note 1

The following interrupts are used by the system: IRQ 0 (Timer), IRQ 1 (Keyboard), IRQ 6 (Floppy Diskette Drive), IRQ 8 (Real-time Clock), IRQ 12 (Mouse/Trackpoint), IRQ 13 (Math Coprocessor), and IRQ 14 (Hard Disk Drive).

ThinkPad 755CD & 755CDV DMA Channel Assignments

DMA	Default Assignment	Other Possible Uses
DRQ0	Infrared	MWAVE DSP, Sound Blaster Audio
DRQ1	Sound Blaster Audio	MWAVE DSP
DRQ2	Diskette Drive	
DRQ3	Infrared	
DRQ4	Cascade	
DRQ5	Unused	
DRQ6	Unused	MWAVE DSP, Sound Blaster Audio
DRQ7	MWAVE DSP	Sound Blaster Audio

THINKPAD DOS/WINDOWS MEMORY MANAGEMENT TIPS

IBM Card & Socket Services Drivers for ThinkPad 755Ce, 755Cse, 755CD, 755CDV, 755CV, & 755CX

DEVICEHIGH=C:\THINKPAD\IBMDSS01.SYS /D (DOS PCMCIA Socket Services Driver for PCMCIA Socket Services 2.1)

The /D parameter allows warm docking when used with a Dock II docking station. If you are not using a Dock II then removing the /D parameter will reduce the amount of upper memory this driver uses by approximately 1KB. Socket Services uses between 6KB and 7KB of memory .

DEVICEHIGH=C:\THINKPAD\IBMDOSCS.SYS (DOS PCMCIA Card Services Driver for PCMCIA Socket Services 2.1)

Card Services uses 29KB of memory.

DEVICEHIGH=C:\THINKPAD\DICRMU01.SYS /MA=C800-CFFF (DOS PCMCIA Resource Map Utility)

The /MA parameter tells Card Services what locations in upper memory can be used by PCMCIA cards or Card Services, and must match or be a subset of an excluded memory range on the EMM386 line. The PCMCIA Resource Memory Map Utility Driver does not remain in memory.

DEVICEHIGH=C:\THINKPAD\$ICPMDOS.SYS (DOS PC Card Power Management Driver)

This driver uses 3KB of memory.

DEVICEHIGH=C:\THINKPAD\AUTODRV.SYS C:\THINKPAD\AUTODRV.INI

This statement loads the PCMCIA Super Client Driver (AUTODRV.SYS) into upper memory. AUTODRV.SYS recognizes many popular modems, 3270 cards, and SCSI cards. It does not recognize 5250 PCMCIA cards, SDLC cards, or LAN PCMCIA cards. AUTODRV.SYS uses 13KB of memory.

Please note that Card & Socket Services also requires a 4KB block of upper memory.

IBM MWAVE DSP DOS Drivers for ThinkPad 755Ce, 755Cse, 755CD, 755CDV, 755CV, & 755CX

DEVICEHIGH=C:\MWD\MANAGER\MWDP0400.EXE (MWAVE DSP Driver)

The MWAVE DSP DOS Driver uses 2KB of memory .

THINKPAD DOS/WINDOWS MEMORY MANAGEMENT TIPS

VESA Video Driver for ThinkPad 755Ce, 755Cse, 755CD, 755CDV, 755CV, & 755CX

(1) The ThinkPad 360, 750, 755C, and 755Cs Models required a VESA Video Driver (VESA.EXE) for VESA support. The ThinkPad 755Ce, 755Cse, and 755CD include VESA support in the Video BIOS. Therefore, no VESA Video Driver is required for these models.

IBM MWAVE DSP Windows Drivers for ThinkPad 755Ce, 755Cse, 755CD, 755CDV, 755CV, & 755CX

(1) Version 1.00 Mwave drivers required a large amount of memory below 1MB in the Windows environment, often limiting the number or Windows applications that could be loaded at one time. Please update to the latest MWAVE Drivers

Disabling SCSI BIOS in ThinkPad DOCK II

(1) If you are not using a SCSI device in the DOCK II or are only using the internal SCSI CD-ROM, you can disable SCSI BIOS and reclaim 16KB of upper memory. SCSI BIOS can be disabled by rebooting the system while in the DOCK II, pressing Ctrl A at the prompt, selecting Configure/ View Host Adapter Settings, and changing Host Adapter BIOS to Disabled. SCSI BIOS can also be disabled by removing the DOCK II's cover and changing the switch settings on the DIP switch block: Switch 1, 2, and 3 to ON. Do not change switch 4.

Memory Management Without PCMCIA Cards

(1) If you do not intend to use PCMCIA Cards, there is no reason to load Card & Socket Services Drivers. Remove all IBM Card and Socket Services Device Drivers from CONFIG.SYS (See previous page).

(2) Card & Socket Services Drivers are not required to use the MWAVE DSP Modem or DSP Audio functions.

(3) Review the ThinkPad Memory Map for your system. Include any upper memory areas not used by adapter cards in the Docking Station. Be sure to exclude the address of the SCSI adapter in the Docking Station if SCSI support is needed.

(4) If you are not using the monochrome video mode (most applications do not), the Monochrome Video Area (B000 - B7FF) may be mapped (by adding I=B000-B7FF to the EMM386.EXE line in CONFIG.SYS). If using Microsoft Windows, add a Device=C:\DOS\MONOUMB.386 statement to the [386Ehn] section of SYSTEM.INI.

THINKPAD DOS/WINDOWS MEMORY MANAGEMENT TIPS

Memory Management With PCMCIA Cards

(1) Many PCMCIA card manufacturers provide Point Enablers with their products. Point Enablers are small programs that provide an interface directly to the PCMCIA controller; therefore they must be written to support a particular type of controller.

Point Enablers are relatively simple to configure, do not require Card & Socket Services Drivers, consume no memory (they remove themselves from memory after configuring the card), and provide the maximum DOS memory for your ThinkPad. However, with Point Enablers, you must specify the slot number of the card (therefore , the card must always be in a specific slot). You must also manually assign any upper memory blocks and IRQs used by that card. In addition, hot-plugging of the card is prohibited (in fact, it may damage the card). If Point Enablers are provided with the PCMCIA card(s) you are using, decide whether to use the Point Enablers or Card & Socket Services.

(2) If you use Card & Socket Services, decide whether to use the Super Client Driver (AUTODRV.SYS) or the drivers that are provided with your PCMCIA card(s). The Super Client Driver automatically recognizes many popular PCMCIA cards (including modems, 3270 cards, and SCSI adapters -- it does not recognize 5250 PCMCIA cards, SDLC cards, or LAN PCMCIA cards.). However, the Super Client Driver can consume more memory than do the drivers provided with the PCMCIA card.

(3) Determine the amount and location of upper memory required by your PCMCIA card(s), Docking Station, and ISA Adapter cards. If possible, locate upper memory required by all PCMCIA cards and ISA Adapters in one contiguous block. If using Card & Socket Services, these drivers require a 4KB upper memory block that can be located anywhere in upper memory.

(4) Review the ThinkPad Memory Map for your system. Exclude from EMM386.EXE's usage the upper memory areas used by (a) the PCMCIA card(s), (b) Card & Socket Services (4KB), (c) the upper memory area used by the SCSI Adapter in the ThinkPad Docking Station (if applicable), and (d) the upper memory areas used by any ISA adapters in the ThinkPad Docking Station. Include any available upper memory areas not excluded above.

(5) If using Card & Socket Services, modify the DEVICE=C:\THINKPAD\DICRMU01.SYS /MA=XXXX-XXXX line in CONFIG.SYS. Make the XXXX-XXXX range match the upper memory area used by any PCMCIA cards (plus the 4KB used by Card & Socket Services).

(6) Exclude any memory area allocated to PCMCIA Cards from usage by Microsoft Windows by adding an EmmExclude=XXXX-XXXX line to the [386Enh] section of the SYSTEM.INI File. Where XXXX-XXXX is the upper memory range allocated to the PCMCIA cards. If you are using Card & Socket Services, the EmmExclude range must match the /MA= range of the DICRMU01.SYS Driver.

(7) If you are not using the monochrome video mode (most applications do not), the Monochrome Video Area (B000-B7FF) may be mapped (by adding I=B000-B7FF to the EMM386.EXE line in CONFIG.SYS). If using Microsoft Windows, add a Device=C:\DOS\MONOUMB.386 statement to the [386Ehn] section of SYSTEM.INI.

(8) If you are using an IBM PCMCIA Token-Ring Adapter, an IBM Token-Ring Adapter in a Docking Station, or an IBM EtherJet Adapter in a Docking Station, download the IBM LAN Client Code from the IBM BBS. This code loads 802.2 Support, Netbios, the Netware Requester, and a TCP/IP stack into extended memory (not upper memory). It can reduce the DOS memory consumption of these protocols to 5KB.

Sample Config: IBM PCMCIA Token-Ring Adapter Installed in 755Ce, 755Cse, 755CD, 755CDV, 755CV, & 755CX System

Recommended Memory Locations

IBM Token-Ring PCMCIA Adapter ROM	CC00-CDFF
IBM Token-Ring PCMCIA Adapter RAM	C800-CBFF
IBM Card Services (If Used)	CE00-CEFF

Card Services CONFIG.SYS (Please ensure that you are using the latest Card & Socket Services Drivers)

```
DEVICE=C:\DOS\EMM386.EXE NOEMS X=C000-CEFF I=CF00-EFFF
DEVICE=C:\THINKPAD\IBMDSS01.SYS
DEVICE=C:\THINKPAD\IBMDOSCS.SYS
DEVICE=C:\THINKPAD\DICRMU01.SYS /MA=C800-CEFF
```

Note: Latest IBM Token-Ring Credit Card Adapter Drivers are Version 3.06 (TRCC1.EXE & TRCC2.EXE on the IBM BBS).

Point Enabler CONFIG.SYS

```
DEVICE=C:\DOS\EMM386.EXE NOEMS X=C000-CDFF I=CE00-EFFF
DEVICE=C:\POINTTR.EXE SB RS=16 MMIO=CC00 IRQ=9 SRAM=C800,16
```

Where: SB is Slot B (Bottom Slot) and RS is Ring Speed

If you are using the IBM PCMCIA Token-Ring Adapter in the PCMCIA slot in the Port replicator, you must add the PCIC parameter to your point enabler device statement: For example: DEVICE=C:\POINTTR.EXE PCIC=03E2 SB RS=16 MMIO=CC00 IRQ=9 SRAM=C800,16. The Port Replicator uses 3E2 as its I/O port base address.

Microsoft Windows SYSTEM.INI

```
[386Enh]
EmmExclude=C800-CDFF
```

(or EmmExclude=C800-CEFF if using Card Services)

Setting the Token-Ring ROM & RAM Address

(1)	Novell Netware ODI Drivers (NET.CFG File):	Link Driver TOKEN (Or TOKENCS Or LANSUP) MEM #1 CC000 MEM #2 C8000
(2)	For IBM LAN Support Native Drivers:	DEVICE=C:\LSP\DXMC0MOD.SYS N ,C800,0,0,0
(3)	The IBM LAN Support NDIS Drivers (PROTOCOL.INI File):	RAM = 0xC800 MMIO = 0xCC00 RAMSIZE = 16

Sample Config: IBM PCMCIA Ethernet Adapter Installed in 755Ce, 755Cse, 755CD, 755CDV, 755CV, & 755CX System

Recommended Memory Locations

IBM Ethernet PCMCIA Adapter RAM	C800-CBFF
IBM Card Services (If Used)	CC00-CCFF

Card Services CONFIG.SYS (Please ensure that you are using the latest Card & Socket Services Drivers)

```
DEVICE=C:\DOS\EMM386.EXE NOEMS X=C000-CCFF I=CD00-EFFF
DEVICE=C:\THINKPAD\IBMDSS01.SYS
DEVICE=C:\THINKPAD\IBMDOSCS.SYS
DEVICE=C:\THINKPAD\DICRMU01.SYS /MA=C800-CCFF
```

Note: Latest IBM Ethernet Credit Card Adapter Drivers are Version 2.06 (ETCC.EXE on the IBM BBS).

Point Enabler CONFIG.SYS

```
DEVICE=C:\DOS\EMM386.EXE NOEMS X=C000-CBFF I=CC00-EFFF
DEVICE=C:\NET\POINTETH.SYS SB IRQ=9 SRAM=C800 IO=300
```

Where: SB is Slot B (Bottom Slot)

If you are using the IBM PCMCIA Ethernet Adapter in the PCMCIA slot in the Port replicator, you must add the PCIC parameter to your point enabler device statement: For example: DEVICE=C:\POINTETH.SYS PCIC=03E2 SB IRQ=9 SRAM=C800 IO=300. The Port Replicator uses 3E2 as its I/O port base address.

Microsoft Windows SYSTEM.INI

```
[386Enh]
EmmExclude=C800-CBFF
```

(or EmmExclude=C800-CCFF if using Card Services)

Setting the Ethernet RAM Address

(1)	Novell Netware ODI Drivers (NET.CFG File):	Link Driver PCMDMCS PORT 300 INT 9 MEM C8000
(2)	The IBM LAN Support NDIS Drivers (PROTOCOL.INI File):	RAMADDRESS = 0xC800 INTERRUPT = 9 IOBASE = 0x300

IBM PCMCIA MODEM CONFIGURATION

Using the IBM Super Client Driver (AUTODRV.SYS)

(1) The IBM Super Client Driver will automatically recognize IBM PCMCIA Modems. Sample CONFIG.SYS file:

```
DEVICE=C:\DOS\HIMEM.SYS
DEVICE=C:\DOS\EMM386.EXE NOEMS X=C800-CFFF
DEVICE=C:\THINKPAD\IBMDSS01.SYS
DEVICE=C:\THINKPAD\IBMDOSCS.SYS
DEVICE=C:\THINKPAD\DICRMU01.SYS /MA=C800-CFFF
DEVICE=C:\THINKPAD\$ICPMDOS.SYS
DEVICE=C:\THINKPAD\AUTODRV.SYS C:\THINKPAD\AUTODRV.INI
```

Using the IBM PCMCIA Modem Point Enabler (Note: Not All IBM PCMCIA Modems Support this Point Enabler)

(1) The IBM PCMCIA Modem Point Enabler (called PCCOMDOS.SYS) does not require Card & Socket Services. It does reside in memory and requires 16KB. Using the Point Enabler can save up to 36KB (if you do not load Card & Socket Services or AUTODRV.SYS). However, with the IBM Point Enabler hot-plugging of the card is prohibited (in fact, it will damage the card).

(2) Be sure to exclude a 4KB block for the modem in upper memory. If you are also using card services, do not include the 4KB block in the /MA=XXXX-XXXX parameter of the DICRMU01.SYS driver.

(3) Sample CONFIG.SYS file:

```
DEVICE=C:\PCCOMDOS\PCCOMDOS.SYS COM2 /BEEP /WINBIOS /AMEM CE
```

Where:	COM2 is the COM 1, 2, 3, or 4	COM 2 is recommended
	/AMEM is the memory location for the modem's 4KB block	CE00 is recommended

Using the IBM PCMCIA Modem Driver

(1) The IBM PCMCIA Modem Driver (called ESTDFM.EXE) does require Card & Socket Services. It does reside in memory and requires 25KB. Therefore, I recommend that you use the AUTODRV.SYS driver since it takes less memory. ESTDFM.EXE is loaded via the AUTOEXEC.BAT:

ESTDFM.EXE S1C2	Where:	S1 is the Slot Number
		C2 is the Communications Port (C1, C2, C3, or C4)

MEGAHERTZ MODEM CONFIGURATION

Using the IBM Super Client Driver (AUTODRV.SYS)

(1) The IBM Super Client Driver will automatically recognize most Megahertz PCMCIA Modems. Sample CONFIG.SYS file:

```
DEVICE=C:\DOS\HIMEM.SYS
DEVICE=C:\DOS\EMM386.EXE NOEMS X=C800-CFFF
DEVICE=C:\THINKPAD\IBMDSS01.SYS
DEVICE=C:\THINKPAD\IBMDOSCS.SYS
DEVICE=C:\THINKPAD\DICRMU01.SYS /MA=C800-CFFF
DEVICE=C:\THINKPAD\$ICPMDOS.SYS
DEVICE=C:\THINKPAD\AUTODRV.SYS C:\THINKPAD\AUTODRV.INI
```

Using the MegaHertz PCMCIA Modem Point Enabler

(1) The MegaHertz PCMCIA Modem Point Enabler (called SETMHZ.EXE) does not require Card & Socket Services. In addition, it removes itself from memory once it has configured the modem. This can save up to 49KB (if you eliminate Card & Socket Services). However, with the MegaHertz Point Enabler, you must specify the slot number of the card (therefore, the card must always be in a specific slot). In addition, hot-plugging of the card is prohibited (in fact, it will physically damage the card).

(2) Obtain the latest Megahertz Point Enabler. Versions before 3.1 do not support the ThinkPad 755. Latest version is 4.3. Be sure to exclude a 4KB block for the modem in upper memory. If you are also using card services, do not include the 4KB block in the /MA=XXXX-XXXX parameter of the DICRMU01.SYS driver.

(3) The SETMHZ program is loaded via the AUTOEXEC.BAT file. Format of the SETMHZ.EXE Program:

SETMHZ.EXE /cn /in /sn /pnnnn /dnnnn

Where:	/cn is COM 1, 2, 3, 4	COM 2 is recommended
	/in is IRQ 1 .. 15	IRQ 3 is recommended
	/sn is Slot A, B, C, or D	
	/pnnnn is the memory location	CE00 is recommended
	/dnnnn is the delay in milliseconds	1500 is recommended

Obtaining Updated Drivers

IBM PC Company Bulletin Board System

BBS Phone Number	919-517-0001
Baud Rate	300-14400 bps
Parity/Data Bits/Stop Bits	N/8/1

IBM PC Company Internet FTP Site

ftp.pcco.ibm.com   cd /pub and get the allfiles.txt file for a listing of available files

IBM PC Company World Wide Web Site

www.pc.ibm.com

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365_tips.txt	ThinkPad 365 Tips in ASCII format.
701_tips.ps	ThinkPad 701 Tips in PostScript format.
701_tips.txt	ThinkPad 701 Tips in ASCII format.
750_tips.ps	ThinkPad 360, 750, 755 Base Models Tips in PostScript format.
750_tips.txt	ThinkPad 360, 750, 755 Base Models Tips in ASCII format.
755_tips.ps	ThinkPad 755 Enhanced Models Tips in PostScript format.
755_tips.txt	ThinkPad 755 Enhanced Models Tips in ASCII format.
760_tips.ps	ThinkPad 760 Tips in PostScript format.
760_tips.txt	ThinkPad 760 Tips in ASCII format.
cdtips.ps	Commercial Desktop Tips in PostScript format.
cdtips.txt	Commercial Desktop Tips in ASCII format.