AMS Cockpit
Version 1.1
USERS GUIDE

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1) AMS Cockpit

The "AMS Cockpit" software was designed to enable customers to interface with the AMS motion control products from a Windows based computer. It can be used in combination with either the passive serial adapters or the intelligent serial adapters from AMS.

AMS Cockpit allows the user to issue commands to the AMS motion control products, for example to set parameters, issue motion instructions, read or set I/Os, or program the memory of the controller. It also incorporates functionality to develop programs using a text editor, to store them as files on your computer as well as to download them into the memory of the controller on the AMS product.

The software includes the following features:
- Auto-detect presence of AMS intelligent serial adapter model SIN-11 (or SIN-10)
- Functions with AMS serial adapters model numbers SIN-9 (as well as older models SIN-7 and SIN-8)
- Create, edit and download Command Files
- Backup and restore non-volatile memory images
- Auto-detect AMS product models in Party Line Mode.

The software is provided free of charge and can be downloaded from the AMS website at www.stepcontrol.com.

2) Supported Operating Systems

AMS Cockpit has been designed for Windows NT operating systems. It has been confirmed to operate on all Windows NT operating systems from Windows 2000 through Windows 7 including Windows XP, Windows Vista and Windows 7.

3) AMS Serial Adapters

AMS Cockpit can be used in combination with, both, the passive serial adapters or the intelligent serial adapters from AMS.

Passive Serial Adapters

AMS offers the SIN-9 serial adapter. It features a DB9 terminal on one side to connect with the serial port (or a USB to serial converter) and an RJ45 terminal on the other end which is connected with the AMS motion control product. The device does not include any electronics. The controller may have an RS-232 or RS-422 interface. The design allows only one axis per COM port.
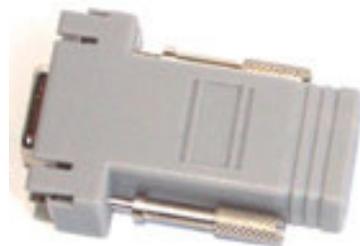
SIN-9 Serial Adapter

AMS Cockpit can also be used in combination with the SIN-7 serial adapter, an older model that is not being sold anymore, which features a DB25 connector instead of the DB9 the SIN-9 has. It is also compliant with the SIN-8 serial adapters, which similar as the SIN-7 adapters are not in production any longer.

Intelligent Serial Adapters

The SIN-11 is the current intelligent serial adapter offered by AMS. This active adapter features a built-in microprocessor to perform the necessary handshaking and a number of other "global" functions. It features a DB9 connector on one end to interface with the serial port of a computer (or a USB to serial converter) and an RJ45 terminal on the other end which is connected with the AMS motion control product. The device does not include any electronics. It can receive a command string of 128 bytes or more, then spool the commands to the target axis. Automatic axis scan, and mapping the axis name(s) to memory, is available and performed automatically upon party-line mode start-up. The SIN-11 supports 9600 baud.

SIN-11 Serial Adapter
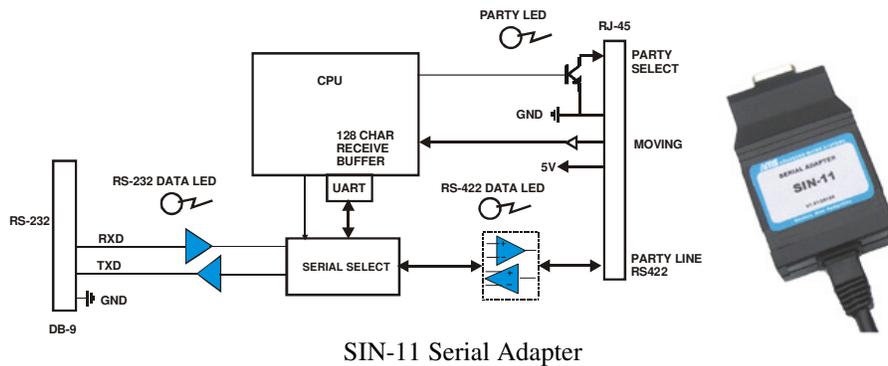
The software is also compliant with the predecessor of the SIN-11, the SIN-10 device.

4) Installation and Launch

To install AMS Cockpit, please download either the 32-bit or the 64-bit setup file to your computer depending on the type of Windows operating system installed on your computer. When starting the setup file, the installer will walk you through the installation. It will ask for the directory in which to install the code. It will also offer you to create a desktop icon or add AMS Cockpit to the quick launch bar. At the end of the installation, the setup program offers you to launch AMS Cockpit prior to exiting the installer.

Note: If you are using a Windows XP or older Windows NT operating system, you will need to install the .NET framework on your computer prior to being able to run AMS Cockpit. The 2.0 Version of the .NET framework is sufficient. The newer 3.5 Version will also work fine. It makes no difference if you first install AMS Cockpit or the .NET framework. For Vista and Windows 7 the .NET framework is included as part of the operating systems and does not need to be installed. The .NET framework is available free of charge from the Microsoft website (www.microsoft.com).

Once installed, AMS Cockpit can be invoked like any other Windows program. If you installed a desktop icon or a quick launch button you can select either of these instead of selecting it from the program list of Windows.

After launch of the software, you need to ensure that the correct COM port is selected. If you are not prompted to the "COM Settings" dialog window upon first startup, please select it from the "Configure" menu. The "COM Port" list will show all available COM Ports that AMS Cockpit found. Select the desired one from the list and press ok. In case you are not sure which one you have your hardware connected to, you can also use the "Device Manager" in the "Control Panel" of Windows to assist you. Ports that are in use by other applications or other instances of this application are hidden.

In case you should have problems installing the software on your computer or working with it, you are welcome to contact us by email at support@stepcontrol.com or by phone at (603) 882 1447.

5) Getting Started

Note: If you are not yet familiar with AMS products it is recommended that you connect only one axis to your computer to get started.
Confirm the following:
- If using a SIN-10 all switches are in the OFF position
- If using a SIN-8 the selector switch is in the "S" (single) position
- If using a SIN-9, or SIN-7 only one motion control axis may be sued
- If using a SIN-10 or Sin-11 (or a SIN-8 in Party Line Mode), make sure that all address connected to one adapter have distinct address names programmed into their non-volatile memory.

On start-up, previous COM port settings are recalled, and the reset function (described in the section "Reset (F8)" Button) is executed. If a single controller is connected, use the Space Bar key to sign on in the Dumb Terminal Mode.

AMS Cockpit "pings" (^E) the serial connection to determine if an intelligent adapter (SIN-11 or Sin-10) is present. If one of these adapters is found then the appropriate "Start Party" button is displayed.

If a SIN-11/SIN-10 is installed and the grey "Start Party" buttons are not displayed, then check the following:
1. Power must be applied as the SIN-11 (SIN-10) adapters derive power from the input connector of the controller. When the power is applied the SIN-11/10 should sign on.
2. Verify that the correct COM port is selected. Select "COM Settings" in the "Configure" menu in order to do so.

When a SIN-11/10 adapter is not being used, then:
1) Party Line Mode is necessary (even for a single axis operation) for any computer controlled operation. An exception is, if the adapter is only used for initial set-up and programming of the motion controller and the motion controller will then be used in the application without a connection to a PC and controlled simply by the GO input port.

Make sure that each axis that you are planning to use has been assigned a name. All axes that are connected in series to one adapter need to have unique names. No two axes connected to one adapter may have the same name. To assign a name you may use the "Control" & "N" key combination on your keyboard in Dumb Terminal Mode. Please note that when you are assigning an axis name, you may only have one axis connected and you must be in Dumb Terminal Mode. Please see the respective product manual for details on the procedure regarding the axis naming.

Once all axes have been named, you may connect them in series as described in the respective product manuals and connect the first one to the adapter that can support Party Line Mode operation (SIN-11, SIN-10 or SIN-8). Then enter Party Line Mode by using the "Start Party" button (in case of SIN-11 or SIN-10) or the "SIN-8 Party" in case you are using a SIN-8 adapter. In case of a SIN-8 adapter, you need to make sure that the switch is set to Party Line Mode prior to issuing the Party Line Mode entry.

When issuing commands from the Text Window in Party Line Mode, you need to add the axis name as prefix to each command. This way it will reach the desired controller. For example, if you would like to issue the command "+1000" to axis C you would need to enter the command "C+1000" followed by the "Enter" key. The only time when you do not need to add axis prefixes in Party Line Mode is when downloading files or reading all non-volatile memory. In this case the Working Axis (which is displayed in the Title Bar is used and AMS Cockpit adds the address prefix when sending the code to the respective controller. This is explained in the Sections Working with command Files and Reading all Non-Volatile Memory.

6) AMS Cockpit Screen Overview

The figure below shows the AMS screen and identifies the various elements.

AMS Screen
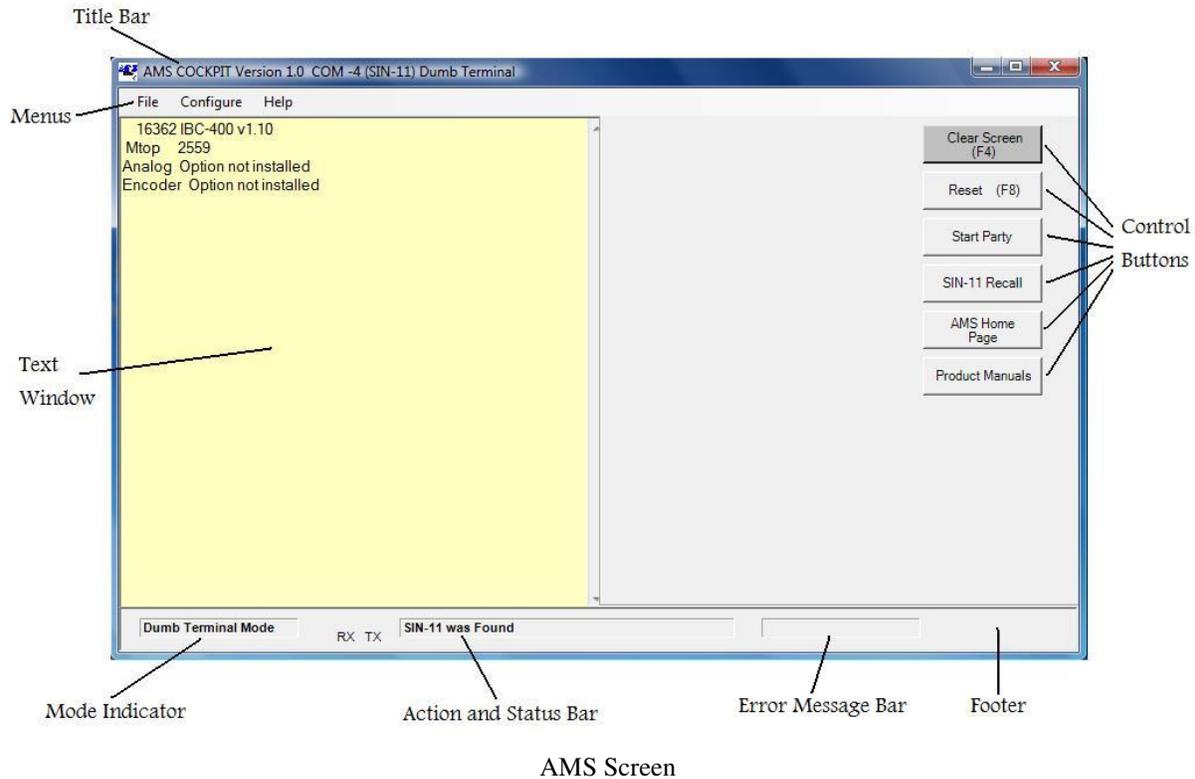
Title Bar

The information displayed in the top Title Bar includes:
- The version of AMS Cockpit
- The COM port that is currently being used or if the COM port is closed
- The type of serial adapter found in case of an intelligent serial adapter.
- The mode: Dumb Terminal Mode or Party Line Mode (see below for an explanation of these modes)
- Scanning operation during axis scanning when entering Party Line Mode
- Working Axis if in Party Line Mode

Working Axis (Title Bar)

The Working Axis is relevant when downloading Command Files or reading the non-volatile memory in Party Line Mode. You can change the Working Axis by using the "Down" key on your keyboard. As a result, the Command Files that you generate will not need the axis prefix in every line of the file – AMS Cockpit adds this for you when downloading the Command File. You will just need to make sure that you have the correct Working Axis selected when you start downloading.

Note that when issuing commands through the Text Window you will need to add the axis prefix to the command as described below – the command will not be automatically directed towards the Working Axis. If it were you would frequently need to change the Working Axis which would make issuing commands through the Text Window more cumbersome than simply adding the axis prefix.

Text Window

The Text Window enables users to enter specific commands and issue them to the AMS controllers. Also, messages sent from the controller to the computer will be displayed in this window. The color of the window indicates which mode of operation is being used. There are two distinct modes:

Dumb Terminal Mode

This is the default mode upon start-up. The background of the Text Window is yellow. This mode allows a maximum of one axis to be connected. It can be used when working only with one axis.

Prior to issuing any commands to the controller, make sure to sign on by hitting the "Space Bar". If the sign on is successful, the AMS controller will respond by sending text back to the computer which AMS Cockpit displays in the Text Window. It includes among other things the controller/product type

When issuing commands no axis prefix is required or allowed since there is only one axis connected and it is therefore clear towards which axis commands are being directed.

Party Line Mode

You can enter Party Line Mode by hitting the "Start Party" button when using a SIN-10 or SIN-11 adapter. Note that the system will first scan for all axes present from A to Z and a to z and that this process will take a few seconds to complete. Once Party Line Mode has been entered, the background color of the Text Window will change to blue.

Note that conversely to the Dumb Terminal Mode where only one controller is connected, no sign on is required or possible in Party Line mode. After the axis scan AMS Cockpit will report all axes found but there is no sign on with the Space Bar as in Dumb Terminal Mode.

In this mode up to 32 axes can be connected to one COM port. Each axis must previously be assigned an axis name and this axis name stored in the non-volatile memory of the respective controller. To identify which axis is being communicated to an axis prefix is used: the one character axis name is placed in front of the command. For examples, if you are intending to have axis "A" make 1000 steps in + direction, you would need to issue the command "A+1000".

Note that the intelligent adapters SIN-11 support the "&" command to enter Party Line Mode. However, AMS Cockpit will not detect the Party Line Mode entry if it is done via the "&" command in Dumb Terminal Mode. You will recognize this by the fact that the background of the Text Window stays yellow and the Dumb Terminal Mode remains to be indicated in the Title Bar and the Mode Indicator. If you plan to use AMS Cockpit functions such as Command File downloading, you will need to enter Party Line using the respective Control Buttons.

Mode Indicator (Footer)

The Mode Indicator displays if you are currently operating in Dumb Terminal or Party Line Mode.

Action and Status Bar (Footer)

Shows when AMS Cockpit is performing actions such as resetting or axis scanning upon entry of Party Line Mode. Indicates if no adapter was found or which intelligent adapter was found. It displays "On Line" after successful entry into Party Line Mode.

Error Message Bar (Footer)

Error messages for "Timeout" and "Aborted" are displayed in the Error Message Bar. A Timeout can occur for example upon entering Party Line Mode if an axis scan is not completed successfully. An "Abort" can be triggered

by the user, for example by hitting "ESC" during an axis scan or Read All Non-Volatile Memory or another operation.

Control Buttons

The exact set of Control Buttons will depend on the adapter you are using and the mode you are operating in. Please be referred to the dedicated Section "Control Buttons" in which each one is explained.

Menus

There are three Menus available: "File", "Configure" and "Help"

File Menu

This is used when working with Command Files or Reading the Non-Volatile Memory.

The "Edit File" option invokes the AMS Editor. Using the AMS Editor you can create new Command Files, open and edit existing files or save files. Please see Section Working with Command Files for more information.

Regarding the Read NVM option, please refer to the section Read All Non-Volatile Memory.

The Exit option enables you to terminate AMS Cockpit.

Configure Menu

This menu is intended to assist you with configuring the port set-up as well as the Font settings. These are explained in more detail below.

Port Open (Configure Menu)

Enables you to open the selected port in case it was closed

COM Settings (Configure menu)

Opens an interactive window in which you can select or change the COM port if needed. Note that AMS Cockpit will list under COM ports all available COM ports that it finds on your computer. To change the COM port, select the desired one from the list and press ok. In case you are not sure which one you have your hardware connected to, you can also use the "Device Manager" in the "Control Panel" of Windows to assist you. Ports that are in use by other applications or other instances of this application are hidden.

Also, baud rate can be selected, depending on the adapter and controller you are using. For the SIN-11 the setting must always be 9600 baud.

The following parameters are shown in the COM Settings window but cannot be altered since they are identical for all set-ups:
- Data bits = 8
- Stop bits = 1
- Parity = None
- Handshake = None

Font Settings (Configure Menu)

Selecting the Font Settings will open up a new window which enables you to change the Font Settings for the Text Window. The window features a standard Windows font editing form.

Help Menu

This menu features an "AMS Website" button which opens a new browser window and navigates you to the AMS website. It also features an "About" button which gives information about the AMS Cockpit software that you are using.

7) Control Buttons

The control buttons are located on the right hand side of the screen. Which ones are shown at any given time will depend on the type of adapter used as well as the present mode of operation.

"Clear Screen (F4)" Button

This button is displayed in any mode of operation. When clicking on this button the Text Window is cleared and the cursor moves to the very top of the window. No command is issued to the motion controller as part of this – it purely represents a clear of the Text Window.

"Reset (F8)" Button

This button is displayed in any mode of operation. Activating it will:
- Clear the Text Window in the same way as the "Clear Screen" Button
- Stops and resets all motion controllers
- Scan for intelligent adapter (SIN-11 or SIN-10). If none is found AMS Cockpit cannot make a determination on the adapter used and will display SIN-0.
- Reset to Dumb Terminal Mode

Pressing the key combination "Control C" on your keyboard will also cause the above reset operation to be executed.

"Start Party" Button

This button is displayed when an intelligent adapter has been found (SIN-11 or SIN-10). Pressing it will trigger the serial adapter to do a full axis scan. In this it will search all axis names from A to Z and a to z. Upon the entry to Party Line Mode, the background color of the Text Window will change to blue. Also, "Party Line" is displayed in the Title Bar and the left Mode Indicator in the Footer. The Working Axis name will be displayed in the Title Bar. The Working Axis is relevant for The Working Axis can be changed in Party Line Mode by using the Up and Down keys on your keyboard. The updated Working Axis is then displayed on the Title Bar.

"SIN-11 Recall' Button

This button is available only if a SIN-11 was detected. A SIN-11 with version 1.01A or higher is required for this operation. When a full scan is performed upon the Party Line Mode entry, axis names are stored in the non-volatile memory of the SIN-11. The SIN-11 recall will result in a fast start-up in Party Line Mode without an axis scan. Specifically, the following commands will be executed:
- Clear the Text Window in the same way as the "Clear Screen" Button
- Stops and resets all motion controllers
- Switches to Party Line Mode indicated by the blue background of the Text Window, the Title Bar and the left Bar on the Footer.
- Sets Working Axis to the alphabetically first axis in the list of axes stored on the SIN-11 (large caps before small caps)

"AMS Home Page" Button

This will open a new browser window and navigate you to the AMS homepage.

"Product Manuals" Button

This button will open a new browser window and navigate you to the web page which comprises the AMS product manuals.

"SIN-8 Party" Button

This button is displayed if no intelligent adapter was found. You will first need to set the switch on the SIN-8 to Party Line prior to activating this button. The SIN-8 is an RS-232 to RS-422 level converter without built in processor. The AMS Cockpit will scan and map Party Line axis using the computer resources to perform the proper handshake protocol. The Working Axis name will be displayed in the Title Bar and can be changed to the next axis by using the "Down" arrow keys on the keyboard.

Note:
- At the end of a command line you will need to issue "Control" & "Enter" instead of just "Enter" to issue the command
- You will only see the text typed on the keyboard if a line starts with an axis name that is present. If a line does not start with a name of an axis that is present, anything typed will be suppressed until "Control" & "Enter" is issued and an axis name identifier of an axis that is connected is typed as the first character of a new line.
- If you are using a SIN-7 or a SIN-9 (which both do not have the party line switch) you will still be able to enter Party Line Mode with this button for evaluation purposes if you are using a controller product that features the SMC-40 microcontroller. This is because on the SMC-40 based products the entry to Party Line Mode is done software based rather than through a hardware signal. However, use of the SIN-11 instead of the SIN-9 is required for reliable operation in Party Line Mode.

8) Special Function Keys

Special functions are assigned to some of the keys on your keyboard. These are described below.

"ESC" Key

If you strike the ESC key on your keyboard, all action on the controllers will be aborted and therewith busy conditions are terminated. The global abort using the ESC key can be used in any mode of operation.

"Control C" Key

Initiates reset and is identical to the "Reset (F8)" Button. See respective description for details.

"Down" Key

In Party Line Mode the Working Axis name is displayed in the Title Bar. Using the "Down" key the Working Axis can be changed to the next letter name, rolling over to the first. Any time either the "Down" Key is used, a "Clear Screen" for the Text Window will be performed and the new Working Axis will be shown at the top of the "Text Window".

"F4" Key

See "Clear Screen (F4)" Button.

"F8" Key

See "Reset (F8)" Button.

9) Working with Command Files

Command Files

Command Files (anyname.SMC) may be created, edited and downloaded to one or more controllers, the text in Command Files must be standard ASCII text, such as those used in the Windows Notepad program.

To open a Command File, Select "Edit File" from the "File" menu. The AMS Editor will open. It allows you to create new files as well as open, edit and save existing one.

Comments may be placed in the Command Files. A comment is indicated by a single quote ('). Any subsequent information on the same line will be ignored during download.
Example:
      +5000 'index 5,000 steps
Only the "+5000" will be downloaded

Example of a Command File:

P0	'enter into programming mode at memory location 0
+1000	'move 1000 steps in + direction
W0	'wait until motion complete
-1000	'move 1000 steps in - direction
W0	'wait until motion complete
Z	'read position counter
G0	'start program at memory location 0
P	'exit programming mode
S	'Save program to the shadow area in the non-volatile memory – for SMC-40 based products S1 needs to be

used
      'to save the program instead

The initial P0 tells the controller to enter programming mode at memory location 0. The P command towards the end exits programming mode. The S command (S1 for SMC-40 based products) saves it to the non-volatile shadow memory so that the code will be available also after powering the controller down and up again until the memory is overwritten by a different code.

Note no axis prefixes is to be added in the Command File. If in Party Line Mode, the Command File will be downloaded to the axis that is selected as the Working Axis. AMS Cockpit will then automatically take care of adding the prefixes when programming the controller – the user does not need to worry about this. He or she only needs to make sure to have the correct axis selected as Working Axis when starting the downloaded. This renders the user increased flexibility since any Command File can be downloaded to any controller without requiring any modification in the Command File.

Downloading Command Files

Command Files can be downloaded to the controller in either Dumb Terminal or Party Line Mode.

If you are in Party Line Mode, you need to make sure that the axis you want to download the command file to is selected as Working Axis. Use the "Down" key on your keyboard to change the Working Axis. The Working Axis is

displayed in the Title Bar. You may have up to the allowed 32 axes which are allowed in Party Line Mode connected when downloading in Party Line Mode.

Note that no matter if you are downloading from the Dumb Terminal Mode or from Party Line Mode, make sure that you never use an axis prefix in the command file. In Dumb Terminal Mode no axis prefix is needed since you can only have one axis connected. In Party Line Mode the Working Axis defines which axis you are downloading to and AMS Cockpit will automatically add the axis prefix to every line of the Command File when downloading. This scheme allows you to download any Command File to any axis by just switching the Working Axis and without having to make any change in the Command File itself.

To download a file select the "File" menu. Then click on "Download File". Select the file to download and click "OK".

10)   Read All Non-Volatile Memory

This function reads all bytes that are contained in the non-volatile memory of the axis selected as Working Axis. Remember that you can change the Working Axis with the "Down" Key prior to invoking the Read All Non-Volatile Memory Command from the File Menu. Reading this memory image must be done in Party Line Mode. More than one axis may be connected. A dialog box will appear prior to starting the operation. It asks you to confirm that you want to go forward with the operation.

Using the "[" command, every value between address 0 and 255 is read. Values between 256 and the last memory location that are not equal to 255 (0FFh) are read. Erased memory has values of 0FFh, thus ignoring these improves efficiency.

During the read of the non-volatile memory, write commands "\" with associated addresses and data will be displayed in the Text Window. The scan can be aborted using the "ESC" key on your keyboard if the upper memory does not contain necessary data. Note: if the "ESC" command is issued, the data read until the abort operation will still be placed in the AMS Editor if the "ESC" command was used after reading of address 255. If it was issued at an address lower than 255, the abort will simply terminate the operation without placing the data read in an AMS Editor window for further use.

On completion, the NV memory image will be displayed in an AMS Editor window and may be saved to a file. The first line in the AMS Editor window shows the axis name it was read from, the product/controller type and the date. The line starts with a ' sign so that it will be ignored if downloaded to a controller later on. It is intended simply for informational purposes.

The saved image can be downloaded as described above in the Download Command Files section. Remember to select the desired Working Axis prior to invoking the command and that a Save command (S or S1 for SMC-40 based products) is required after loading the data in case the data is to be stored in the non-volatile shadow memory.