IOS Linux Software
User's Manual

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Introduction

This document covers general information on how to obtain and install a Linux distribution and how to install the IOServer "C" library software.

Linux is distributed in many ways, mostly free of cost and downloaded over the Internet. The most common distribution method is CD and DVD media. There are several types of CD and DVD media available, including:

A full set of the software on CD or DVD media.
Live images you can use to try Linux, and then install to your system if you so choose.
Reduced-size bootable images you can use to install Linux over an Internet connection.

Download an ISO image for the full distribution on CD or DVD from one of the many Linux distribution sites. Create CD or DVD media from the ISO file using your preferred CD or DVD writer application.

The Linux installation procedure is fairly simple, and consists of only a few steps:

Download ISO files to make media or another bootable configuration.
Prepare system for installation.
Boot the computer and run the installation process.
Reboot and perform post-installation configuration.

You may need to press a specific key or combination of keys to configure your system's Basic Input/Output System, or BIOS, to boot from the media such as USB-CDROM or USB-DEVICE. On most computers you must select the boot or BIOS option promptly after turning on the computer. Most computer systems use a special key such as "Del" to start the BIOS configuration menu

Boot from the desired media, with any options appropriate for your hardware and installation mode. If you boot from the Live CD, select the "Install to Hard Disk" option from the desktop to run the installation program. If you boot from minimal media or a downloaded kernel, select a network or hard disk resource from which to install.

Proceed through all the steps of the installation program.
When installation is finished, reboot your system.

After the system reboots, it displays additional configuration options.
Make appropriate changes to your system and proceed to the login prompt.

A note about out-of-tree loadable kernel modules.

Acromag developed a set of strategies, code, and testing methods to help us reuse code, maintain quality, and maximize our testing resources in order to get the best quality product to our customers in the shortest amount of time. To accomplish this, out-of-tree loadable kernel modules have been developed over the past ten years. Recently, out-of-tree loadable kernel modules have become an unpopular topic with core Linux kernel developers.
Our Open Source out-of-tree drivers generally work with all kernel releases back to 2.4 and many users still want a driver that will support the newest hardware on older kernels making out-of-tree drivers a necessary business solution for hardware vendors.
With kernel releases 3.4 and newer, loading any out-of-tree driver module will taint the kernel with a debug message similar to this: "Disabling lock debugging due to kernel taint". It is not a kernel bug, but expected behavior. The taint flags (multiple flags may be pending) may be examined using the following:

cat/proc/sys/kernel/tainted
4096 = An out-of-tree module has been loaded.

Possibly, if the out-of-tree driver was merged into the kernel (i.e. add the sources and update the kernel Makefiles) and build it as part of the kernel build, the taint and taint message would likely go away.

Hardware Support

The list of supported Acromag I/O modules is shown in Table1.

Table 1: Acromag I/O Server Modules

Model	Description
IOS-220-X	Analog output, 12-bit D/A, (-8, -16) 8 or 16 channels
IOS-231-X	Analog output, 16-bit D/A, (-8, -16) 8 or 16 channels
IOS-320	Analog input, 12-bit A/D, 20D / 40SE channels
IOS-330	Analog input, 16-bit A/D, 16D / 32SE channels
IOS-341	Analog input, 14-bit A/D simultaneous sample and hold, 16DE
IOS-408	Digital input/output, 32 high-voltage bi-directional I/O
IOS-409	Digital input/output, 32 differential bi-directional I/O
IOS-440-2	Digital input, 32 port-isolated channels
IOS-445	Digital output, 32 port-isolated channels (SSRs)
IOS-470	Digital input/output, 32 TTL bi-directional I/O
IOS-482	Counter/timer, 16 Bit, 10 TTL channels
IOS-483	Counter/timer, 16 Bit, 2 RS422 and 5 TTL channels
IOS-484	Counter/timer, 16 Bit, 5 RS422 channels
IOS-520	Serial communication, 8 EIA/TIA-232E ports
IOS-521	Serial communication, 8 EIA/TIA-422/485 ports
IOS-560	CAN Bus Module
IOS-560-I	Isolated CAN Bus Module
IOS-571	Single Channel MIL-STD-1553 Module
IOS-572	Dual Channel MIL-STD-1553 Module
IOS-EP201	Re-configurable FPGA, digital I/O, 48 TTL I/O lines
IOS-EP202	Re-configurable FPGA, digital I/O, 24 differential RS485 I/O lines
IOS-EP203	Re-configurable FPGA, digital I/O, 24 TTL and 12 RS485 I/O lines
IOS-EP204	Re-configurable FPGA, digital I/O, 24 LVDS I/O lines

Getting Started

Hardware Installation

1. Plug the necessary I-Packs into the carrier. Make sure to configure any jumpers on the I-Packs as necessary.
2. With power off, install the carrier into the slot on the PC. Connect any field wiring at this time.

Software Installation

It is strongly advised that the user make a backup copy of the distribution media and that the original media be stored in a safe place.

The software is installed by simply copying the library files to the user's "home/ios/" directory and compiling and linking with the user's application program.

Source files for a utility that displays the slot letter and IOS module model number can be found in the 'ioslst' subdirectory.

Following is a table that indicates which Acromag I/O Boards are supported and in what subdirectory the support files may be found:

Subdirectory	Boards Supported
IOS220	IOS220-8, IOS220-16 .
IOS231	IOS231-8, IOS231-16.
IOS320	IOS320.
IOS330	IOS330.
IOS341	IOS341.
IOS408	IOS408.
IOS409	IOS409.
IOS445	IOS445.
IOS470	IOS440-2, IOS470.
IOS482	IOS482, IOS483, IOS484.
IOS520	IOS520.
IOS521	IOS521.
IOS560	IOS560, IOS560-I.
IOS570	IOS571, IOS572 IP-IOS570-EDK 9500-430 Required.
IOSEP20x	IOSEP201, IOSEP202, IOSEP203, IOSEP204.

Also included in each subdirectory is an "information" file which contains a list and detailed explanation of all of the program files which make up each library. For example, the information file for the IOS440 and IOS470 families of boards is named "info470.txt".

It is recommended that the user read the User's Manual for the I/O board and thoroughly familiarize themselves with the hardware.
For a new user to become familiar with the Acromag Library it may be most "straight forward" to proceed in the following manner:

(a) Build and load the device driver module.

i) See the information file in the device driver directory "/ios/devios/info.txt" for information about building and loading the device driver module.

(b) Build and execute the Library Demonstration.

ii) See the information file located in the IOS module directory "infoxxx.txt" for information about building executing.

iii) Use the makefile to build the project.

iv) Launch the debugger, "gdb a.out" use the 'run' command to start the program or './a.out' without the debugger.

v) The Acromag Demonstration program menu should appear on the processor's console terminal.

Fedora 18
Kernel 3.6.10-4