SIEMENS

Technical Bulletin

Motion Control Systems

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Part Name: A2100 Hard Drive Backup			**Part Number:**	
Engineering Change Notice	Install Time	No. of Pages Attached: 9	Updates Part from Rev.	To New Revision
Release Classification	QTY.	NAME	PART NUMBER	MFG. NUMBER
Information Only ☒				
Customer Option ☐				
Recommended ☐				
Other _____ ☐				
Part Kit Number:				

Problem Description (symptoms):
Preventive maintenance for backing up and restoring A2100 data files in the event of a hard drive failure or exchange (upgrade). See added sections 4.1 and 4.2.

Solution Procedure
Topics covered in this bulletin:

Software Effect
None.

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Saving the Hard Drive content:

The data on a hard drive is unlike any other component of a computer-based system because it increases in value the longer it is used. At the same time, the more the data is used, the greater the chance the data will be inadvertently modified, overwritten or corrupted. The traditional method to protect the data is to keep one or more backup copies of the data. Wherever a hard drive is used, there should be a regularly scheduled procedure to back up the data. This should be done frequently for the data that is the most expensive to replace. A less frequent backup is appropriate for data that doesn't change, or can be more easily replaced. For every control, the priorities will differ. For some, the part programs are the most valuable, but others may have an original copy of the part program elsewhere, and perhaps for them the tooling information is the most valuable.

There are trade-offs. These involve the amount of data to be backed up, and the difficulty of doing so. For example, if a control has no floppy drive or network connection, the only location for backup files is the hard drive itself. With a floppy disk, it is practical to backup the machine-specific data, but the part programs may not fit. If the control has a network connection, all of the customer's data (and more) can be copied to the network. With third-party software, the entire contents of the drive can be saved, including the boot programs. The data can be saved on a network, and can be used to load another hard drive as a spare. The trade-off for this method is that the A2100 control software must be shut down, and the backup performed via Windows NT. Otherwise the A2100 will hold some files open making them inaccessible for backup.

Following are several procedures to back up and restore different types of data. This includes the A2100's machine-specific data, customer-specific data, and the entire hard drive.

1.0 Backup and Restore of Machine Operations Data:

The A2100 stores data for machine operations in its database, which consists of four binary files on the D: partition (if it exists. Some older A2100 hard drives only had a C: partition). The database is large, (up to 15 MB) and its binary files may be incompatible from one release to the next. Instead of backing up the entire database, the A2100 allows portions of the database to be written to text files on either a floppy or the hard drive. When the user performs a backup, the default location for backup files is the "C:" device. Note that within A2100, "C:" is really an A2100 "user device" that maps to the directory C:\Mustang\User. This procedure backs up the following items:

- Machine Data, including cycle parameters, axis and servo configuration (and more)
- Operations data, including tooling information, pallet and fixture offsets, function locks (and more)

This procedure requires:
- The A2100 is running (but see Note 2 below)
- Optionally, a floppy drive

1.1 Backing up

- ☐ Go to the Service screen. Press "Backup and Restore Machine Data"
- ☐ Press "Backup"
- ☐ Press "Machine Data" to backup the Machine Data, using the default file name (see Note 1 below)
- ☐ Press "All Operations Data" to backup the Operations Data, using the default file name (see Note 1 below)
  Note: For A2100 software prior to Release 2.1, the button for "All Operations Data" was labeled "Everything"

Note 1 - The default name for the Machine Data backup file is "Mxx-yyyy.BCK, where xx-yyyy is the last 7 digits of the serial number, and the default name for the Operations Data backup file is OPER.BCK. However, for control software prior to Release 2.1, the default names were "MACHDATA.BCK" and "A2100ALL.BCK" respectively. If the purpose of your backup is to move the data to a different control, you may need to change the default file name when you do the backup or restore.

Note 2 - Backup from an unbootable drive: The following technique, for experienced service personnel only, is unsupported and may not work with future versions of A2100. If the hard drive does not boot and there is no backup of the Machine Data and Operations Data, this can be a desperate situation. It may be possible to use an A2100 simulator to perform the backup. The simulator must have the same A2100 version as the unbootable drive. The method depends on the fact that when A2100 starts up, it makes a backup copy of the database files in C:\Mustang\User\Data. There are 4 files; their names match WDB*.NVS. If you can boot DOS and copy these files from the unbootable drive, you can copy them to the simulator, start A2100, and then use Backup to save the Machine Data and Operations data to a floppy. This is not a supported operation; your simulator could stop working. The WDB*.NVS files are large (up to 15MB) but compress well using PKZIP. To place them on your simulator, go to the directory: \Mustang\System\<release>\Data. Rename the existing files WDB*.NV to WDB*.SAV. Copy the files from the failed drive, and rename them from WDB*.NVS to WDB*.NV. Start A2100, and use Backup (as above) to extract the necessary data.

1.2 Restoring

- ☐ Go to the Service screen. Press "Backup and Restore Machine Data"
- ☐ Press "Restore"
- ☐ Press "Machine Data" to restore the Machine Data
- ☐ Press "All Operations Data" to restore the Operations Data

Note: For A2100 software prior to Release 2.1, the "All Operations Data" button was labeled "Everything". See Note 1 above.

2. 0 Backup the A2100 User Data

In this procedure, you back up the data by copying a set of files to floppies or other media. The A2100 saves the user's data on drive C:, in the directory: C:\Mustang\User. The part programs, for example, are in C:\Mustang\User\Data. You should not manipulate these files individually; they should be backed and restored as a set. You must ensure that while the backup is running, A2100 does not modify any file as it is being backed up. This is not usually a problem, but it is recommended that during the backup the A2100 should be idle.

Before you begin, you must back up the Machine Data and Operations Data to C: drive, using the previous procedure.

This procedure backs up User data, including:

- Backup files that the user created on C: drive, such as Machine Data and Operations Data
- Part program store (it is not necessary to export each program)
- Part programs the user exported
- Journal files, such as the Alarm history
- Various logs generated by part programs

The procedure does NOT back up:

- Third-party software installed on the control
- Changes to Windows NT, such as network or printer configuration
- Data files that the customer may have saved outside of the "user" directory

This procedure requires:

- A 101-key keyboard. A mouse or other pointing device is helpful but not required.
- File compression software. If you store the data on floppies: An archiving program like PKZIP is required when the data will not fit on a single floppy. PKZIP is a shareware product of PKWARE. A license is required; for more information see www.pkware.com. Obtain PKZIP version 2.04g, then copy the files **pkzip.exe** and **pkunzip.exe** to a blank floppy disk and label it "Disk 1".
- External mass storage such as a network drive or Zip drive. If a Zip drive is to be used (only the external model is supported via the parallel port), additional preparations may be necessary so the control detects it at power on.

2.1 To back up to a network device or Zip drive:

☐ Open a Command Window from Program Manager (on NT 3.5) or the Start button (on NT 4.0)
☐ Enter the command:

```
del c:\mustang\user\data\prgsbdir.fil
```

(A2100 creates the G-sub and M-sub directory file on startup, but only if it is not already present. If your backup files might be restored to a different control or A2100 version, you must NOT transfer this file.)

☐ Save the files in **c:\mustang\user** and its subdirectories, for example:

```
xcopy c:\Mustang\User e:\A2100\M1Y1234 /s /n
```

In this example, 'n' represents the network drive or Zip drive letter, and the backup is saved in a directory derived from the control serial number: M1Y-1234.

2.2 To back up to floppy diskettes:

- ☐ Open a Command Window and enter the following instruction:

  ```
  del c:\mustang\user\data\prgsbdir.fil
  ```

  (A2100 creates the G-sub and M-sub directory file on startup, but only if it is not already present. If your backup files might be restored to a different control or A2100 version, this file must not be transferred.)

- ☐ To reduce the space required for the backup, enter the command:

  ```
  del c:\mustang\user\data\wdb*.nvs
  ```

  (These are backup files for the A2100 database, and A2100 re-creates these files each startup.)

- ☐ Insert a diskette that contains the only the files **pkzip.exe** and **pkunzip.exe**. Do *not* make A: the default drive! Enter the following command to run PKZIP:

  For Windows NT: `a:pkzip -^& -rp a:userdata.zip c:\mustang\user\*.*`
  For DOS: `a:pkzip -& -rp a:userdata.zip c:\mustang\user\*.*`

  Each diskette should be numbered in order and labeled with the customer or control name.
  Explanation of PKZIP parameters: The -rp options tell PKZIP to include files in subdirectories and to save the subdirectory names. The -& option means to span diskettes, in case the data is too large to fit on a single diskette. Note that NT requires the ^ before the PKZIP command & option(s). This is because NT use the & to separates multiple commands on the same line, and the ^ is required to override this behavior.

2.3 Backup of a drive that does not boot:

If a drive fails and the control will not boot, you can use DOS commands to back up the existing user data on the C: drive. Be aware that the Machine Data and Operations Data on C: may not be current.

- ☐ Configure the control to boot from the floppy drive (requires a CMOS change, see below for details).
- ☐ Insert a bootable floppy containing DOS 6.2 or higher and boot the control.
  If you are backing up to a network or Zip drive, you must have the DOS software drivers loaded for the device.
- ☐ Continue in the appropriate section as previously outlined.

AMI BIOS change:
1. Press 'DEL' key to enter setup.
2. Use the 'down' arrow key to select 'Boot Options'. Press 'enter'.
3. The field labeled 'First Boot Device' should show the hard disk as the current selection. Press enter, then use the up/down arrow key to highlight the 'Floppy' selection. Press 'enter' to lock in the change.
4. Press 'F10' to save changes and exit setup.
5. The system should now boot from the floppy drive to an 'A:\>' prompt.

AWARD Software BIOS change:
1. Press 'DEL' key to enter setup.
2. Use the 'down' arrow key to select 'BIOS FEATURES SETUP' and press 'enter'.
3. Use the arrow key to highlight the field for 'Boot Sequence'. The standard setting should be 'C,A'. Use the PgUp/PgDn keys to toggle to the 'A,C' selection. Press 'ESC' to exit this menu.
4. Use the down arrow key to highlight the 'SAVE & EXIT SETUP' field. Press 'enter'. When prompted to 'SAVE to CMOS and Exit (Y/N)?', type the letter 'Y' and press 'Enter'.
5. The system should now boot from the floppy drive to an 'A:\>' prompt.

Creating a bootable system diskette:
One of the following methods can be used to create a bootable system diskette:
1. DOS method. At the DOS prompt, type the following command and press enter:
   Format a:/s (formats the diskette and installs the system files).
2. Windows 95 method:
   - Double-click the 'My PC' icon on the Windows Desktop display.
   - Right-click on the '3½ Floppy' icon and select 'Format…'
   - Select the correct capacity from the drop-down box, select 'Full' format type, and check the box for 'Copy system files'. Click 'Start' to begin formatting.

3.0 Restoring the A2100 User Data
To restore the User Data, A2100 must be shut down. This is because the A2100 prevents writing to files that it is using. To prevent A2100 from starting:

☐ Restart A2100. Wait until the "A2100 System Load" screen appears:
- Press and hold down the 'Shift' key on the 101-key keyboard
- Click "Emergency Uninstall" with a mouse or wait until the 'Keypad/Touch Screen (KTI)' diagnostic passes, then press the touch target on screen
- Wait a second, and then release the shift key

☐ Open a Command Window from Program Manager (on NT 3.5) or the Start button (on NT 4.0) and proceed with one of the following selections:

3.1 To restore from a network connection or Zip drive:
☐ Enter the command:

```
xcopy e:\A2100\M1Y1234 c:\Mustang\User /s /n
```
(see the example for 'Back up' above)

3.2 To restore from floppy diskettes:
☐ Enter the command:

```
a:pkunzip -d a:userdata.zip c:\mustang\user
```

Notes: This assumes you have copied 'pkunzip.exe' to the floppy. The -d option tells PKUNZIP to restore the files into subdirectories.

4.0 Backing up the entire hard drive:

The A2100's open architecture allows the use of various third-party applications for back up. Siemens Energy & Automation does not endorse or support the third-party products mentioned below and any damage to the control or machine that results from the use of third-party products is not covered under warranty.

The programs listed below will backup the entire drive, including all the hidden files, file system information, partition information and boot programs. These programs will save the data as a file on the network or local mass storage (such as an Iomega Zip drive), and the data is compressed to save space. If a second hard drive is connected to the Workstation CPU board using the second IDE channel, data can be copied directly from one drive to the other. These programs allow you to back up a hard drive of one size, and restore the data to a new drive of equal or greater capacity.

This method lets you copy your original drive to a spare. Be sure to check the software licenses for all software installed on the hard drive. Users are permitted to make one copy of Windows NT and A2100 for backup purposes.

The programs listed below run from DOS, so to use them it is necessary to boot the control from a floppy which will involve changing the boot sequence in CMOS.

Drive Image Professional
PowerQuest Corporation
P.O. Box 1911
Orem, UT 84059-1911 USA
Telephone: 801-437-8900
Fax: 801-221-0149
Web site: www.powerquest.com
The license for Drive Image Professional allows a single user (owner) to use the program on any number of hard drives. It has the look and feel of a Windows app, including mouse support.

Ghost
BINARY RESEARCH LIMITED
7040 N. Port
Washington Road, Suite 420
Milwaukee, WI. 53217 USA
Telephone: 414-540-1530
Web site: www.ghostsoft.com
Ghost requires a separate license for each hard drive that it backs up (as of 22 Oct 1998)

LapLink Tech for Windows 95, 98, NT
Traveling Software, Inc.
18702 North Creek Parkway
Bothell, WA, USA 98011
Phone: (425) 483-8088
Fax: (425) 487-1284
Web site: www.travsoft.com
LapLink Tech now includes "Ghost Special Edition (SE)"

ImageCast
(800) 274-6065
Web site: netversant.com

ImageCast's main purpose is to duplicate many hard drives simultaneously over a network. Support for drive-to-drive copying is not known.

4.1 Local hard drive cloning guide lines:

Hard drive cloning may be accomplished using 'Ghost' 6.01 (or later) Standard / Enterprise edition software from a bootable floppy disk directly on the A2100.

Preparation:

1. Connect a standard IDE data cable from the second IDE port (if available) on the Workstation CPU to the new hard drive.
    a. Alternate method: Use a data cable with two drive connections. The target drive must be configured for 'slave' operation by changing the jumper setting (refer to hard drive label or documentation).
2. Attach DC power connections using the extra power supply cables (a splitter cable may be necessary if spare connections are not provided).
3. Insert the boot disk in the floppy drive.
4. Apply power to the control.
5. Enter the CMOS setup menus and change the boot sequence from 'C;A' to 'A;C'. BIOS manufacturers may use different access methods but the most common keys to use are 'Del', 'Esc', 'F1', or "F2".
6. Once the boot order has been modified, save the settings and restart. The system should boot to a DOS prompt.

Connections and Operation:

Execute the Ghost application program from a bootable floppy disk.

Sequence of events:

1. Connect the source drive to IDE 1
2. Connect the target drive to IDE 2
3. Boot up on a floppy (DOS or Win9x)
4. Launch the Ghost.Exe program.
5. Press Enter to clear the welcome screen.
6. 'Local' should be highlighted by default, press Enter.
7. Select 'Disk' on the Action window, press Enter.
8. Select 'To Disk' on the Disk window.
9. Highlight the source drive (Drive 1), press Enter or OK.
10. Same for the target drive (Drive 2), press Enter or OK.
11. If all looks OK on the review screen, press 'Yes' to clone.
12. If the drives are **not** the same size, you may have to clone by partition or sector.

4.2 Special cases: Cloning WinNT4 /pre-SP4 drives with WinXP or Win2000:

When Windows 2000 or WinXP first encounters an NTFS volume, the operating system automatically updates that volume to the current NTFS version (NTFS 5). If an A2100 hard drive loaded with NT3.51 or NT4.0 (SP3 or earlier) is connected to a WinXP or Win2000 system for backup purposes, the down-level Windows NT version will be updated. When the drive is re-installed in the control, a 'blue screen' displaying a stop code with **'inaccessible boot device**' in the screen text will result.
Drives loaded with **NT4.0 Service Pack 4** or later are not affected.

Any A2100 hard drive can safely be connected to any of the following operating systems for 'Ghosting', cloning, or copying without altering the NTFS volume information or drive contents:

- DOS 6 or later
- Windows NT 3.51
- NT4.0

Siemens Energy & Automation, Inc. may be able to reconstruct NT4 SP3 hard drives modified by WinXP or Win2000, but no reliable recovery method exists for NT 3.5x systems other than re-imaging the drive.

5.0 Issues concerning replacement hard drives with existing hardware:

- Replacement hard drives may come with a setup diskette. Use this to disable the write-back cache (if applicable), as this will interfere with the proper operation of the A2100 software.
- Refer to Tech Bulletin A2100-065C for details concerning hardware (hard drive capacity) and software (Workstation BIOS and NT Operating system version) compatibility issues.
- Service Parts can furnish a qualified, pre-configured hard drive upon request. The part number for this unit is 3-424-2383K. Call (513) 494-5211 for details.
- Siemens recommends using only qualified hard drives (Quantum Fireball).