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Socket Services 7.0 for OS/2 Release Document

Socket Services for OS/2

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Table of Contents

Product Description	4
Setup	5
Specific Problems with support of ATA cards	7
Improper Voltage sensing.	7
Improper configuration of ATA cards.	7
BIOS Support of CardBus Bridge	8
Tips & Tricks	9
Known Problems.....	10
Command Line Options	11



Introduction

This document describes APSOFT's software product Socket Services 7.0 for OS/2.

Socket Services for OS/2 (also called SSPCIC.SYS in this document) can be used to replace many of the standard IBM OS/2 Socket Services drivers. SSPCIC.SYS is a single driver that supports many devices – please refer to the list of supported adapters at the end of this document. (For the list of features provided by Socket Services, please refer to the PC Card Standard).

SSPCIC.SYS supports OS/2 Warp 3 and Warp 4.

Warning! SSPCIC.SYS is an highly flexible driver, as it supports a wide-range of PC Card Adapters. When combined with the wide-range of computers, the driver has many configuration options, which can be set using software switches. Configuration of the driver on a particular machine could be a difficult and time-consuming task. APSOFT can provide assistance on a fee basis, but supplies the driver on an "as is" basis to customers – no free support is available. This document is the only source of information on driver setup and functionality.

Product Description

SSPCIC.SYS is implemented as an IBM OS/2 base device driver. It supports the PC Card Standard 7.0; the full specification is both implemented and enabled.

(Note: As Warp 3 Card Services complies to version 2.0 of the PC Card Standard, the SSPCIC.SYS under Warp 3 also reports compliance with PC Card Standard 2.0. Nevertheless, the full range of version 7.0 Socket Services is still provided).

SSPCIC.SYS is designed to recognize each supported PC Card Adapter individually. It installs appropriate support for the features of each detected adapter. When different adapters are found in the same machine, SSPCIC.SYS installs full feature support for each individual adapter. (This is very different to other Socket Services drivers, which tend to work on a "common denominator" basis).

SSPCIC.SYS supports up to 4 PC Card adapters with up to 4 sockets per adapter. Each adapter can be different from the others (or the same, in any combination). The maximum is not architectural – it was selected to save memory for most machine configurations. SSPCIC.SYS also has internal logic for "hot-docking", but this is disabled by default. Any OEM requiring support beyond the default configuration should contact APSOFT.



Setup

SSPCIC.SYS is very easy to integrate into an OS/2 system. However, it is necessary to install support for one of the IBM-recognized PC Card Adapters, and then modify the system to use our driver in its place.

IBM have shipped WARP 4.0 PCMCIA support in many different ways. Fortunately, the simplest approach is suitable to use SSPCIC.SYS.

1. Start the selective install process via OS/2.
-> "System Setup"
-> "Selective Install"
2. Click the 'Next' button until you see the panel that includes PCMCIA support. Click on the 'PCMCIA' button.
3. Select one of the supported portable computers from the list. (e.g., Toshiba T4800). Make sure the check-boxes are selected for "PCMCIA Modem/Fax", "PCMCIA Hard Disk, and "PCMCIA Flash Card" if you ever intend to use these card types.
4. Continue with completing "Selective Install". After the CONFIG.SYS is updated, you will be prompted to shutdown the system - you should ignore this instruction!

(Reason: You have only installed components at the base maintenance level from your Warp CD, and for the wrong Socket Services driver. If you reboot, your system will not work and might even crash).

5. Copy the SSPCIC.SYS driver to the OS2\Boot directory.
6. Edit CONFIG.SYS and comment-out the IBM Socket Services BASEDEV statement:
"BASEDEV=IBM2TOS.SYS /s0=2 /c0=15" line (a)
7. Add:
BASEDEV=SSPCIC.SYS /e <additional switches> after previous line
8. Save changes
9. Reapply your current OS/2 fixpack to upgrade the PCMCIA support to the latest maintenance level.
10. Reboot the system after applying the fixpack.

The next section describes each of the supported switches in detail and you must determine the best configuration for your chosen machine. All the switch settings are coded on the BASEDEV=SSPCIC.SYS statement in CONFIG.SYS. You can change these settings and re-boot your computer to see the effects – there is no need to perform the "Selective Install" more than once.



WARNING! Please be very careful! Many of the switch settings can cause the system to fail during the boot process. Make sure you have a (tested) set of WARP Utility diskettes to recover your system. You will need to edit the invalid switch settings in CONFIG.SYS before re-booting from the hard disk.

Most notebooks will require the switches "/VS:auto, /AP:on, /EC:auto, /II:off, and /MX:off". You can use these as your starting configuration. Most desktop systems will require almost the same switches, except you should code "/II:on".



Specific Problems with support of ATA cards

Two specific problems were noticed in IBM ATA support.

1. Improper Voltage sensing.
2. Improper configuration of ATA cards.

Improper Voltage sensing.

Many of older ATA cards improperly report voltage sense to the host. As result host configures such cards to Vcc = 3.3V instead of Vcc = 5.0V. As result the ATA card that doesn't support dual voltage becomes unusable. You can work-around of this problem by specifying /VS:50 instead of /VS:AUTO in SSPIC command line.

Improper configuration of ATA cards.

Normally ATA card supports 4 operating modes: Primary and Secondary IDE, ATA mode and memory mode. The IBM PCM2ATA driver uses ATA mode. In ATA mode card operates via 16 continuous I/O registers.

However, instead of working via just 16 I/O range the IBM PCM2ATA driver allocates two I/O range: one – 16-Byte range with 8-bits access is used for control functions and one 2-Bytes long with 16-bits access is used for Read/Write operations.

On our test machine for example, the I/O allocated as following: 0x140-0x14F is 8-bit access window used for control and 0x150-0x151 is 16-bit access window used for data read/write.

Such configuration is incorrect and doesn't follow the PC Card standard. According to the standard all card access should be performed via the same window.

Such incorrect configuration works fine on the original PCIC adapter and most of clones (e.g. Toshiba ToPIC etc). However you may come across adapter where such configuration could be not supported: on such adapter ATA card will be never ready.

We did not check how many of adapters show this problem.

If you have symbols for PCM2ATA driver you can easily patch its _RequestIO720 function, making card functional.



BIOS Support of CardBus Bridge.

Most PC Card Adapters used in modern machines are CardBus Bridges, which should be supported through the BIOS. This section describes the BIOS support that might be provided for a CardBus Bridge. SSPCIC.SYS will also support the older technologies of 16-bit PCMCIA Adapters and PCI-to-PC Card Bridges but, because they do not require special BIOS support, the contents of this section can be ignored.

In theory, the computer's BIOS should perform a series of tasks to initialize the CardBus Bridge:

1. Enable the bridge.
2. Assign IRQ to Bridge functions (i.e., not to any cards in the sockets).
3. Set an appropriate interrupt mode.
4. Assign legacy I/O address to access the socket's registers.
5. Assign a 4KB memory window to access the socket's registers.
6. Enumerate secondary PCI buses behind the Bridge (one per socket).
7. Adjust number of installed PCI buses reported by BIOS (considering number of CardBus sockets).
8. If your notebook has a docking station, the BIOS should also perform full initialization after each docking event, and re-adjust its resources after each undocking event.

Most modern Notebook BIOS' will perform task 1 to 4, and some will also perform task 5. Presently, APSOFT is only aware of one BIOS that performs Task 6 and 7 (none are known to perform task 8). So far, most desktop BIOS' completely ignore the CardBus Bridge, and therefore, perform none of the above tasks.

SSPCIC.SYS is able to perform some, or all of the initialization tasks that ought to be carried out by the BIOS. Command line switches are used to define which tasks the SSPCIC.SYS should perform and how to perform them. There are two groups of switches:

1. Intelligent Switches (e.g., /VS:auto, /AP:on) will instruct SSPCIC.SYS to try to detect the system state of a particular characteristic. If the state is not considered optimal, it will be changed automatically.
2. Direct Control Switches (e.g., /VS:50, /IM:...) influence the same characteristics of the Bridge, but force SSPCIC.SYS to perform initialization in a particular way. However, be very careful when using Direct Control Switches, as SSPCIC.SYS does not perform any validity checks. It is very easy to initialize Socket Services in such a way, that makes the machine unusable. Therefore, you should plan your backup strategy to deal with the system hanging or crashing during the next OS/2 boot process.



3. The PCI interrupt assignment to CardBus adapters is only possible under PCI Bios 2.1 or higher. If your computer uses an older PCI Bios you may need to request a BIOS upgrade from your PC manufacturer.

Tips & Tricks

- The Interrupt Mode (/IM:...) Direct Control Switch does not have an equivalent Intelligent Switch, as the correct Interrupt Mode cannot be detected automatically. It is quite often useful when a modem does not work properly. If for example, a modem card is recognized by the system and can be configured, but characters do not echo to the terminal program, that is because no modem interrupts were generated. You will have to use the /IM switch to resolve this problem. Either, you get information from the platform manufacturer, or ... simply experiment with different combinations.
- If you have a TI-12xx and/or TI-1450 adapter, the proper setting of /EC is very important. If the /EC setting is not correct the card may not be recognized.
- The PCI interrupt assignment (controlled by /AP and /PI) is required only for CardBus support, or if your adapter does not provide PC Card 16 interrupts routing options, other than via PCI IRQ. Normally any notebook and most CardBus card readers provide PC Card 16 interrupt routing either via a serial or parallel interrupts scheme. If you do not need the above support you can ignore "Unable to automatically assign PCI IRQ" warning.
- When you setup a platform use a "simple" 16-bit card (e.g., modem). You should immediately be able to see the EXACT card name in the OS/2 GUI. If you do not see the card name, you must resolve the problem before doing anything else. Please check:
 - If the memory window used by Card Services for CIS access is not shadowed or used by another hardware component.

In some machines, an additional line has to be included in the CONFIG.SYS file: BASEDEV=RESERVE.SYS /mem:nnnn mmmm (nnnn has to be replaced with the address where PCMCIA usually would start and mmmm has to be replaced with a value of 1000 or more (increased in steps of 1000)). This line should be at the beginning of the CONFIG.SYS.

First run rmview /mem to find out at which address PCMCIA is located. This would be the hex number that comes in place of nnnn. Then try out whether it works with 1000 (in place of mmmm). RESERVE.SYS actually prohibits the PCMCIA driver to use this area and thus avoids a conflict which otherwise arises. If 1000 doesn't work try 2000 etc.

- If your /EC switch (TI 12xx, TI1450) is set properly.
- If your CardBus access memory is available. (The CardBus access memory is controlled by /RS and /RE switches).
- It makes no sense to try to configure the card before the system is able read the CIS (Card Information Structure). After CIS is read, the card usually works unless OS/2 has assigned the IRQ or I/O address to another component. If the card still does not work, you probably set the wrong interrupt mode (/IM switch)

Known Problems

Item	Description
1.	<p>If an ATA card is inserted after booting a Warp 3 system, it cannot be configured. The PCM2ATA.ADD driver was found to de-register the timer procedure before the end of the initialization stage, with the result that the MountCard procedure is never called for the card inserted into the system after the boot. The only solution is to insert the card before booting.</p> <p>OS/2 Warp 4 contains a newer version of PCM2ATA.ADD driver that supports "hot" insertion of ATA cards.</p>
2.	<p>It is possible for a PC Card to be configured, but not work, because it was assigned to IRQ 5 by the Card Services. If the notebook has a sound card, the Warp Sound Card driver will be initialized later in the boot sequence - IBM Card Services is a "base" driver which is loaded very early during the system boot. The Sound Card driver will use a static configuration and assume (without checking) that IRQ 5 is available. The Sound Card driver will reassign IRQ 5 and the PC Card will no longer work.</p> <p>This problem can be by-passed by reconfiguring the Sound Card to use a different IRQ (one that will still be free), via the BIOS setup program. The corresponding change must be carried out in the Warp "Selective Install" configuration panel for the Sound Card.</p>
3.	<p>Most Xircom Network Card drivers are not designed to act as Card Services clients. They are shipped with a "point enabler" that tries to manage the PC Card as a private resource. As the Xircom driver does not register the card with the IBM Card Services driver, Card Services assumes that the card was not configured and turns off the power to the card - the card is no longer operational.</p> <p>These Xircom Card NDIS drivers are not compliant with the PC Card standard and cannot co-exist with the IBM Card Services (PCMCIA) driver. Therefore, you cannot configure Warp to use Xircom network cards at the same time as compliant PC Cards under SSPIC.SYS. You must maintain two separate configurations and reboot the system in one or the other mode. As an alternative you can reserve the socket with the highest number for the Xircom card using the /MS switch. E.g., if your adapter has two sockets (0 and 1) you can add a /MS:0,1 switch to the SSPIC.SYS command line. Card Services will only handle one socket (socket 0). It will allow you to use the Xircom card in socket 1 with the Xircom enabler. The same technique can be used for any other similar card.</p>
4.	<p>The SunDisk SPDL5 version 1.3 will fail to be configured by the IBM PC2ATA.ADD driver. This is because the SunDisk card holds its configuration data in a vendor-specific tuple, but the IBM driver expects to find it in the standard tuple called CISTPL_CFTABLE_ENTRY. The IBM ATA driver does not check for this condition.</p>



Command Line Options

SSPCIC.SYS supports the following command line options:

/AP:[m,]on	Automatically assigns an IRQ number to the PCI or CardBus PC Card adapter 'm', if BIOS didn't assign a PCI IRQ (Interrupt Line Register doesn't contain valid IRQ number). If no adapter number is specified, this switch will be applied for all adapters. The switch will be ignored for ISA PC Card adapters.
/B:n	For ISA adapters only: use I/O base address 'n' (0x100 <= n <= 0x3FF) for detection of ISA adapters (default: autodetect). This switch will be ignored for PCI/CardBus adapters.
/BE:auto	Performs bus enumeration for CardBus adapters only if CardBus bus number is not already assigned by BIOS.
/BE:off	Disables bus enumeration for CardBus adapters. By default, Socket Services performs bus enumeration for CardBus adapters since most versions of BIOS don't perform this correctly. If you are sure that you have a BIOS which performs the bus enumeration correctly, use /BE:off switch.
/DP:m	Assigns different PCI IRQs to sockets of PCI or CardBus PC Card adapter 'm'. Will be used only, if '/AP:[m,]on' switch is selected.
/E	Enables screen output (default: silent).
/EC:[m,]auto	Do not change setting of 'power switch clock' register for adapter 'm' but use setting assigned by BIOS. If no adapter number is specified, this option is chosen for all adapters. (Default: use power switch clock generated by PCI clock) Note: This switch is ignored for all PC Card adapters except TI PCI121x/122x and TI PCI1250/1450
/EC:[m,]on	Use external power switch clock for adapter 'm'. If no adapter number is specified, this option is chosen for all adapters. (Default: use power switch clock generated by PCI clock) Note: This switch is ignored for all PC Card adapters except TI PCI121x/122x and TI PCI1250/1450
/FB:n	Specifies number of first PCI bus available for CardBus adapters (Default: 1). This option is ignored in /BE:off mode.
/FP:off	Disables full search for PCI PC-Card adapters. This option should be selected, if non-existent PCI PC-Card adapters are detected.
/FS:n	Socket IRQ filter. Socket Services will not assign IRQ for sockets if corresponding bit is set in the mask. For example, if n is 0x20 than SS will not configure socket on IRQ5.
/H	Prints help text.
/IA:on	Always assign I/O base address for PCI adapters. By default Socket Services assigns I/O base address for PCI adapters only, if base retrieved from PCI configuration space is 0.
/IF:on	Detects ISA/EISA adapters before PCI/CardBus adapters (default: detect PCI/CardBus adapters before ISA/EISA).

/II:[m,]off	Disables writing of interrupt mode into registers of PC Card adapter 'm'. If no adapter number is specified, this switch will be applied for all adapters. This switch will be ignored for all adapters which don't support interrupt mode (see /IM description).									
/IM:m,t	Sets interrupt mode used for adapter 'm' (default: Par). This setting is ignored for Non-CardBus adapters. Possible values for type 't' are (default is Par):									
	<table border="0"> <tr> <td rowspan="4" style="text-align: center; vertical-align: middle;">Par</td> <td><u>TI1130/1x31:</u></td> <td>Use parallel ISA-type interrupts;</td> </tr> <tr> <td><u>TI12xx:</u></td> <td>Use parallel ISA and PCI interrupts;</td> </tr> <tr> <td><u>CL-6832, OZ6832:</u></td> <td>Use External-Hardware Interrupt mode;</td> </tr> <tr> <td><u>Ricoh RB5C478:</u></td> <td>Use parallel interrupt mode.</td> </tr> </table>	Par	<u>TI1130/1x31:</u>	Use parallel ISA-type interrupts;	<u>TI12xx:</u>	Use parallel ISA and PCI interrupts;	<u>CL-6832, OZ6832:</u>	Use External-Hardware Interrupt mode;	<u>Ricoh RB5C478:</u>	Use parallel interrupt mode.
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		Will be ignored for all other adapters.								
/IN:on	Ignores PCI device function number when setting PCI interrupt through BIOS call. (Pass 0 as function number instead.) (default: off)									
/IO:m,n	For PCI/CardBus adapters only: use I/O base address 'n' for PCI/CardBus adapter 'm' (default: find base of free I/O range). Caution: adapter will be ignored if specified base can't be used. This switch will be ignored for ISA adapters.									
/IR:[m,]off	Disables routing of ISA IRQs on adapter 'm'. If no adapter number is specified, this switch will be applied for all adapters. This switch should be used for PCI/CardBus controllers, if the ISA IRQ-routing paddleboard is not connected.									
/IW:m,n	Limits number of I/O windows per socket on adapter m to n.									
/MH:n	Adapter IRQ filter. Socket Services will not use IRQ for adapters if corresponding bit is set in the mask. For example, if n is 0x8000 than SS will not use IRQ 15									
/MS:m,n	Support maximum number of sockets 'n' for adapter 'm' (default: autodetect). If n=0 is specified, adapter will be ignored.									
/MW:m,n	Limits number of memory windows per socket on adapter m to n.									
/MX:[m,]off	Does not initialize the multiplex IRQ routing register on adapter 'm'. If no adapter number is specified, this switch will be applied for all adapters. (Default: Initialize register). This switch is only used on TI PCI122x/1250/1450 adapters and is ignored for all other adapters.									
/OZ:97:off	OZ6832 PC Card adapter only: reset PC97 IRQ support bit.									
/OZ:97:on	OZ6832 PC Card adapter only: set PC97 IRQ support bit.									
/OZ:IL:off	OZ6832 PC Card adapter only: reset ISA Legacy bit.									
/OZ:IL:on	OZ6832 PC Card adapter only: set ISA Legacy bit.									

/PD:off	Disables automatic power-down for broken cards, which is done by default for PCI adapters. This automatic power-down avoids system lock, which occurs on PCI adapters if broken cards couldn't be powered-up successfully (i.e. power doesn't become 'active' or card doesn't become 'ready')
/PI:m,[n,]l	Assigns IRQ number 'i' as PCI IRQ for adapter 'm', socket 'n'. If no socket number 'n' is specified, the IRQ number is the same for all sockets of the adapter. This IRQ number will be written to the PCI configuration space (Interrupt Line register) of the specified adapter. For CardBus adapters: the IRQ number will be written to the PCI configuration spaces of all sockets. The IRQ number will be ignored for ISA PC-Card adapters. Main purpose of this switch is for CardBus adapters, since many old BIOS' don't assign IRQ number in Interrupt Line registers. The IRQ number must be level sensitive (routed to PCI IRQ), otherwise CardBus cards and Status Change Interrupt will not work.
/RA:[m,]off	Disables assignment of free base addresses for CardBus register memory windows on adapter 'm'. Use base addresses assigned by BIOS instead (except this base is 0). If no adapter number is specified, this option will be chosen for all adapters.
/RS:n /RE:n	Start (/RS) and End (/RE) of CardBus register window area (default: 0x40000000 – 0x60000000). These parameters are used only for CardBus PC Card adapters. Also, they are ignored if /RA:off is selected. The value 'n' must be aligned on a 4K boundary (i.e. the last three digits of 'n' must be 0 in hexadecimal (use prefix 0x)).
/SA:m,n	Swaps adapter m with adapter n. Multiple use of /SA switch is possible.
/SC:m,n	Uses Status Change Interrupt 'n' for adapter 'm' (default: Card Services select Status Change Interrupt).
/SI:off	Does not set PCI interrupt on hardware, only writes Interrupt Line register. (default: on)
/VS:33	Powers 16-bit cards always to Vcc=3.3V, regardless of voltage sense reported from the card. All pure 5V 16-bit cards will not work when using this switch.
/VS:50	Powers 16-bit cards always to Vcc=5V, regardless of voltage sense reported from the card. CAUTION: Using this switch can damage pure 3.3V 16-bit cards. Never insert such cards when using this switch.
/VS:auto	Don't use voltage sense reported from 16-bit card directly, but execute algorithm to check if voltage reported from the card is correct. Power card to Vcc=5V, if this checking shows that card reports voltage incorrectly. Switch /VS:auto is necessary to support 16-bit 5V ATA cards which report voltage sense incorrectly. But be aware that pure 16-bit 3.3V cards may be damaged, if they don't comply with PC Card Standard. Switch /VS:auto is ignored, if CardBus card is inserted, i.e. for CardBus cards always voltage sense reported from the card is used.
/VS:off	Same as /VS:auto. Provided for backward compatibility.
/W:n	Uses number of Wait States 'n' for 16-bit I/O access. This value could be 0 or 1 (default 1).
/XP:[m,]l	Excludes IRQ 'i' from automatic PCI IRQ assignment. Will only be used, if '/AP:[m,]on' switch is selected. Multiple use of /XP switch is possible.



A command line option of SSPIC can be added, changed or deleted by editing the following line in the CONFIG.SYS file:

BASEDEV=<disk name>\OS2\BOOT\SSPIC.SYS

The selected options are only set when the system boots.



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