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Document—

How to Update Display Firmware for Mark VI Controls

PRELIMINARY

How to Update Display Firmware for Mark VI Controls

This document describes the procedures necessary to install or upgrade the display firmware for machines equipped with the Milnor® Mark VI control system. These machines are identified by the graphic display in the control panel, as shown in Figure 1.

Supplement 1

Do I Need This Information?

The display firmware in your Milnor® machine was designed to operate with one or more specific versions of the machine controller software. When Milnor® develops a new feature for a control system, a controller software update accommodating the new feature may be made available for purchase. Because the graphics display firmware and the machine controller software must be compatible, use Table 1 “Compatible Display Firmware by Machine Controller” in Section 5.1 to verify compatibility. This document describes the procedure for acquiring and installing the firmware for the graphics display controller.

You **may** need this information if you have installed machine software with a version number that is different from the software version most recently used in the machine. Use Table 1 in Section 5.1 or the Customer Service area of the Milnor® web site (<http://www.milnor.com>) to determine if your current display firmware is compatible with the new machine software.

If you replace the Mark VI display unit with a unit which has not been pre-loaded with Milnor firmware, begin with the procedure described in Section 7 “How Do I Repair an Aborted Transfer?”

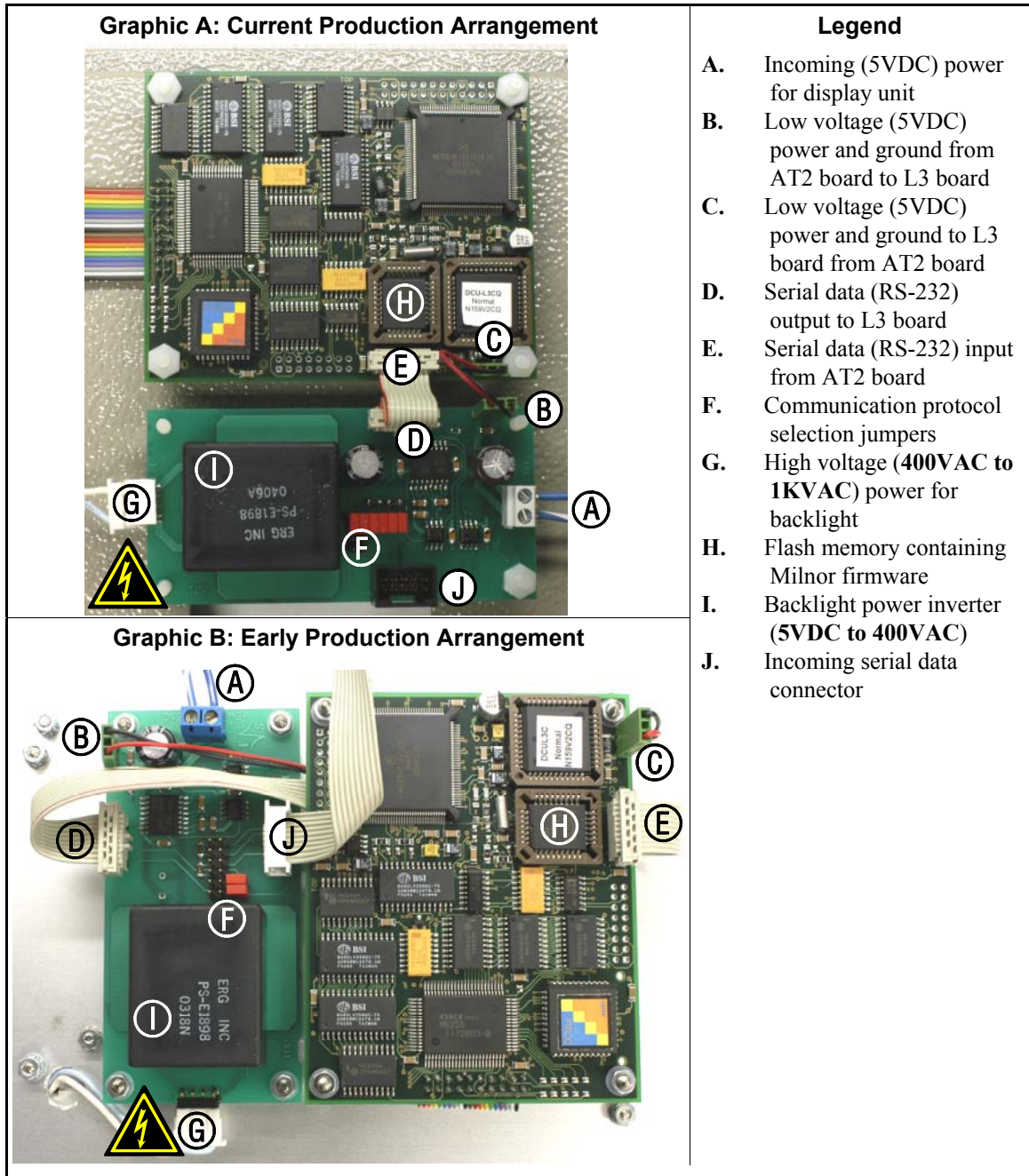
Note 1: Some controls shown in Figure 1 may not appear on your specific machine model, or your machine may have controls that are not shown in this photograph. The procedure described in this document applies to all machine models with the Mark VI control system.

How to Update Display Firmware for Mark VI Controls

Figure 1: Mark VI Control Panel, Typical Front View



Figure 2: Mark VI Display Unit, Rear View



1. What Do I Need?

- A computer running Microsoft Windows 95 or later and equipped with an available serial (COM) port.
- F&S Electronics Daisy-2 software or the DCUTerm.exe module of the Daisy-2 software to communicate from the computer to the display unit
- DCUL3v2.def firmware file provided by Milnor
- A special cable, Milnor part number 10Y-FPDPC1 or equivalent, for temporarily connecting the computer to the display

- A screwdriver to remove the machine control panel
- Probably a pair of pliers to remove and replace jumpers on the display board

2. How to Identify the Firmware Version

You must be able to identify the firmware version installed in your machine before you begin this procedure, then again after updating to verify that the process was completed.

The machine controller automatically shows the *Copyright screen* (Figure 3) **briefly** when machine power is enabled (⏻) but before the microprocessor starts using the screen. Immediately afterwards, the copyright screen is replaced by the *Controller Title screen* for approximately two seconds. The firmware version number is on the third line in the upper right corner of the display, below the software version.

Figure 3: Where to View the Firmware Version Number



Note 2: As a last resort in viewing the display firmware version number, you may remove the connector from MTA-30 on the machine processor board. Because this is the serial communication link from the processor board to the display unit, the display will not advance beyond the copyright screen (Figure 3).

3. Install the DCUTermi Communication Software

Save the file `DCUTermi.exe` to the personal computer which will be connected to the Milnor[®] machine for the update procedure.

4. How Do I Connect the Computer to the Display Unit?

4.1. Remove Power from the Machine!



CAUTION [1]: Electrocution and Electrical Burn Hazards—Contact with high voltage will electrocute or burn you. Power switches on the machine and the control box do not eliminate these hazards. High voltage is present at the machine unless the main machine power disconnect is off.

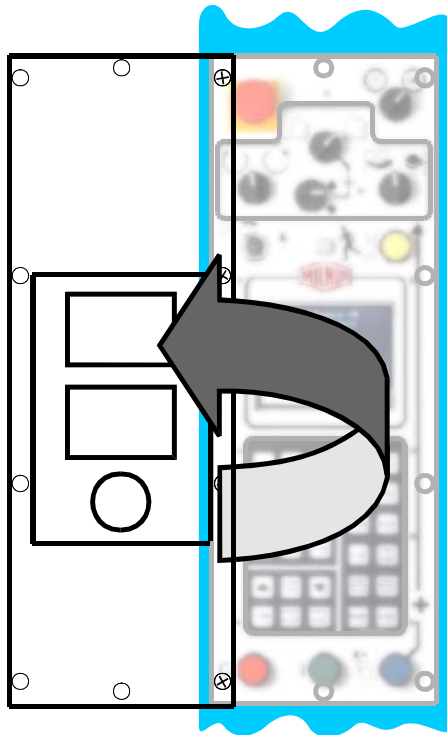
- Lock out and tag out power at the main machine disconnect before servicing, or in accordance with factory service procedures.
- Never leave the machine unattended without replacing the control panel.

4.2. Remove the Control Panel

—Because the control panel is heavy and should remain attached to the machine while the upgrade is performed, we recommend this procedure for gaining access to the components on the rear of the control panel.

1. Have a helper support the control panel firmly in place while you remove the screws that secure the panel.
2. As shown in Figure 4, carefully flip the control panel around so the back of the panel is accessible. Re-attach one side of the control panel to the machine with the original screws. Take care not to bend the control panel or pull any wires loose when flipping and mounting the panel.

Figure 4: Control Panel Positioned for Firmware Update



4.3. Change Jumper Positions—The display controller normally communicates with the Milnor[®] machine controller using the RS-485 serial protocol. Because Milnor[®] machines use RS-485 serial protocol and personal computers use RS-232C (more formally called EIA-232C), you must change the protocol of the display controller to connect a personal computer to the display unit.

Note 3: Milnor[®] machines use RS-485 protocol because that protocol allows multiple addresses on the same serial line (one-to-many communication). Each peripheral board in a Milnor machine has a serial address that is unique within that machine. Personal computers use RS-232C because that protocol was designed for relatively short cable runs between devices and one device per serial port (point-to-point communication) with standardized connectors.

1. With machine power disconnected, remove the serial communication cable from the DCU-AT2 board of the display unit. Specifically, the connector is the *Incoming Serial Data Connector* labelled in Figure 2.
2. Remove the six jumpers from the RS-485 position on the DCU-AT2 board. The RS-485 (normal operation) position is shown in *Graphic A* of Figure 2.

Tip: Relative positions (e.g., up, down, upper, lower) given in these instructions apply to the current production arrangement of the display controller when the control panel is temporarily mounted to the machine as described above. These instructions generally apply to all arrangements of the display controller components, but you may have to adjust some directions if your machine uses the earlier arrangement.

3. Install two jumpers on the lower set of two jumpers (nearer the *Incoming Serial Data Connector*). **Do not rotate the jumpers**; just move two of them down to the lower set of pins. The RS-232 (firmware upgrade) position is shown in *Graphic B* of Figure 2.

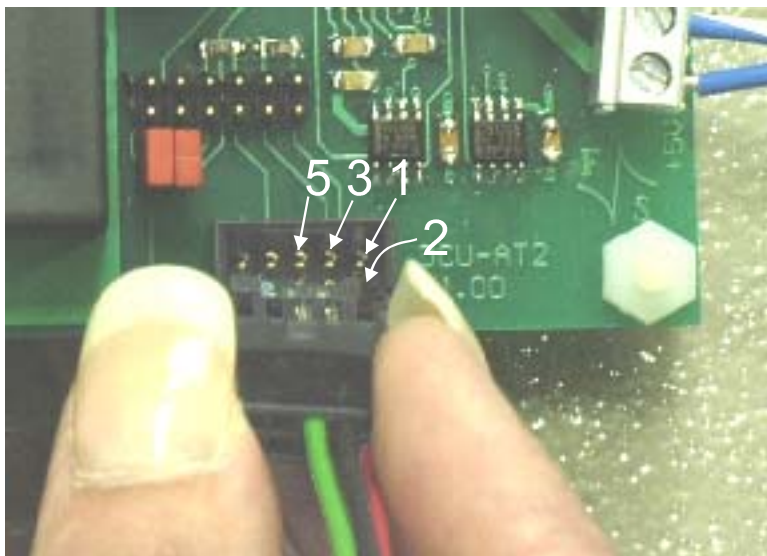
4.4. Connect Cable to Computer—Connect the serial transfer cable to a 9-pin serial port on the personal computer. Usually the serial ports are labelled as *COMx* or with a symbol similar to 10101.

4.5. Connect Cable to Display Unit

1. Disconnect the *incoming serial data cable* from the *Incoming Serial Data Connector* on the DCU-AT2 video controller board. See Figure 2 for the location of this connector. In normal operation, this connection carries all data from the machine processor board to the display controller.
2. Connect the temporary *serial transfer cable* (Milnor part number 10Y-FPDPC1) from the computer to the *Incoming Serial Data Connector* on the DCU-AT2 board. Be sure that the cable connector is oriented so the wires in the cable connect to pins 2, 3, and 5 on the DCU-AT2 board.

Tip: The connector on the DCU-AT2 board is keyed so the cable connector will only attach in the correct orientation.

Figure 5: Connecting Cable at Display Unit



5. How Do I Transfer the New Definition File?

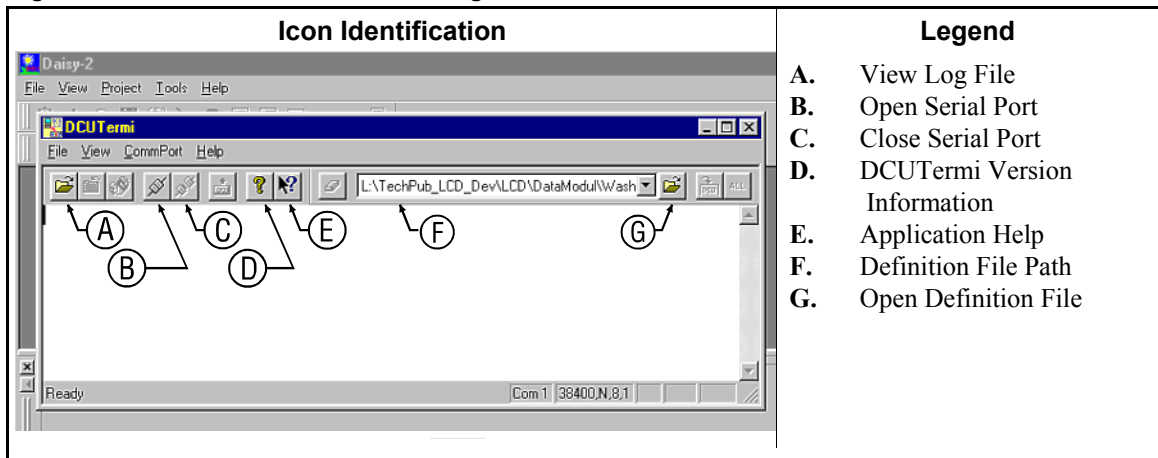
- 5.1. Save the New Definition File**—The display controller definition file must match the specific controller software version for your machine. The display will present scrambled information if the definition file and the software version are not compatible. See the table below or browse to the *Customer Service* area of the Milnor web site (<http://www.Milnor.com>) to match display firmware and machine controller software versions.

Table 1: Compatible Display Firmware by Machine Controller

Machine Controller Version	Display Firmware Version	Machine Controller Version	Display Firmware Version	
68036F5N models only				
2100C	21003	2100HX	21010	
2100D	21004	2100HY		
2100E	21005	2100HZ		
2100F	21008	21100		
2100G				
2100H				
60044SP2 models only				
2100J	21012			
2100JX				
2100JZ				

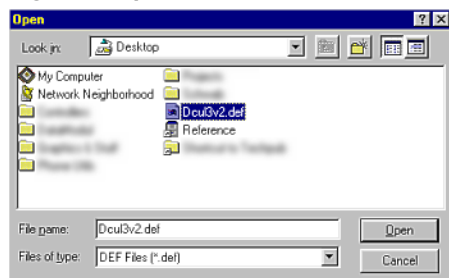
- 5.2. Using the DCU Terminal Program (DCUTerm.exe)**—DCUTermi (see Figure 6) is the component of the Daisy-2 software that allows communication between a personal computer and the DCU-L3 display controller. DCUTermi can run as a stand-alone program, without first starting Daisy-2.

Figure 6: DCUTermi Communication Program



1. First, save the new definitions file—usually named `DcuL3v2.def`—to the personal computer. Remember where you saved it, as you'll need this information soon.
2. Click the *Open Definition File* icon in DCUTermi (see Figure 6).
3. Navigate to the saved definition file (Figure 7) and click on the *Open* button. The path and filename of the definition file (e.g., `DcuL3v2.def`) appears in the *Definition File Path* drop-down box shown in Figure 6.

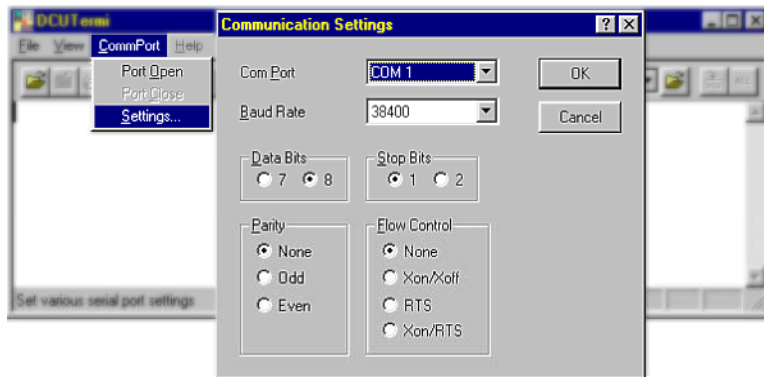
Figure 7: Open File Window



4. Select *Settings...* from the *CommPort* menu item to verify the communication settings. The *Communication Settings* window appears similar to Figure 8.
 - a. Select the *Com Port* to which the cable is attached. This will usually be either *COM1* or *COM2*.
 - b. Set the *Baud Rate* to 38,400.

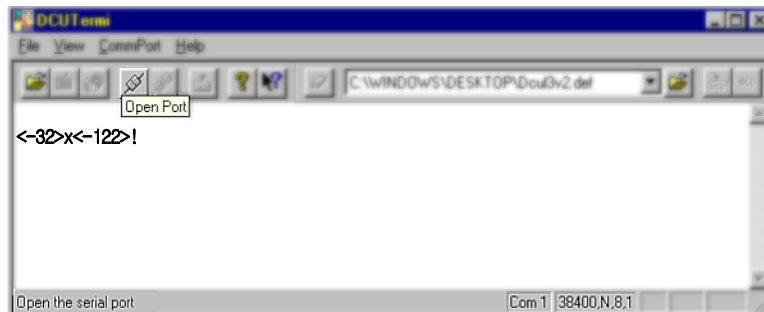
Note 4: A baud rate of 19,200 may be required when recovering from an aborted update, but 38,400 is used for the normal procedure.
 - c. Select 8 *Data Bits* and 1 *Stop Bit*.
 - d. Set *Parity* to *None* and *Flow Control* to *None*.
 - e. Click *OK* to save the settings.

Figure 8: Communication Settings Window



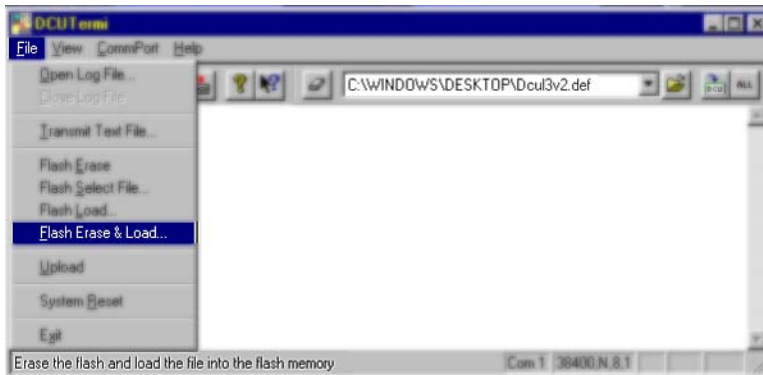
5. Click the *Open Port* icon to open the communications port on the personal computer.
6. Turn on machine power. When the machine microprocessor begins communicating with the display controller, the DCUTermi program displays a string of characters similar to those shown in Figure 9.
 - If the displayed string ends with the “!” character, all is well. Proceed to the next step.
 - If characters appear, but the last character is not “!,” verify the communication settings again. If the settings are correct, follow the procedure described in Section 7 “How Do I Repair an Aborted Transfer?”.
 - If no characters appear when you turn on machine power, verify that the cable is correctly attached to the computer and the display controller. Also, check that the *Com Port* selected in the *Communication Settings* window matches the port to which the cable is connected.

Figure 9: Open Port Button and Communication OK Prompt



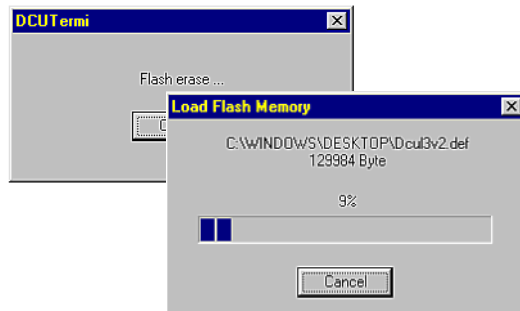
7. Select *Flash Erase & Load...* from the *File* menu, as shown in Figure 10. The DCUTermi program erases the existing definition file and begins loading the new definitions automatically. **Do not interrupt the transfer!**

Figure 10: Flash Erase & Load Command



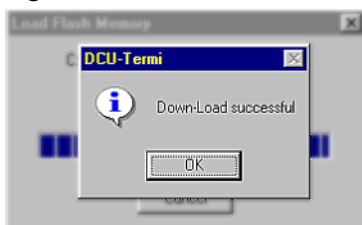
Do not interrupt the file transfer in any way while the *Flash Erase* prompt or the *Load Flash Memory* progress window (Figure 11) is visible. If the machine or personal computer loses power, the cable is disconnected, or any electromagnetic noise interferes with the transfer, the *Load Flash Memory* window will freeze. You will probably be required to use the procedure described in Section 7 “How Do I Repair an Aborted Transfer?”, as successfully resuming the transfer is unlikely.

Figure 11: File Transfer Progress Bar



8. The DCUTermi program signals that the download completed successfully.

Figure 12: Successful File Transfer



6. How Do I Verify the New Definition File?

When the computer display appears similar to Figure 12, watch the machine LCD display while you click *OK*. The machine display will refresh and display the copyright screen (Figure 3) containing the new firmware version number.

7. How Do I Repair an Aborted Transfer?

If the firmware update process is interrupted in any way while the *Load Flash Memory* progress window is visible or if the flash memory has never been properly erased, the memory in the display controller will be corrupted. This prevents normal communication between the controller and the personal computer until the controller memory is completely erased, as described below.

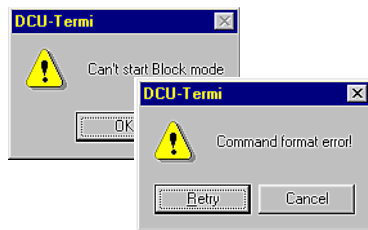
Supplement 2

Symptoms of an Aborted Transfer

If machine loses power during the transfer or communication between the personal computer and the display controller fails for any other reason, the transfer is aborted and the progress bar in the *Load Flash Memory* window stops. The DCUTermi program may display an error message automatically or after you press *Cancel*. When you try to resume the procedure, the DCUTermi program displays “Flash erase ...” until you cancel the transfer, then displays an error window similar to Figure 13.

Corrupted memory in the display usually causes the DCUTermi software to freeze or display an error message on subsequent update attempts.

Figure 13: Errors Requiring System Reset

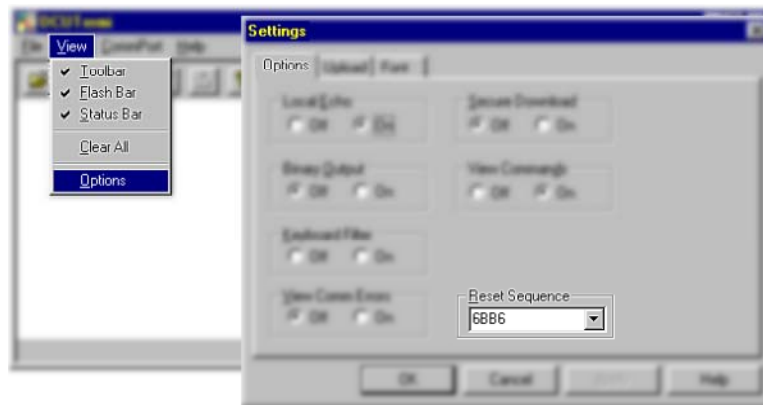


1. Open the *Communication Settings* window (Figure 8) and change the *Baud Rate* to 19200.

Note 5: Reducing the baud rate (communication speed) increases the amount of time required to upgrade the display controller, but the slower speed is the default controller speed after an aborted transfer.

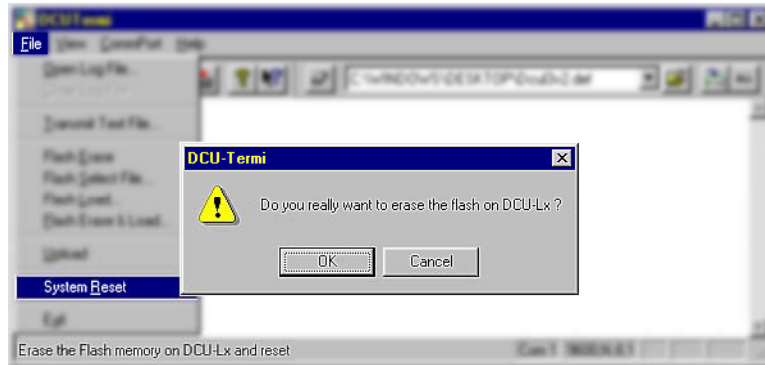
2. In the *Options/Settings* window (Figure 14), verify that the *Reset Sequence* is 6BB6.

Figure 14: Selecting the Correct Reset Sequence



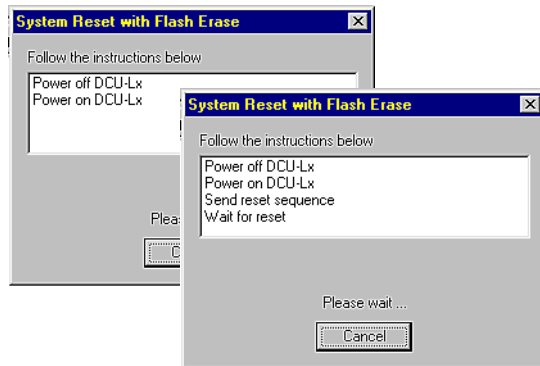
3. Send the *System Reset* command from the *File menu*, and confirm your action (see Figure 15).

Figure 15: Send and Confirm the *Reset* Command



4. The DCUTermi program prompts you to complete the reset sequence by turning power to the display controller off and on again. Turn the machine master switch off (⊗), wait five seconds, then turn machine power on (⊙) again. The prompt window will close automatically when the reset process is complete.

Figure 16: Prompt Before and After Toggling Machine Power



5. Select *Flash Erase & Load...* from the *File* menu, as shown in Figure 10. The DCUTermi program erases the existing definition file and begins loading the new definitions automatically. **Do not interrupt the transfer!**
6. The DCUTermi program signals that the download completed successfully.

8. How Do I Return the Machine to Service?

1. Verify the upgrade as described in Section 6 “How Do I Verify the New Definition File?”.
2. Remove power from the machine by turning off the main power disconnect.
3. Disconnect the serial cable from the display controller at the machine.
4. Replace the jumpers on the display controller (Item F in Figure 2) to command RS485 serial protocol.
5. Replace the incoming serial data cable from the machine microprocessor (Item J in Figure 2).
6. Carefully re-install the control panel in the machine frame.

Tip: Arrange the wires behind the control panel so it fits flat against the machine frame with no pinched wires.

7. Restore power to the machine. Verify that the controller *Title* screen (see Figure 3) appears briefly when you turn on the machine *master switch* (⊙).

9. Constructing the Cable

The cable required for connecting the display controller to a personal computer is available from Milnor as part number 10Y-FPDPC1. However, if you choose to construct the cable yourself, the following requirements must be met.

1. The cable must contain a minimum of three conductors.
2. The connector on the personal computer end of the cable must be suitable for connecting to an available RS232 serial port on the computer, with DB9 (9 pins) preferred.
3. The connector on the display controller end of the cable must be equivalent to Tyco/AMP part number 87631-6 (housing) with 1-87523-9 pins.
4. Wire the connectors at each end according to Table 2.

Figure 17: Cable Connections

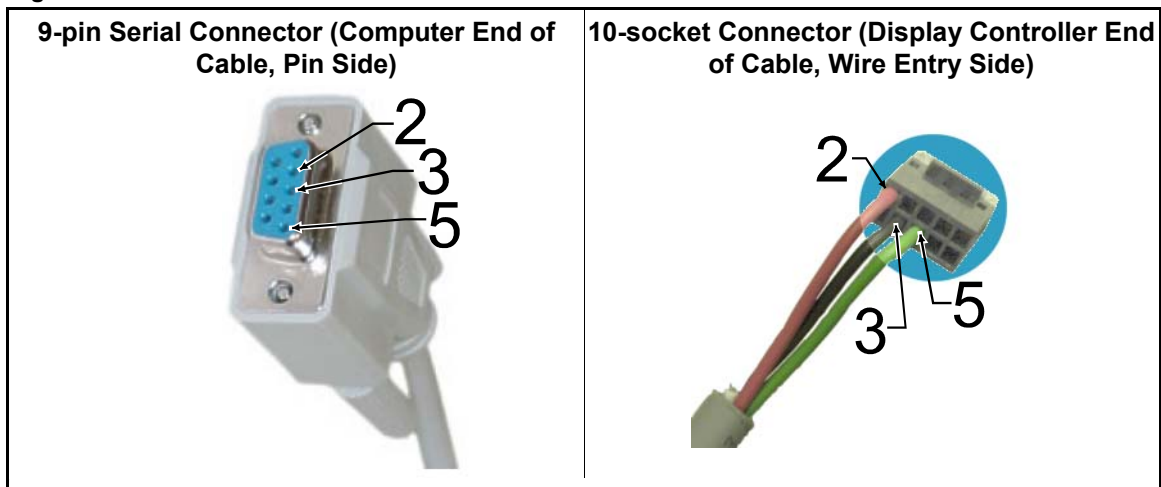


Table 2: Cable Conductors and Signals

Pin Number			RS232 Signal
Controller Termination	Personal Computer Termination		
Tyco/AMP 87631-6	DE9	DB25	
2	2	3	
3	3	2	Received Data
5	5	7	Transmit Data
			Signal Ground

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