

**HSL-DC5
APM Decorator
High Speed Front End
User's Manual**

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WARNING

To ensure the equipment described by this User Manual, as well as the equipment connected to and used with it, operates satisfactorily and safely, all applicable local and national codes that apply to installing and operating the equipment must be followed. This includes the National Electric Code in the USA and other applicable legislation, regulations, and codes in practice elsewhere. Since codes can vary geographically and can change with time, it is the user's responsibility to determine which standards and codes apply, and to comply with them.

FAILURE TO COMPLY WITH APPLICABLE CODES AND STANDARDS CAN RESULT IN DAMAGE TO EQUIPMENT AND/OR SERIOUS INJURY TO PERSONNEL.

Persons supervising and performing installation or maintenance must be suitably qualified and competent in these duties, and should carefully study this User Manual and any other manuals referred to by it prior to installation and/or operation of the equipment.

The contents of the User Manual are believed to be correct at the time of printing; however, no responsibility is assumed for inaccuracies. In the interests of a commitment to a policy of continuous development and improvement, the manufacturer reserves the right to change the specification of the product or its performance or the contents of the User Manual without notice.

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SECTION 1

GENERAL DESCRIPTION

This section describes the features of the M4508 APM Decorator High Speed Logic Module. This includes the functional description, alarms detected, etc.

1.1 FEATURES

- Performs high speed control functions of the APM Decorator to speeds in excess of 2400 CPM.
- High speed front-end upgrade package which interfaces with existing control system.
- Accurate detection of misloaded cans and trip cam control eliminates inside deco and varnish problems.
- Accurate speed compensated single can (bad can) pin chain blow-off reduces scrap and eliminates silver cans down the line.
- Single select-a-can QC pin chain blow-off allows operator to blow off a can from a selected spindle (or blanket) to verify print quality of each blanket with machine running at full production speeds.
- Can gate open/close control.
- Alarm detection: infeed track jam, no can transfer (can on mandrel), and timing signal fail detection.
- Data Acquisition: Total number of good cans printed, total number of blow-offs, trips per spindle, etc. (for both current shift and last shift).
- Built-in 2 Line X 40 character sealed display with 24 key membrane keypad allows local viewing of collected data (can count, blow-off count, trips per spindle) by operator and set-up of all user variables (passcode protected or key switch enabled) by authorized personnel.
- Interfaces directly with machine mounted resolver, can/no can sensor and all trip and blow-off solenoids.

SECTION 1

GENERAL DESCRIPTION

- Based on high performance M4508 PLC/PLS module which allows easy trouble-shooting and user customization using SYSdev (DOS-based) programming package.
- Built-in PLS provides all machine timing, eliminating need for an additional PLS.

1.2 FUNCTIONAL DESCRIPTION

The HSL-DC5 is an electronic upgrade for the APM Decorator/Basecoater that detects miss-loaded cans, performs speed compensated trip cam control, and single can (bad can) blow-off at speeds in excess of 2400 CPM. In addition, a select-a-can pin chain blow-off function is used to perform print quality verification of each blanket. The control system interfaces directly to the machine mounted resolver, can/no can sensor, trip and blow-off solenoids as well as the host PLC via discrete DC I/O.

Alarm detection is provided including:

- Infeed Track Jam
- No Can Transfer (can on mandrel)
- Timing Signal Failure

Data collection (both for the current shift and last shift) includes:

- Total Good Can Count
- Blow-Off Counts
- Trips Per Spindle

The control system is not a dedicated “black box”, but is instead implemented using the high performance SYSTEMS M4508 PLC/PLS module. This allows easy customization by either SEA or the end user. The M4508 module is programmed using the DOS-based SYSdev programming package, which allows the module to be programmed in any combination of Ladder or High-level (subset of “C”), as well as perform on-line monitoring and trouble-shooting. The M4508 module incorporates a built-in PLS which interfaces directly with the machine-mounted resolver and provides all machine timing, eliminating the need for an external PLS.

1.3 MANDREL TRIP CONTROL

Trip cam control at speeds in excess of 2400 CPM is incorporated in the M4508. The appropriate trip cam is accurately extended for the spindle of the miss-loaded can and retracted back prior to the spindle following the miss-loaded can at all speeds. This reduces scrap by providing an accurate single mandrel retract at all speeds. This eliminates inside litho problems by assuring that the miss-loaded spindle is completely skipped.

1.4 BAD CAN AND SELECT-A-CAN PIN CHAIN BLOW-OFF

Both the “Bad Can Pin Chain Blow-Off” and “Select-A-Can Pin Chain Blow-Off” incorporate speed compensation to compensate for the response time of the solenoid regardless of machine speed. This allows accurate rejection of a single can from the pin chain at all speeds. The bad can blow-off is activated automatically to reject miss-loaded cans from the pin chain.

The “Select-A-Can” feature allows the user to dial in a mandrel number, either at a remote PB station or from the Keypad/Display, and blow-off one can printed on that mandrel. This provides a way to verify the print quality of each mandrel. Two other “Select-A-Can Blow-Off” modes are available. The “Consecutive Blanket” mode blows off consecutive cans printed on each blanket, starting with mandrel 1. The “Consecutive Spindle” mode blows off consecutive cans printed on all mandrels, starting with mandrel 1.

The following variables can be set by the user for the “Bad Can” pin chain blow-off:

- Number of shifts from machine to blow-off port (up to 999)
- Number of cans to blow-off for each bad can (one is normal, can be up to 5).
- Both the “on” and “off” solenoid response time (used by the speed compensation algorithm)

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The following variables can be set by the user for the “Select-A-Can” blow-off:

- Q.C. shift offset, this is used to match the actual mandrel number to the selected mandrel number
- Both “on” and “off” solenoid response times

1.5 ALARM DETECTION

The following alarms are detected:

Infeed Track Jam: The infeed track jam alarm occurs when 7 consecutive empty mandrels are detected by the “Can/No Can Sensor” after the can gate is opened.

No Can Transfer: The no can transfer alarm occurs when the “No Can Transfer” sensor detects a can on the mandrel after the disk transfer location.

Timing Signal Fail: The timing signal fail occurs when any of the timing signals generated in the PLS section fail to change state while the machine is running.

The “Encoded Alarm” outputs of the M4508 are as follows:

Alarm	Bit 1	Bit 0
None	0	0
Timing Signal Fail	0	1
No Can Transfer	1	0
Infeed Track Jam	1	1

SECTION 1

GENERAL DESCRIPTION

1.6 DATA COLLECTION

The following data is collected for both the current shift and the previous (last) shift:

- Total Number of Good Cans Printed
- Total Number of Cans Blown-Off
- Total Number of Miss-Loaded Cans (bad cans)
- Total Number of Restart Blow-Offs
- Total Number of Manual Blow-Offs
- Total Number of Select-A-Can QC Blow-Offs
- Total Trips per Spindle (for each spindle)

This data can be viewed locally on the Keypad/Display or sent to the host PLC via RS-232 communications (MODBUS or Allen-Bradley DF1 protocols) using the optional S4516 communication board.

This information is updated (“Current” shift transferred to “Last” shift) based on the change of state of the “End of Shift” input. This can be activated on an 8 or 12-hour basis or alternatively based on label run, depending on the user's preference.

A separate buffer is used to collect “Trips per Spindle” counts as a diagnostic to aid in trouble-shooting a loading problem. Unlike the shift data, these counts can be reset at will. This allows one to note an abnormally high count on a specific mandrel.

The collected data is available via encoded “Blow-off Data” outputs from the M4508 as follows:

Blow-off Data	Bit 2	Bit 1	Bit 0
None	0	0	0
Restart Blow-offs	0	0	1
QC Blow-offs	0	1	0
Manual Blow-offs	0	1	1
Bad Can Blow-offs	1	0	0
Good Cans	1	0	1

SECTION 1

GENERAL DESCRIPTION

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SECTION 2 INSTALLATION

The standard HSL-DC5 control system is provided for back-panel mounting inside the existing control cabinet.

2.1 WHAT'S INCLUDED

Verify that the following items are included when unpacking the HSL-DC5:

- 1ea. M4508 PLC/PLS module
- 1ea. P4500 Power Supply
- 1ea. D4591 Display with ribbon cable for mounting in the existing control cabinet door
- 1ea. HSL-DC5 User's Manual
- 1ea. M4500 User's Manual
- 1ea. HSL-DC5 Program Disk

The following items are optional items and can be purchased separately as required or desired:

- 1ea. HSL-QCSTA Remote Select-A-Can PB station
- 1ea. RSV34-MS1 Resolver
- 1ea. RSV-RSCBLE-XX Resolver Cable

2.2 POWER REQUIRED

The HSL-DC5 is powered from 115VAC/230VAC 50/60HZ and +24VDC. The 115VAC/230VAC is used to power the M4508 module while the +24VDC is used to power the +24VDC I/O (sensors, trip and blow-off solenoids).

Note: +24VDC solenoids must be used for all trip and blow-off solenoids. These provide a more consistent and repeatable response time than 115VAC solenoids.

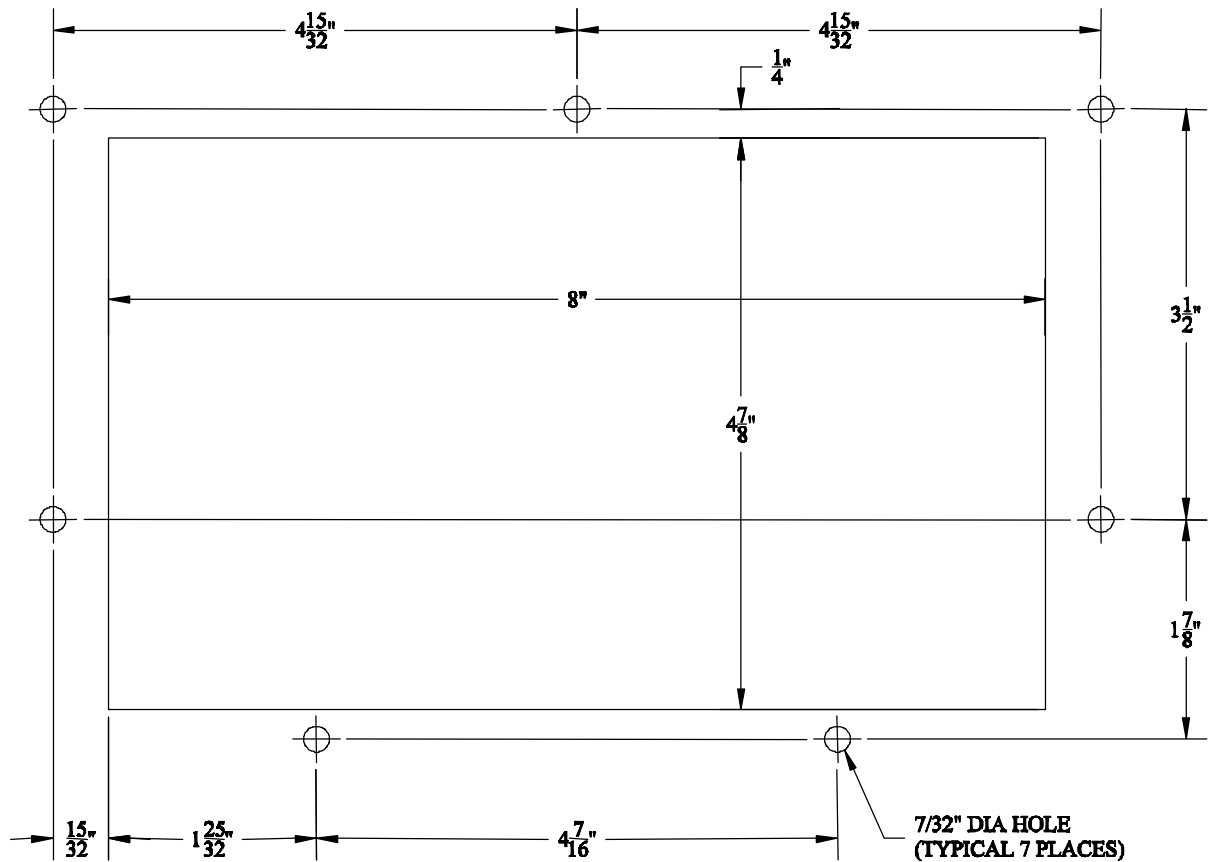
If +24VDC solenoids were used in the existing system, the +24VDC current required by the HSL-DC5 is no more than the existing systems +24VDC current requirement, therefore the existing +24VDC power supply should be adequate.

SECTION 2 INSTALLATION

2.3 MOUNTING AND WIRING THE HSL-DC5

Mount the back-panel in the existing control cabinet.

Referring to the figure below, create a cut-out in the existing control cabinet door and mount the D4591 Keypad/Display.



D4591 Recommended Panel Door Cut-out

Note: The D4591 must be located within 6 feet of the M4508 module to avoid EMI pick-up on the display ribbon cable. Connect the ribbon cable from the M4508 module to the D4591 module.

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Referring to the electrical control schematic at the back of this manual, wire the HSL-DC5 to the existing control system as follows:

Note: Keep all +24VDC wiring, resolver cable, and sensor cable wiring away from high voltage wiring. Wire the machine-mounted resolver directly to the 8-pin resolver input connector of the M4508.

- 1) Incoming Power: 115VAC-230VAC to FU1, neutral to 900 and ground to GND. Logic power (+24VDC) to 501 and common to 500. Control power (+24VDC) to 601 and common to 600.
- 2) Interlocks from existing control system (terminals I12 through I17 & I42).
- 3) Interlocks to existing control system (terminals O10 through O19).
- 4) Module fault interlock (FLT; +24VDC sink output)
- 5) Can Gate, Bad Can Blow-off and Q.C. Can Blow-off solenoids (FU2, FU3 & FU4)
- 6) Trip Cam “ON” and “off” solenoids (FU5 through FU10)
- 7) Ductor solenoids (FU11 through FU18)
- 8) Can/No Can sensor, Mandrel No.1 Mark sensor, Can on Mandrel sensor (terminals I09, I10 & I11) and Ductor Feedback sensors (terminals I40 through I47) using three conductor shielded cables. The shields of the sensor cables should be tied to earth ground at a terminal inside the existing control cabinet and left floating at the sensors.
- 9) Set-Up Enable key switch (if desired) to allow entry to set-up variables through Keypad/Display
- 10) Resolver cable from resolver (or existing PLS) to 8-pin resolver input connector on the M4508 using a three pair, two conductor shielded cable. The shield of the resolver cable should be tied to the “SHLD” terminal of the M4508 resolver input connector. Make sure the resolver cable shield is left floating at the resolver.

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2.4 MOUNTING THE HSL-QCSTA

The HSL-QCSTA is used to blow-off a can from a selected spindle (or blanket) from the pin chain for quality verification. If the optional HSL-QCSTA remote select-a-can PB station was purchased, mount it in the vicinity of the pin chain QC blow-off port in a convenient location for the operator. Wire the HSL-QCSTA to the HSL-DC5 referring to the electrical control schematic at the back of this manual.

2.5 MOUNTING THE RSV34-MS1 RESOLVER

The HSL-DC5 is designed to interface to a resolver (not encoder) for machine timing. If the machine is not already equipped with a resolver, then the existing encoder will have to be removed and a resolver mounted in its place.

Note: The resolver must make 1 revolution per 2 spindles (interposer trip), 1 revolution per 3 spindles (rotary trip).

Route the resolver cable in a separate conduit, away from all other high voltage and control wiring. Wire the cable directly to the 8-pin resolver connector on the M4508 (see section 2.3).

2.6 MOUNTING THE MANDREL #1 MARK I.D. SENSOR

If the machine has not been provided with a spindle #1 I.D. sensor, then one will have to be mounted. This sensor is used to determine which spindle is the #1 spindle for both the QC select-a-can blow-off and the trips per spindle count. This must see a target once every revolution of the spindle wheel (once every 24 spindles). Any non-discriminating 10-30VDC proximity sensor can be used and can be mounted anywhere around the periphery of the spindle wheel. The target should be either a large steel bolt head or 1" by 1" square steel target mounted on the spindle wheel in the vicinity of spindle #1.

2.7 HSL-DC5 SOFTWARE INSTALLATION

Follow the steps below to install either the Windows or DOS based setup programs and PLC application program on a PC used to support the HSL-DC5 control system.

2.7.1 WINDOWS BASED SETUP PROGRAM INSTALLATION

The APMDEC setup program is compatible with Windows 95/98/ME/2000/XP operating systems and is used to:

- Setup (tune) the user adjustable variables
- Adjust the timing channel set-points
- Download the application program to the M4508 module
- Download (restore) or upload (save) the user setup variables from the M4508
- View “Shift” and “Trips per Spindle” data

To install the set-up software, perform the following steps:

- 1) Insert the HSL-DC5 CD into the drive
- 2) From the Windows desktop, “Click” Start and then select run.
- 3) From the “Run” dialog box, “Click” the Browse button.
- 4) Select the drive with HSL-DC5 CD. Select the “setup.exe” file and “Click” Open and then Ok.
- 5) This will initiate the installation process. Follow the instructions that appear on the screen to complete the installation process. The APMDEC setup program can be executed from the “Systems” folder located in Programs.

SECTION 2 INSTALLATION

2.7.2 DOS BASED SETUP PROGRAM INSTALLATION

The HSLDC5 set-up software is used to:

- Setup (tune) the user adjustable variables
- Adjust the timing channel set-points
- Download the application program to the M4508 module
- Download (restore) or upload (save) the user setup variables from the M4508 to disk
- View “Shift” and “Trips per Spindle” data.

To install the DOS based set-up software perform the following steps:

- 1) Create a directory off the root for each decorator. These will be used to store the “HSLDC5.EXE” setup program and set-up data for each decorator.

Create a directory for each machine:

HSLDEC1 (line 1 Decorator)
HSLDEC2 (line 2 Decorator)
HSLDEC3 (line 3 Decorator)
etc.

- 1) Install the “PROGRAMS” disk into the drive. For each “HSLDEC” directory you created, at a DOS prompt:
 - Switch to that directory
 - Install the “HSLDC5” set-up program by typing the following (Line 1 decorator is shown):

CD \HSLDEC1<ENTER>
A:INSTALL<ENTER>

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- 3) Add each decorator's set-up program to your computer's menu software by creating a selection for each decorator called:
 - “SET-UP DECO LINE1” for the line #1 decorator
 - “SET-UP DECO LINE2” for the line #2 decorator
 - etc..

The DOS commands executed for these selections should be (Line 1 decorator is shown):

For the “SET-UP DECO LINE1” selection:

```
CD \HSLDEC1
HSLDC5 HSLDC5
CD \
```

- 4) To execute the respective decorator's set-up program, simply select the corresponding “SET-UP DECO LINE” selection from the menu software's menu.
- 5) Alternatively, a “PIF” file for each HSLDC5.EXE could be setup on the Windows desktop.

2.7.3 SYSDEV PROGRAM DEVELOPMENT SOFTWARE INSTALLATION

The SYSdev Program Development software is used to perform on-line trouble-shooting and program modifications to the HSL-DC5. If SYSdev was purchased with the HSL-DC5 package and is not already installed on the your computer, install SYSdev onto the hard drive of your computer following the steps in outlined in the SYSdev Program Development manual.

SECTION 2 INSTALLATION

2.7.4 APPLICATION PROGRAM INSTALLATION

The application program is a SYSdev based program, loaded into the M4508 module and performs the HSL-DC5 logic. The program is written in a combination of Ladder logic and High-level. If the user desires to make program changes or perform on-line monitoring of the program execution the files, which constitute the HSLDC5 program, will have to be loaded onto the hard drive of the PC used to support the system. The SYSdev Program Development Software will also have to be loaded on the PC. To install this program perform the following:

- 1) Install the “PROGRAMS” disk into the drive.
- 2) For each of the “HSLDEC” directories (created in section 2.7.2), copy all the files from the disk to each of these subdirectories.

2.8 MODIFY EXISTING PLC PROGRAM

Modify the existing control system PLC program to interface with the HSM-DC5 by incorporating the following into the existing PLC ladder logic:

- 1) The HSM-DC5 now controls:
 - The Can Gate Solenoid
 - Pin Chain Blow-Off Solenoids
 - Trip Cam Solenoids
 - Ductor Solenoids

If the existing host PLC was controlling these functions, this logic can optionally be removed from the existing host PLC if desired. In most cases this logic can be left in the program as connecting the respective solenoids to the HSM-DC5 will effectively defeat the logic.

- 2) The “Test Mode” can be an output from the PLC or from a push button or selector switch. The cans will then be blown off at the “Bad Can” pin chain blow-off port as long as this input is “ON”.

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- 3) The “End of Shift” can be an output from the PLC or from a push button. When the “End of Shift” input goes “ON” the current shift data is transferred to the last shift and all data registers for the current shift, as well as the trips per spindle, will be reset to zero.
- 4) Add the “Can Feed Enable” output to the PLC logic. When turned “on” while running, the infeed is timed “open” with the can feed timing signal. When turned “off” while running, the infeed is timed “closed” with the can feed timing signal. When the machine is stopped, turning this input “on” and “off” will respectively “open” and “close” the can stop.
- 5) Add the “Main Drive On” output to the PLC logic. This should be “on” when the drive is enabled (running) and should be “off” when the drive is disabled (this includes auto stop conditions). This is true for jog modes as well.
- 6) Add the “Alarm Reset” output. This signal should be “on” as long as the system reset push-button is depressed.
- 7) Add the “Pin Chain Manual Blow-off” output to the PLC logic. When “on”, the bad can pin chain blow-off is “on”. When “off”, the pin chain blow-off functions normally blowing off detected bad cans, restart cans, etc.
- 8) Add the “PLC Clock” (timing channel CH06) input to the PLC logic. This is a general purpose PLC clock timing signal, pulsed once per can.
- 9) Add the “Blow-off Data Clock” (timing channel CH07) input to the PLC logic. This is used to clock the blow-off data bits (0, 1 and 2). Use the leading edge of this signal to increment the PLC blow-off data counters. The blow-off data is encoded into a 3-bit binary code according to the following chart.

	BLOWOFF 2	BLOWOFF 1	BLOWOFF 0
None	0	0	0
Restart Blow-off	0	0	1
Q.C. Blow-off	0	1	0
Manual Blow-off	0	1	1
Bad Can Blow-off	1	0	0
Good Can	1	0	1

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- 10) The following alarms are available to the host PLC via the discrete encoded alarm bits according to the following chart.

	ALARM BIT 1	ALARM BIT 0
Timing Signal Fail	0	1
No Can Transfer	1	0
Infeed Track Jam	1	1

- 11) Add the “Canfeed Enable Speed” into the PLC logic. The canfeed enable speed comes “ON” whenever the speed of the machine is within the canfeed enable window. Use this signal to control the canfeed enable whenever this signal is “ON”.
- 12) Add the “Ductors Feedback Fault” into the PLC logic. If a ductor is not detected as cycling properly, the “Ductor Feedback Fault” is energized, indicating a problem with the ductor cycling control. If the ductor feedback sensors are used, enable the particular stations that have feedback. If the ductor feedback is not used, disable all stations that do not have feedback.

If a “Ductor Feedback Fault” does occur, the ductors should be manually activated to verify proper cycling operation, as well as, the sensor for proper feedback operation. The feedback sensor should be set such that it is only “ON” when the ductor is in contact with the fountain roll.

- 13) Add the “Ductors Auto On” into the PLC logic. This input should be “ON” whenever cans are feeding into the decorator.

2.9 TUNING THE HSL-DC5

The HSL-DC5 is shipped from the factory with the application program loaded in the PLC. In most cases, the default variables and timing signals will have to be altered to tune the HSL-DC5 to the actual decorator it is controlling.

Once the system is installed and powered back up, perform the following to set-up and tune the HSL-DC5. The set-up is performed using either the Keypad/Display or a PC running the set-up program.

See section 3 of this manual for a description of the Keypad commands and menu displays of the Keypad/Display. See sections 4 and 5 for a description of menus and variables and how to use the set-up programs.

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2.9.1 DEFAULT SET-UP VARIABLES

As shipped, the user variables for the M4508 are set the following defaults:

Speed Parameters:

Canfeed Enable - Low Speed _____: 600
Canfeed Enable - High Speed _____: 1000
O'Varnish Roll Speed Calibrate _____: 380

Pneumatic Ductor Parameters:

Maximum Cycle Duration (0.1 cans) _____: 500
Maximum "On" Duration (0.1 cans) _____: 200
Response Time Compensation (msec) _____: 25
Color Gain (CG-100% per 2000cpm) _____: 100%
Feedback Enabled _____: 1N, 2N, 3N, 4N, 5N, 6N, 7N, 8N

Bad Can (pin chain) Blowoff:

of cans to blowoff from infeed open _____: 012
of cans to blowoff from print at restart _____: 000
of cans to blowoff from varnish at restart _____: 000
of bad cans to blowoff for misload _____: 001
of pins to pin chain blowoff port _____: 032
Blowoff solenoid "on" response time (msec) _____: 015
Blowoff solenoid "off" response time (msec) _____: 028

QC Can (select-a-can) Blowoff:

Blowoff solenoid "on" response time (msec) _____: 015
Blowoff solenoid "off" response time (msec) _____: 028
QC can blowoff port shift offset _____: 001

Spindle Trip Offset _____: 000

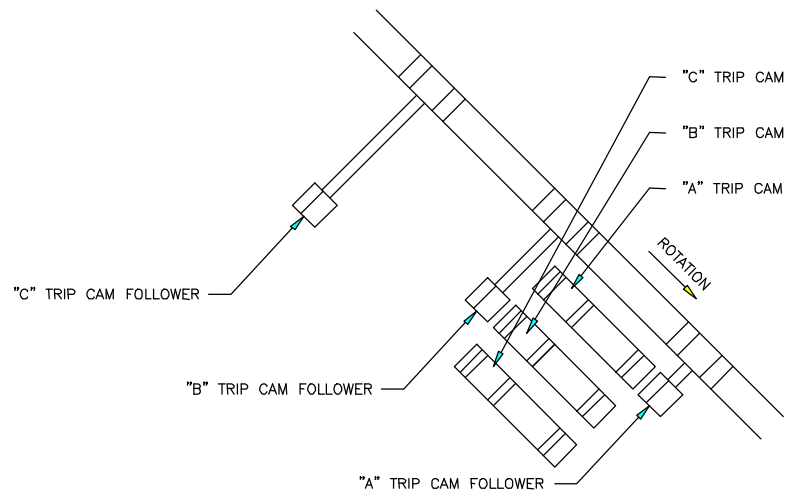
Timing Setpoints:

Bad Can blowoff "ON" position _____: 180°
Q.C. blowoff timing "ON" position _____: 185°
Can Gate timing "ON" position _____: 0°

2.9.2 SET MACHINE ZERO

To zero the machine (set resolver offset) perform the following:

- 1) Enter the “Set-Up” menu by pressing the “SET-UP” key of the Keypad/Display.
- 2) Select “6: VERIFY CAN PRX1 LOCATION/TIMING” and observe the “ACTUAL ABSOLUTE POS:” field. Verify that as the machine is rotated forward (either jogged or barred) that the position increases linearly from 0 through 1079 for “Rotary Trip” Machines or 0 through 719 for interposer trip machines. If not, swap the S1 and S3 leads of the resolver at the M4508 resolver connector. Then verify that the position then indeed does increase with forward movement. Press <ESC> to return to the primary set-up menu.
- 3) Position the machine at machine zero (“A” trip cam follower just past “A” trip cam, (see figure below).



- 4) Auto zero the resolver by selecting “5: ZERO MACHINE” from the primary set-up menu of the Keypad/Display. Enter “0” to zero the resolver. The “VERIFY CAN PRX” menu will be displayed, now showing the “ACTUAL ABSOLUTE POS:” at zero.
- 5) The M4508 will calculate the actual offset value required to make this the 000 position and will display this number in the offset field.

SECTION 2 INSTALLATION

- 6) Return to the primary set-up menu by pressing the <ESC> key.
Return to the default screen by pressing the <ESC> key again.

2.9.3 VERIFY LOCATION OF CAN/NO CAN SENSOR

Verify the location of the “Can/No Can” sensor by placing a can on an “A” spindle and performing the following:

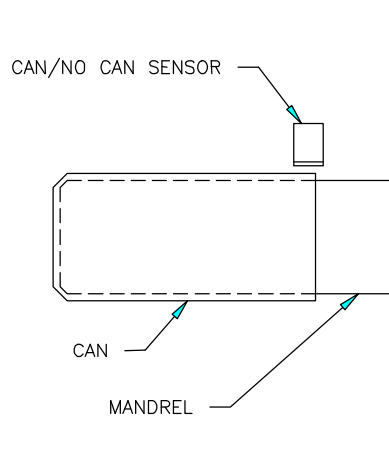
- 1) Enter the “Set-Up” menu by pressing the “SET-UP” key of the Keypad/Display.
- 2) Select “6 VERIFY CAN PRX1 LOCATION/TIMING”.
- 3) Locate the machine with an “A” spindle approximately under the “Can/No Can” sensor. The “Can/No Can” sensor is located approximately at the “One O’clock” position of the spindle wheel (see sheet 2 of the electrical timing procedure drawing at the back of this manual).
- 4) Locate the machine to the exact location, defined as follows:

Rotary Trip Type Machines: Locate the machine at exactly 990 degrees as displayed in the “Actual Absolute POS” field of the Keypad/Display.

Interposer Trip Type Machines: Locate the machine at exactly 630 degrees as displayed in the “Actual Absolute POS” field of the Keypad/Display.

SECTION 2 INSTALLATION

- 5) The “Can/No Can” sensor should be centered radially over an “A” spindle at this position. The sensor should be located axially on the spindle such that the sensor will “See” the top (open end of can) only if it is fully loaded on the spindle.



Location of “Can/No Can” Sensor

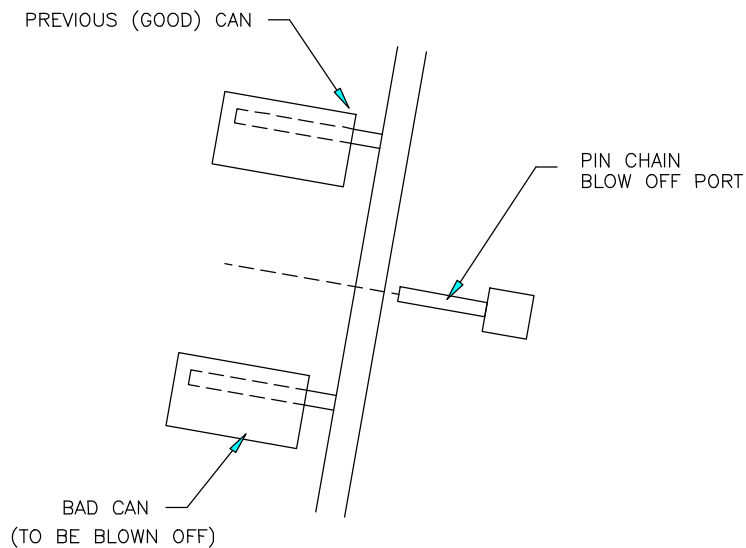
- 6) If necessary, adjust the “Can/No Can” sensor to achieve the location relative to an “A” spindle as described above.

SECTION 2 INSTALLATION

2.9.4 SET PIN CHAIN BLOW-OFF TIMING “ON” POSITION

This timing signal should just turn “ON” when the pin chain blow-off port is centered between pins on the pin chain. To set either the “Bad Can Blow-off” or “Q.C. Blow-off” timing “ON” position, perform the following:

- 1) Locate the machine with the blow-off solenoid centered between pins on the pin chain (as shown below).



“ON” Position of Pin Chain Blow-off Solenoid

- 2) This is the “ON” position for the blow-off solenoid. This position will be different for the “Bad Can Blow-off” and “Q.C. Blow-off” solenoids.

Warning: The blow-off “ON” timing can not be set within +/- 20 degrees of the Cam Reset timing (CH03 set at 320 degrees). If the optimum position for the blow-off “ON” set-point is within this window (300 to 340 degrees), the blow-off must be physically moved approximately 1 inch from its current location. The blow-off “ON” position timing can then be properly set.

2.9.5 SET CAN GATE TIMING “ON” POSITION

This signal is used to open and close the can gate. Adjust the “ON” position for proper can gate operation.

2.9.6 SET CANFEED ENABLE SPEED

Set the “Canfeed Enable Low Speed” and “Canfeed enable High Speed” in conjunction with one another to define a window within which the can gate can be opened or closed. This allows the flow of cans to be controlled whenever the machine speed is inside this window. When the machine goes to a stand-by condition, the speed of the machine will need to be decreased inside this window for the can gate solenoid to be deactivated. The M4508 will activate/deactivate the can gate solenoid on the “Can Gate Timing ON” signal.

2.9.7 SET NUMBER OF PINS TO PIN CHAIN BLOWOFF PORT

Set the “# of pins to pin chain blowoff port” by counting the number of pins from the spindle wheel to disc transfer location to the bad can pin chain blowoff port. The number entered is the number counted minus 2 (this is just an approximation).

Set the “# of bad cans to blow-off for each misload” equal to one. Run the machine at low speed with cans and verify that for each misload, the one bad can is blown off. If the bad can is not blown off then adjust the “# of pins to pin chain blow-off port” accordingly until the misloaded can is blown off.

Note: On this system, only one can is normally blown off for each misload on a particular mandrel. However, the end user may select to blow-off up to five cans to get rid of the excess ink on a particular blanket. The chain take-up must be after the bad can pin chain blow-off. If the take-up is before the port, the relative position of the port to the blow-off timing will vary as the take-up moves, causing partial blow-offs to occur.

SECTION 2 INSTALLATION

2.9.8 SET SPINDLE TRIP SHIFT OFFSET

Set the “Spindle Trip Shift Offset” as follows:

- 1) Initially set the “Spindle Trip Offset” to zero.
- 2) Wrap a piece of tape around spindle #1 such that cans will not load on this spindle.
- 3) Run the machine very slowly with the can gate open and verify that indeed cans do not load on spindle #1 and that the #1 spindle is tripped.
- 4) Observe the trips per spindle data and determine which spindle number is being incremented every time the #1 spindle trips. The spindle number that should be incrementing is spindle #1. If it is not, subtract 1 from the spindle number that is being incremented and enter this value as the spindle trip offset (this variable must be a number between 0 and 23 or 35).
- 5) Now verify that the spindle #1 count is incremented every time the #1 spindle trips. If it still increments another spindle number other than #1, continue adjusting the “Spindle Trip Offset” until it does, then stop the machine and remove the tape from spindle #1.

2.9.9 SET QC BLOW-OFF OFFSET

Set the “QC Can Blowoff Port Shift Offset” as follows:

- 1) Dial in spindle #1 on the select-a-can thumb wheel switch.
- 2) Run the machine slowly and mark cans printed on spindle #1 so they can be identified while they are on the chain.
- 3) Press the select-a-can push-button and observe the can blown off with the location of a can printed on spindle #1.
- 4) Add the number of cans difference between the can actually blown off and the can printed on spindle number one to the “QC can blowoff port shift offset”.

SECTION 2 INSTALLATION

Note: This variable must be a number between 1 and 24 or 36, as there is always a can printed on spindle #1 every 24 or 36 cans. Once set-up, verify that a can from spindle #1 is blown off when 1 is dialed in on the thumb wheel and the select-a-can push-button is pressed.

2.9.10 SET NUMBER OF CANS TO BLOW-OFF

Set the number of cans to blow-off as desired.

Cans to Blow-Off for Each Mis-Load: This is the number of cans blown off at the pin chain port when a mis-loaded can is detected (typically set at 1 can). Any additional cans entered, will be blown off every 12th can later (cans printed on the same blanket).

Cans to Blow-off at Infeed Open: This is the number of cans blown off when the infeed is first opened. Valid range: 0 to 99.

Cans to Blow-off from Print at Restart: This is the number of cans blown off from the print station when the machine is restarted. Valid range: 0 to 99.

Cans to Blow-off from Varnish at Restart: This is the number of cans blown off from the varnish station when the machine is restarted. Valid range: 0 to 99.

SECTION 2 INSTALLATION

2.9.11 SET PIN CHAIN BLOW-OFF SOLENOID RESPONSE TIMES

Pin Chain (bad can and QC) Blow-off Solenoid “ON”

Response Time (msec): This is the time used as the “ON” response time of the pin chain blow-off port (time from solenoid actuation to first air out port) in milliseconds. The M4508 will activate the solenoid this amount of time ahead of the Pin Chain blow-off “ON” position (usually set at 15 to 20 milliseconds). Valid range: 5 to 60 msec.

Pin Chain (bad can and QC) Blow-off Solenoid “off”

Response Time (msec): This is the time used as the “off” response time of the pin chain blow-off port (time from solenoid “off” actuation to air stopping at port) in milliseconds. The M4508 will activate the solenoid “off” this amount of time ahead of the Pin Chain blow-off “ON” position (usually set at 15 to 20 milliseconds for double acting solenoids and set at 25 to 30 milliseconds for single acting solenoids). Valid range: 5 to 60 msec.

2.9.12 SET O’VARNISH ROLL SPEED CALIBRATE

The O’Varnish drive speed input is a 0-10VDC signal from the O’Varnish drive (if available). The roll speed calibrate is used to scale this signal to display the “O’Varnish RPM”. The number entered should equal the O’Varnish roll speed when the drive is at full speed (input = 10VDC).

THE MACHINE IS NOW SET-UP AND READY TO RUN!

2.10 M4508/P4500/D4591 INSTALLATION

The following is provided only as a reference. These steps are performed by the factory prior to shipping the HSL-DC5. These steps need only be performed in the event either the M4508 module, P4500 power supply, or D4591 display need to be replaced. Refer to the M4500 User's Manual for general details on installing the M4508, P4500, and D4591.

2.10.1 M4508 MODULE INSTALLATION

To install the M4508 module, perform the following:

- 1) Remove the cover from the M4508 chassis (retained with three captive screws on the lower front of the cover and two captive screws on each side of the M4508 chassis).
- 2) Install S4563 (SLOT0-0): Set the slot address dip switches (SW1) on the S4563 to the following positions (slot0):

S4563: SW1 switch1 = "OFF"
 SW1 switch2 = "OFF"

Install the S4563 in Slot0-0 (furthest left slot) of the M4508 chassis.

- 3) Install S4573 (SLOT0-1): Set the slot address dip switches (SW1) on the S4573 to the following positions (slot1):

S4573: SW1 switch1 = "ON"
 SW1 switch2 = "OFF"

Install the S4573 in Slot0-1 (slot next to S4563) of the M4508 chassis.

SECTION 2 INSTALLATION

- 4) Install S4573 (SLOT0-2): Set the slot address dip switches (SW1) on the S4573 to the following positions (slot2):

S4573: SW1 switch1 = "OFF"
SW1 switch2 = "ON"

Install the S4573 in Slot0-2 (slot next to S4573) of the M4508 chassis.

- 5) Install S4573 (SLOT0-3): Set the slot address dip switches (SW1) on the S4573 to the following positions (slot3):

S4573: SW1 switch1 = "ON"
SW1 switch2 = "ON"

Install the S4573 in Slot0-3 (slot next to S4573) of the M4508 chassis.

- 6) Install the cover back over the M4508, making sure all the board connectors protrude the slots in the cover. Tighten the three captive screws on the lower front of the cover and the two captive screws on each side of the M4508 chassis.
- 7) Connect the display ribbon cable to the connector on the back of the M4508 (the connector on the cable is polarized and should mate with the connector on the M4508 only one way).
- 8) Mount the M4508 chassis to the HSL-DC5 back panel using four 8-32 screws.
- 9) With power to the P4500 "off", install the P4500 power supply cable to the +5/C/+12/C/-12 connector on the M4508 (the connector on the cable is polarized and should mate with the connector on the M4508 only one way).
- 10) Install the respective field wiring arms on all the I/O boards of the M4508 (I/O slots0 thru 3, resolver connector, and IN0/IN1 connector). Make sure all field wiring connectors are fully mated in the M4508.

2.10.2 P4500 POWER SUPPLY INSTALLATION

To install the P4500, perform the following steps:

- 1) Mount the P4500 to the HSL-DC5 in the mounting holes next to the M4508 (left side) using two 8-32 screws.
- 2) With power to the P4500 “off”, install the P4500 power supply cable to the +5/C/+12/C/-12 connector on the M4508 (the connector on the cable is polarized and should mate with the connector on the M4508 only one way).

2.10.3 D4591 KEYPAD/DISPLAY INSTALLATION

To install the D4591, perform the following steps:

- 1) With the gasket installed on the mounting studs of the D4591, install the D4591 in the cut-out in the user's existing control cabinet. Secure the display to the enclosure using 7ea. 8-32 nuts and external lock washers.
- 2) Connect the display ribbon cable to the connector on the lower back of the display (the connector on the cable is polarized and should mate with connector on the M4508 only one way).

SECTION 2 INSTALLATION

2.10.4 DOWNLOAD HSLDC5 PROGRAM AND SET-UP DATA TO M4508

Once the M4508/P4500/D4591 are installed, perform the following to download the HSLDC5 application program to the M4508 as well as download the previously saved set-up data and timing channel set-points:

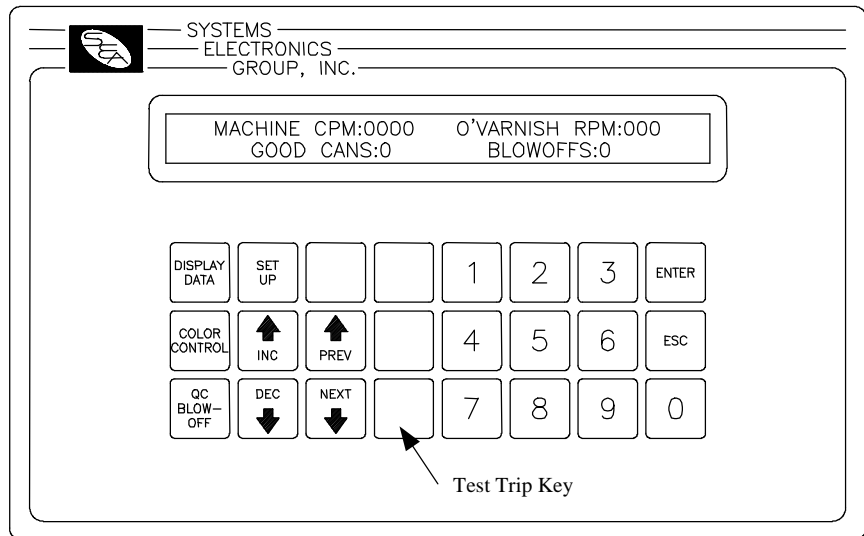
- 1) Power up the M4508 and the PC used to interface with the HSLDC5.
- 2) Connect an RS-232 cable from the computer COM port to the “PROG” port on the M4508.
- 3) Initiate the respective setup program (APMDEC for Windows systems, HSLDC5.exe for DOS systems).
- 4) Download the HSLDC5 application program to the M4508. See section 4.2.3 for Windows based systems, see section 5.8 for DOS.
- 6) Download the previously saved set-up data to the M4508. See section 4.2.4 for Windows based systems, section 5.9 for DOS.
- 7) The M4508 is now ready to run, loaded with HSLDC5 application program, timing set-points, and set-up data.

Note: Double check the machine zero position and re-zero the resolver if necessary, prior to running the machine.

SECTION 3

USING THE KEYPAD/DISPLAY

The D4591 Keypad/Display contains 24 keys consisting of data display commands, set-up commands, and a numeric keypad. The display is a 2 line by 40 character back-lit LCD display which displays the selected data and set-up menus. The Keypad/Display can be used to view data, adjust the timing and all set-up parameters, activate the select-a-can QC blow-off and adjust the pneumatic ductor color control parameters.



The Keypad/Display allows the following to be viewed or adjusted:

- 1) Set Speed Parameters
- 2) Set Pneumatic Ductor Parameters
- 3) Set Pin Chain/QC Blow-off Parameters
- 4) Set Machine Timing
- 5) Set Machine Zero
- 6) Verify Location of Can/No Can Sensor
- 7) View the Number of Trips per Spindle
- 8) View the Current Shift Data
- 9) View the Last Shift Data
- 10) View Lifetime Can Count
- 11) View Ductor Feedback Status
- 12) Activate the select-a-can QC blow-off
- 13) Adjust the Color Control Parameters

The definitions of the keypad commands and menus are described in the following sections.

SECTION 3

USING THE KEYPAD/DISPLAY

Note: For virtually all the menus, the “NEXT” and “PREV” keys can be used to advance to the next or previous parameter respectively. To change the currently displayed parameter, simply enter the new value on the numeric keypad and press <ENTER>. The value will be entered and the next parameter will automatically be displayed. When the last parameter in a section is entered, the primary set-up menu is again displayed. Pressing <ESC> at anytime will exit back to the primary set-up menu.

3.1 DEFAULT SCREEN

The default screen (displayed when no other commands are active) contains the following data:

MACHINE CPM:0000	O'VARNISH RPM:000
GOOD CANS:0	BLOWOFFS:0

“Machine Speed” is the current speed of the decorator. “O’Varnish RPM” is the current speed of the varnish unit. “Good Cans” field is the total number of good cans printed so far into the current shift, and the “Blow-offs” field is the total number of cans blown-off the machine (scrap) so far into the current shift. This display effectively replaces a speed meter, and two can counters. This screen is always returned to when no commands are active.

3.2 “DISPLAY DATA” KEY

This selection is used to invoke the primary display data menu. This consists of the following selections:

- 1: DISPLAY TRIPS PER SPINDLE DATA
- 2: DISPLAY CURRENT SHIFT DATA
- 3: DISPLAY LAST SHIFT DATA
- 4: DISPLAY LIFETIME CAN COUNT
- 5: DISPLAY DUCTOR FEEDBACK STATUS

When selected, each of the above selections will bring up a sub-menu with the corresponding data. The following sections describe these sub-menus and the definitions of the corresponding data.

SECTION 3

USING THE KEYPAD/DISPLAY

To select the respective sub-menu, simply press the corresponding numeric key (1 through 5).

3.2.1 TRIPS PER SPINDLE DATA

The Number of trips per spindle menu is provided to aid in the trouble-shooting of a loading problem with a spindle or spindles. The total number of trips for each spindle since the last reset or end of shift is displayed. The operator can reset these counts at any time to aid in the trouble-shooting process. The data can be viewed simply by pressing this key. The display shows a series of screens each with four spindles from 1 through 24 or 36 as shown below:

-- TRIPS (MIS-LOADS) PER SPINDLE --
1:xxxx 2:xxxx 3:xxxx 4:xxxx

Where the numbers 1 through 4 are the first 4 spindles and the “xxxx” would be the actual counts for the respective spindles. Screens for the rest of the spindles are shown in this fashion, each for a time delay of 10 seconds.

The final screen prompts the user to reset the counts by pressing “0” or press “ESC” to return to the main menu. This provides the operator with the opportunity to reset the counts if desired.

The “ESC” key can also be used at any time to abort the trips per spindle data display and return to the default screen.

SECTION 3

USING THE KEYPAD/DISPLAY

3.2.2 CURRENT SHIFT DATA

The “Current Shift” data is the totals so far into the current shift. The data is transferred to the “Last shift” when the end of shift input transfers from a “0” to a “1”. This can be at the end of either an 8 or 12 hour shift or alternatively could be done at label changes such that the data collected would be for label runs rather than complete shifts. This data cannot be reset by the operator, only at the end of shift transition. **Note:** The Current shift “Good Cans” and “Blow-offs” is displayed as part of the default screen (see section 3.1 – Default Screen, Using the Keypad/Display).

The Current Shift data is defined as follows:

Good Cans: This is the total number of good cans printed so far into the shift. This is essentially a can counter.

Blow-offs: This is the total number of cans blown-off the machine. This includes all types of blow-offs: cans blown-off for every mis-loaded can, infeed open blow-offs, restart blow-offs, manual blow-offs, select-a-can QC blow-offs, etc.

Mis-loads: This is the total number of mis-loaded cans (trips). These would be the actual number of damaged cans that did not load properly on the machine. This gives an indication of conveying/can handling problems.

Restart Blow-offs: This is the total number of cans blown off when the infeed opened and from the print station and varnish station at machine restart.

Manual Blow-offs: This is the total number of cans blown-off by the operator using the Manual Blow-off PB or selector switch.

QC Blow-offs: This is the total number of cans blown-off by the operator with the Select-A-Can QC station or QC Blow-off key on the D4591 keypad for quality verification.

Trips (Mis-loads) per Spindle (1:-24 or 36:): This is the total trips (mis-loads) for each spindle. A disproportionately high count for a particular spindle indicates a loading problem for that spindle.

SECTION 3

USING THE KEYPAD/DISPLAY

3.2.3 LAST SHIFT DATA

The “Last Shift” data is identical to the current shift data except it is for the previous 8 or 12 hour shift or previous label run, however the shift collection is set-up. This allows data collection and diagnostics to take place automatically over a two shift period. Refer to section 3.2.2, (Current Shift Data, Using the Keypad/Display) for definitions of the data fields in the “Last Shift” data menu.

3.2.4 DISPLAY “LIFETIME” CAN COUNT

The lifetime can count is used to display the total number of cans printed by the machine. This count is never reset and displays in 1,000 can increments.

3.2.5 DISPLAY DUCTOR FEEDBACK STATUS

The ductor feedback status display is used to view the state of the ductor solenoids in conjunction with the status of the feedback sensors. As the machine is running, the cycling of the ductor solenoids, as well as the status of the feedback sensors can be viewed. With the machine stopped and the ductor control in “Manual”, the numeric keys (1 through 8) can be used to activate the individual solenoids. This can be used to verify the operation of the ductor solenoid, as well as the status of the feedback sensor.

SECTION 3

USING THE KEYPAD/DISPLAY

3.3 “SET-UP” KEY

This selection is used to invoke the primary set-up menu. This consists of the following selections:

- 1: SET SPEED PARAMETERS
- 2: SET PNEUMATIC DUCTOR PARAMETERS
- 3: SET PIN CHAIN/QC BLOW-OFF PARAMETERS
- 4: SET MACHINE TIMING (SET-POINTS, ETC.)
- 5: ZERO MACHINE (SET RESOLVER OFFSET)
- 6: VERIFY CAN PRX1 LOCATION/TIMING
- 7: VIEW CRITICAL INPUT POSITIONS

When selected, each of the above selections will bring up a sub-menu with the corresponding set-up parameters. The following sections describe these sub-menus and the definitions of the corresponding variables. To select the respective set-up sub-menu, simply press the corresponding numeric key (1 through 7).

Note: The “Set-Up Enable” input is used to enable the primary set-up menu. When this input is “on”, the primary set-up menu is enabled through the Keypad/Display. If the “Set-Up Enable” input is “off”, then the primary set-up menu is bypassed.

3.3.1 SET SPEED PARAMETERS

This menu is activated when the “1” key (SET SPEED PARAMETERS) is pressed while the primary set-up menu is active. The following four set-up parameters may then be adjusted or viewed:

Canfeed Enable Speed: The “Canfeed Enable Low Speed” and “Canfeed Enable High Speed” are used in conjunction with one another to define a window within which the can gate can be opened or closed. This allows the flow of cans to be controlled whenever the machine speed is inside this window. This window should be set for optimal loading conditions.

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USING THE KEYPAD/DISPLAY

O’Varnish Roll Speed Calibrate: The O’Varnish drive speed input is a 0-10VDC signal from the O’Varnish drive (if available). The roll speed calibrate is used to scale this signal to display the “O’Varnish RPM”. The number entered here should equal the O’Varnish roll speed when the drive is at full speed (input = 10VDC).

3.3.2 SET PNEUMATIC DUCTOR PARAMETERS

This menu is activated when the “2” key (SET PNEUMATIC DUCTOR PARAMETERS) is pressed while the primary set-up menu is active.

See section 6, (Pneumatic Ductor Color Control) for a complete description of set-up and tuning of the ductor control system.

3.3.3 SET PIN CHAIN/QC BLOW-OFF PARAMETERS

This menu is activated when the “3” key (SET PIN CHAIN / QC BLOW-OFF PARAMETERS) is pressed while the primary set-up menu is active. The following blow-off set-up parameters may then be adjusted or viewed:

Cans to Blow-off at Infeed Open: This is the number of cans that will be blown off when the infeed is first opened. Valid range: 0 to 99.

Cans to Blow-off from Print at Restart: This is the number of cans that will be blown off from the print station when the machine is restarted. Valid range: 0 to 99.

Cans to Blow-off from Varnish at Restart: This is the number of cans that will be blown off from the varnish station when the machine is restarted. Valid range: 0 to 99.

Cans to Blow-off for each Misload: This is the number of cans blown off at the pin chain port when a mis-loaded can is detected (typically set at 1 can). Any additional cans entered, will be blown off every 12th can later (cans that would be have been printed on the same blanket).

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USING THE KEYPAD/DISPLAY

Pins to Pin Chain Blow-off Port: This is the number of pins from the spindle wheel to disk transfer location to the first can blown off at the Pin Chain blow-off port minus two. This can be a number from 0 to 999.

Pin Chain (bad can) Solenoid “on” Response Time (msec):

This is the time used as the “on” response time of the pin chain blow-off port (time from “on” solenoid actuation to first air out port) in milliseconds. The M4508 will activate the solenoid “ON” this amount of time ahead of the Pin Chain blow-off “ON” position (usually set at 15 to 20 milliseconds). Valid range: 5 to 60 msec.

Pin Chain (bad can) Solenoid “off” Response Time (msec):

This is the time used as the “off” response time of the pin chain blow-off port (time from “off” solenoid actuation to air stopping at port) in milliseconds. The M4508 will activate the solenoid “OFF” this amount of time ahead of the Pin Chain blow-off “ON” position (usually set at 15 to 20 milliseconds for double acting solenoids and set at 25 to 30 milliseconds for single acting solenoids). Valid range: 5 to 60 msec.

QC Blow-off Solenoid “on” Response Time (msec): This is the time used as the “on” response time of the QC blow-off port (time from “on” solenoid actuation to first air out port) in milliseconds. The M4508 will activate the solenoid “ON” this amount of time ahead of the QC blow-off timing “ON” position (usually set at 15 to 20 milliseconds). Valid range: 5 to 60 msec.

QC Blow-off Solenoid “off” Response Time (msec): This is the time used as the “off” response time of the QC blow-off port (time from “off” solenoid actuation to air stopping at port) in milliseconds. The M4508 will activate the solenoid “OFF” this amount of time ahead of the QC blow-off timing “ON” position (usually set at 15 to 20 milliseconds for double acting solenoids and set at 25 to 30 milliseconds for single acting solenoids). Valid range: 5 to 60 msec.

QC Blow-off Shift Offset: This is the number of spindles difference from detection of the spindle #1 flag to the QC blow-off port. This is a number between 1 and 24 (or 36) and is empirically set by selecting spindle #1 for blow-off and adjusting this value until the can from spindle #1 is the can that is blown off.

SECTION 3
USING THE KEYPAD/DISPLAY

Spindle Trip Shift Offset: This is the number of spindle difference from the detection of the spindle #1 flag to the Can/No Can sensor. This is a number between 0 and 23 (or 35) and is empirically such that a mis-loaded can on spindle #1 increments the spindle #1 count in the “Trips per spindle” menu (see section 2.9.8 – Set Spindle Trip Shift Offset, Tuning the HSL-DC5).

3.3.4 SET MACHINE TIMING

This selection brings up the timing set-point menu which displays the following fields:

“channel description” “ON” POSITION: XXX
RPM:yyyy POS:zzz OFFSET:www SCALE:360

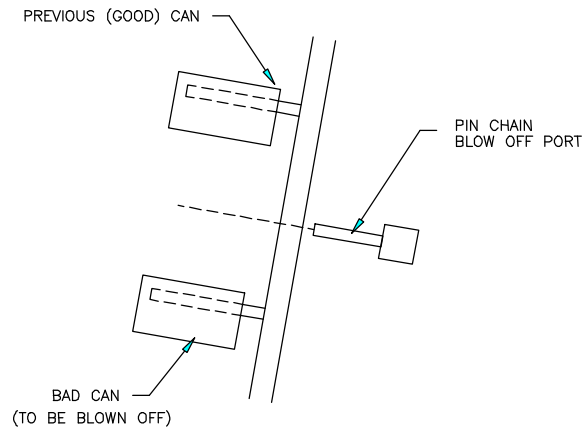
Each field is defined as follows:

<u>Field</u>	<u>Definition</u>
POSITION: xxx	Leading Edge of the “ON” Position for the Timing Setpoint.
“channel description”	Selected Timing Set-point Description.
RPM: yyyy	Current Main Drive Speed where “yyyy” is in Main Motor RPM.
POS: zzz	Current Resolver Position where “zzz” is in Degrees (0-359 degrees).
OFFSET: www	Resolver Offset where “www” is the Offset in Degrees.
SCALE: 360	Resolver SCALE FACTOR (360 degrees per Mandrel).

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USING THE KEYPAD/DISPLAY

Bad Can Blowoff “ON” Position: Set this signal to turn “ON” when the pin chain blow-off port is centered between pins on the chain, (see figure below).



Q.C. Blow-off Timing “ON” Position: Set this signal to turn “on” when the select-a-can chain blow-off port is centered between pins on the chain, (see figure above).

Can Gate Timing “ON” Position: This signal is used to open and close the can gate. Adjust the “ON” Position for proper can gate operation.

Warning: The blow-off “ON” timing can not be set within +/- 20 degrees of the Cam Reset timing (CH03 set at 320 degrees). If the optimum position for the blow-off “ON” set-point is within this window (300 to 340 degrees), the blow-off must be physically moved approximately 1 inch from its current location. The blow-off “ON” position timing can then be properly set.

3.3.5 ZERO MACHINE (SET RESOLVER OFFSET)

This selection is used to auto zero the resolver. Follow the instructions in section 2.9.2, (Set Machine Zero, M4508 Set-Up) to position the machine at machine zero.

Press the “0” key on the numeric keypad to set the resolver offset. The M4508 will calculate the actual offset value required to make this the 000 position and display this number in the offset field of the machine timing menu

3.3.6 VERIFY CAN PRX LOCATION/TIMING

This selection is used to verify the location of the “Can/No Can” sensor.

Interposer Trip Type Machines: This location is 630 degrees as displayed in the “Actual Absolute POS” field of the Keypad/Display.

Rotary Trip Type Machines: This location is 270 degrees as displayed in the “Actual Absolute POS” field of the Keypad/Display.

See section 2.9.3, (Verify Location of Can/No Can Sensor) for setting the location and timing of the “Can/No Can” sensor.

3.3.7 VIEW CRITICAL INPUT POSITIONS

This selection is used to view the location of the “ON” position of the “Can/No Can” sensor (360 degree reference mandrel to mandrel).

Misloaded cans are clocked into the “Bad Can” shift register at the leading edge of the “Cam Reset” timing (CH03 – set at 320 degrees). The “ON” Position of the “Can/No Can Sensor” can be anywhere from 0 to 280 degrees. If the “ON” position is outside this range, the physical position of the sensor should be moved such that the sensor first sees the “Can” between 0 and 280 degrees.

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USING THE KEYPAD/DISPLAY

3.4 “QC BLOW-OFF” KEY

This key is used to blow-off a can, from a selected spindle, at the pin chain “QC Blow-off” port. To blow-off a can, press the “QC BLOW-OFF” key. The display will then prompt “Enter Spindle to Blow Can off:”. Enter the desired spindle number (1-24 or 1-36) and press enter. One can from that spindle will be blown off at the Pin Chain QC blow-off port.

3.5 SET “COLOR CONTROL” KEY PASSCODE

The “Set Passcode” input to the M4508 is used to set or view the passcode of the “Color Control” menu. Normally this input is “off”.

To set the passcode, jumper +24VDC to this input and press the “Color Control” key. The “ENTER PASSCODE” prompt will be displayed, as well as, the current 5-digit passcode. This allows the passcode to be viewed if necessary.

To change the passcode, enter any number from 1 to 64999 and press <ENTER>.

Note: Set the passcode to “0” to disable passcode protection. When the passcode is prompted for after the “Color Control” key is pressed, simply press <ENTER> to proceed to the color control menu. To enable passcode protection, set the passcode to a number from 1 to 64999. When the “Color Control” key is pressed, the actual valid passcode number will have to be entered in order to gain access to the color control menu.

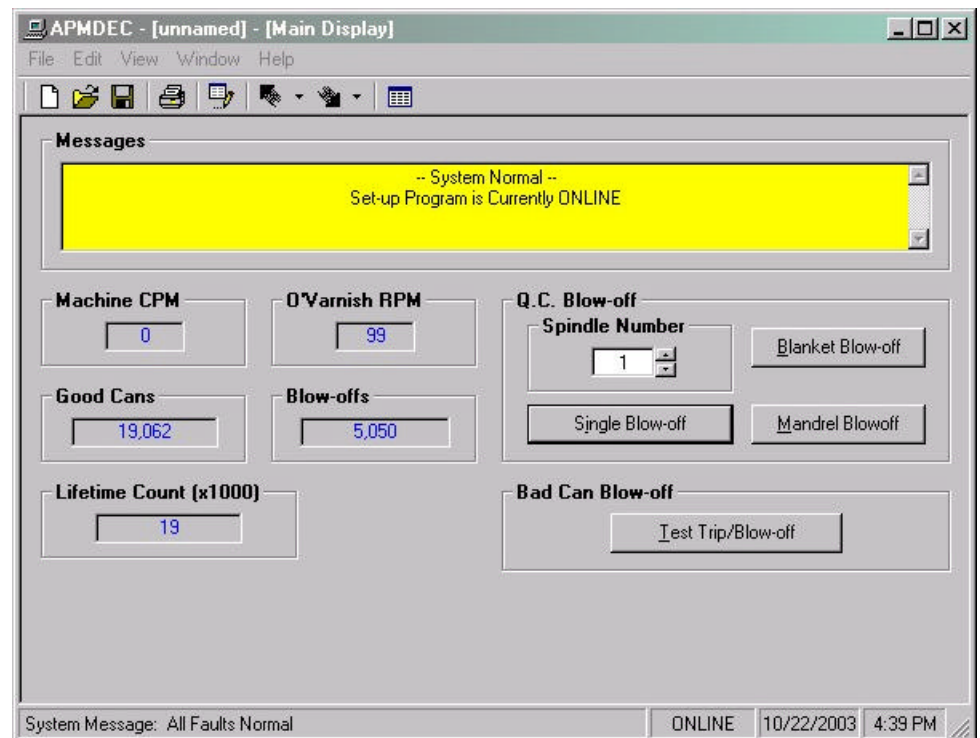
Once the passcode is set, turn the “Set Passcode” input “off” and the set-up menu will be passcode protected with the number entered.

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“APMDEC” WINDOWS BASED SETUP PROGRAM REFERENCE

The Windows based set-up program is menu driven, allowing the user to easily view data, alter set-up variables or set machine timing (machine offset, timing signal locations, etc.), using a PC running the Windows (95/98/ME/2000/XP/NT) operating system. The set-up variables are used to configure and tune the HSL-DC5 to match the configuration and performance of the specific decorator (see section 2.9 – Tuning the HSL-DC5, Installation).

Note: The set-up program is an on-line communications program used to interface with the M4508 module. The data displayed and set in the windows is communicated directly to the module, while in the “Online” edit mode. Therefore, prior to going online with the processor, make sure an RS-232 cable is connected from the COM port on the computer to the “PROG” port on the M4508. The variables displayed while in the “Online” edit mode are read directly from the processor. Data is saved to a “Set-up Data” file (*.sdt) whenever changes are made to a parameter or if the data is uploaded from the processor.



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“APMDEC” WINDOWS BASED SETUP PROGRAM REFERENCE

4.1 GENERAL DESCRIPTION

Title Bar: At the top of the window is the “Title Bar”. The title bar is used to display the name of the working “Set-up Data” file, as well as, the name of the active “Window”. The title bar is dark if the window is active and grayed if another window is active. The color depends on the settings of the Display Properties of the Control Panel.

Tool Bar: At the top of the window is the “Tool Bar”. The tool bar allows the user to quickly execute those functions most often used. These functions can also be executed from the drop down menus at the top of the window. The following functions can be executed from the tool bar:



New... This creates a completely new “Setup” file, loaded with the default variables and the word “[unnamed]” is displayed in the title bar. If any changes were made to the existing file, the user is prompted to save changes to the existing file.



Open... This displays a dialog box allowing the user to select an existing setup data file to open. The name of the file will be displayed in the title bar.



Save This displays a dialog box allowing the user to select a folder and enter a name for the file. The user will be notified if the file already exists and the extension “.sdt” will automatically be added to the file name. If this is a “New” file, the user will be prompted to enter a file name.



Print This allows the user to generate a “Report” printout of all set-up parameters, shift data and label data settings contained in the current setup data file.



Offline Edit This function allows the user to perform “Offline” editing on the current set-up data file. The user is able to make any necessary changes to the set-up parameters and label data settings while not online with the processor.

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Upload (save) Settings This allows the user to upload set-up parameters, shift data and label data settings from the M4508 into a “Set-up Data” file. Selecting this button will upload “All” the set-up parameters, shift data values and label data settings. The user has the option of selecting the associated button menu to upload only the set-up parameters or shift data or label data settings.



Download (restore) Settings This allows the user to download set-up parameters, shift data and label data settings to the M4508 from a “Set-up Data” file. Selecting this button will download “All” the set-up parameters, shift data values and label data settings. The user has the option of selecting the associated button menu to download only the set-up parameters or shift data or label data settings.



Target Board Interface This allows the user to view fault codes, S3000 network communication error codes and review the current “Ident” and “Revision” of the application program.

Status Bar: At the bottom of the window is the “Status Bar”. The status bar is used to display system messages, online or offline mode, as well as, the current time and date as set by the operating system. The system messages panel displays general information about operation of the system. The Online/Offline mode panel displays the status of the current set-up program mode of operation. The mode of operation can be changed by simply double clicking the online/offline mode panel.

Hot Keys: Hot keys are activated by holding down the “ALT” key and simultaneously pressing the underlined letter of the desired function. Almost every function can be activated by either pressing a series of hot keys or using the “TAB” key to move between fields.

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Online/Offline Modes: The set-up program allows the user to make changes while “Online” with the processor. The “Offline” mode is used to preset parameters prior to download. All functions are available to the user while “Online”, however, specific “Online” functions are disabled in the “Offline” edit mode.

Note: Offline changes can only be made by enabling “Offline Editing”, accessed under the “Edit” menu.

Getting Help: The entire contents of this “User’s” manual, is contained within the help file. Pressing Ctrl+H will display the help file window. Pressing the F1 key will display the contents file. Hot spots allow jumps to other topics to display additional information as desired.

Selecting “About APMDEC” from the Help menu will display a dialog box listing information about the current revision of the setup program and how to obtain technical support.



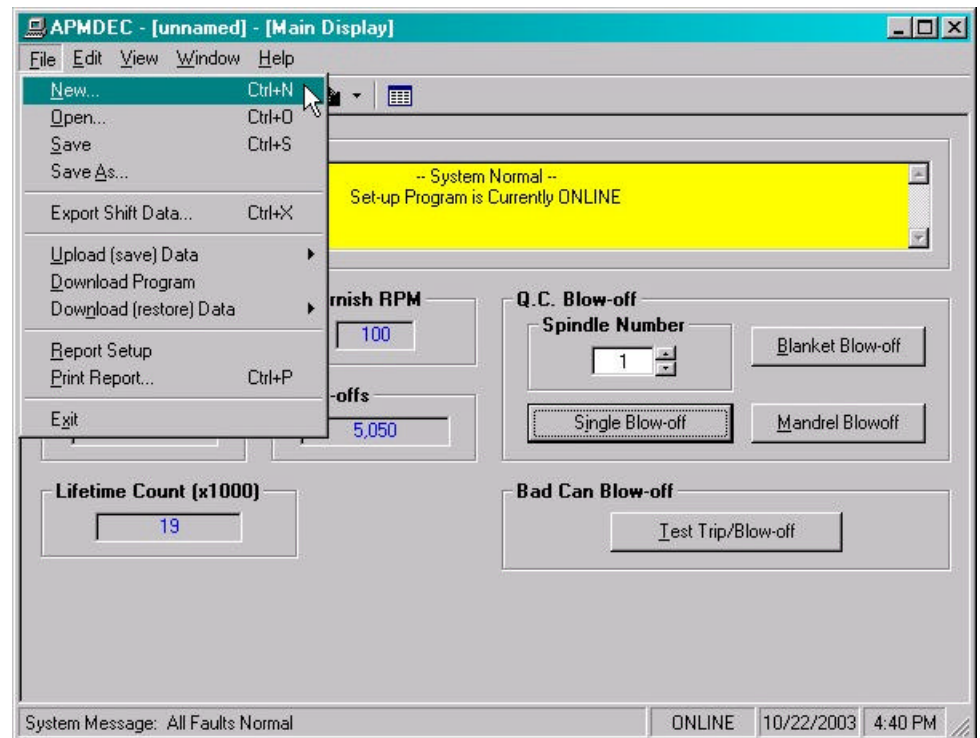
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“APMDEC” WINDOWS BASED SETUP PROGRAM REFERENCE

4.2 THE FILE MENU

The “File” menu allows the user to perform the following functions:

- Create a “New” set-up “Data File”.
- Open an existing “Data File”.
- Save any changes made to the current “Data File” to disk.
- Upload (save) Data from the Processor.
- Download a SYSdev (.sdv) program to the processor
- Download (restore) Data from the current set-up “Data File” to the processor
- Print a Report of the current set-up parameters.
- Exit the set-up program



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4.2.1 THE SET-UP DATA FILE

The set-up “Data File” (.sdt) is a binary access file, designed for fast file I/O operation. When the set-up program is first invoked, the default set-up parameters are loaded into memory. If changes are made to any of the set-up parameters (either online or offline), as well as shift data, the user will be flagged to “Save Changes” upon exit of the program.

Note: Any windows based “Set-up” program can open a set-up “Data File”, however, the data tables will not be properly aligned. The user will be alerted to the problem if a set-up data file has been created by either a different set-up program or a different revision of the software.

The set-up “Data File” is similar to that of a word processing file. When the program first starts, a default file is loaded and the user is able to make any changes as desired. The set-up program is unaware of the settings and parameters that exist within the M4508. Therefore, to normalize the set-up program with the processor, the user should define or open an existing file, then upload “All” variables from the processor. This allows the user to either create a backup of the data or maintain an existing file. The user can even open a data file for another decorator, save the file to a new name, make the necessary changes and simply download the new parameters to another processor.

The following functions can be accessed any time, from any set-up or display windows.

New: To create a “New” data file, select “New” from the “File” menu or press “Ctrl + N”. This creates a completely new file, loaded with the default variables and the word “[unnamed]” is displayed in the title bar. If any changes were made to the existing file, the user is prompted to save changes to the existing file.

Open: To “Open” an existing data file, select “Open” from the “File” menu or press “Ctrl + O”. This displays a dialog box allowing the user to select an existing data file to open. The name of the file will be displayed in the title bar. If any changes were made to the existing file, the user will be prompted to save any changes before terminating the program.

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Save: To “Save” data file to disk, select “Save” from the “File” menu or press “Ctrl + S”. This displays a dialog box allowing the user to select a folder and enter a name for the file. The user will be notified if the file already exists and the extension “.sdt” will automatically be added to the file name. If this is a “New” file, the user will be prompted to enter a file name.

Save As: To save the data file to a new name, select “Save As” from the “File” menu.. This displays a dialog box allowing the user to select a folder and enter in a new name for the file. The user will be notified if the file exists and the extension “.sdt” will automatically be added to the file name.

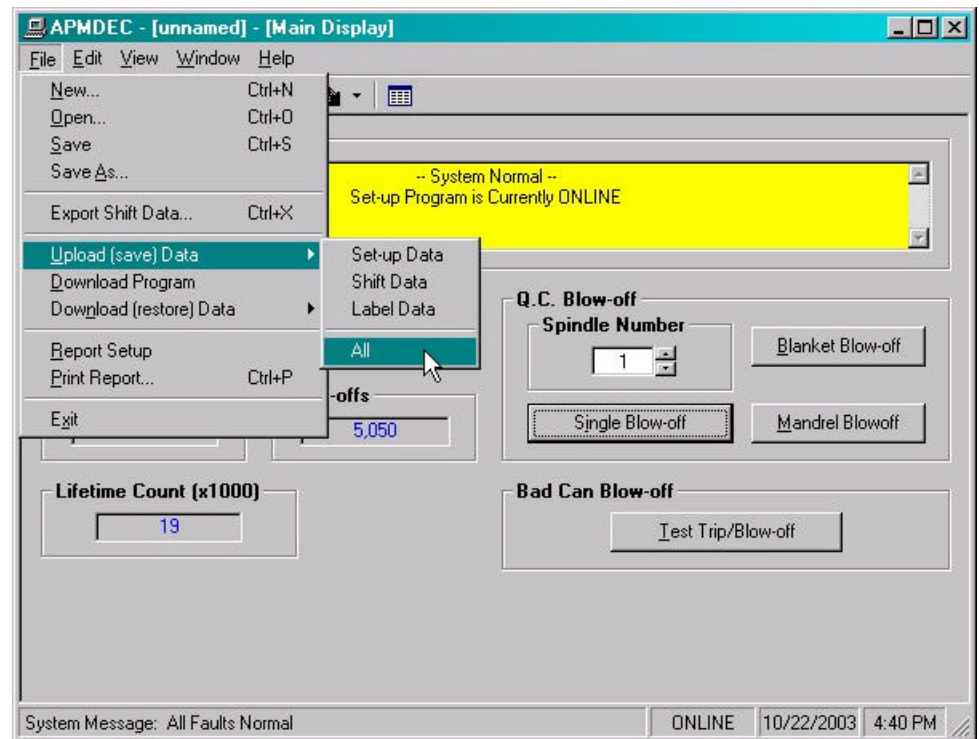
Export Shift Data...: This function allows the user to export the shift data to a “Tab Delimited” text file. This allows the user to easily use the shift data to produce production reports.

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4.2.2 UPLOAD (SAVE) DATA

The “Set-up” program allows the user to upload set-up parameters, shift data and label data settings from the M4508 into a “Set-up Data” file. This function is accessed from the “File” menu.



Set-up Data: This option uploads the “Set-up” data from the M4508 without changing any other values or parameters.

Shift Data: This option uploads the “Shift Data” from the M4508. This includes the “Trips per Spindle” data, the “Current Shift” data, the “Last Shift” data, as well as the “Lifetime Can Count” data.

Label Data: This option uploads the “Label Data” from the M4508. Once selected, the user is prompted to either upload all 100 labels or specify a range. This allows the user to upload the label information from one processor and download it to another, without altering any other registers.

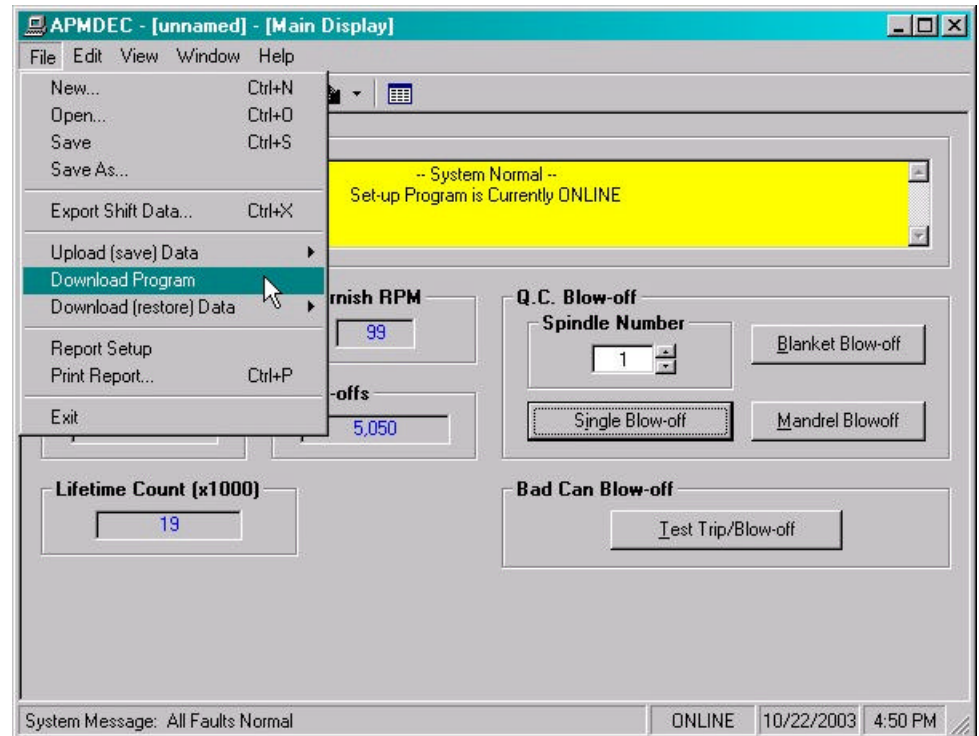
All: This option allows the user to completely upload “All” of the set-up parameters, shift data and label data from the M4508.

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4.2.3 DOWNLOAD PROGRAM

The “Set-up” program allows the user to “Download” any SYSdev program file to the M4508.



Note: To “Download” a SYSdev program to the processor, the program must be “Online”. If “Online” mode cannot be achieved, program download will not be executed. If the program is currently “Offline”, the user will be prompted to first go “Online”.

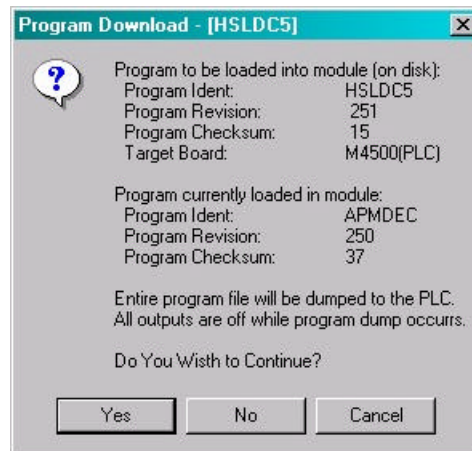
Once selected, and the set-up program “Online” with the processor, a dialog box will be displayed, allowing the user to select the SYSdev file to download.

Note: Only the files with the “.sdv” file extension will be displayed. It is important to keep in mind that only a valid M4508 PLC SYSdev file can be downloaded through the set-up program. Care should be taken when selecting a program to download.

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Once selected, a message box is displayed informing the user of the current program, revision and checksum of the program loaded in the processor, as well as, that of the selected program.



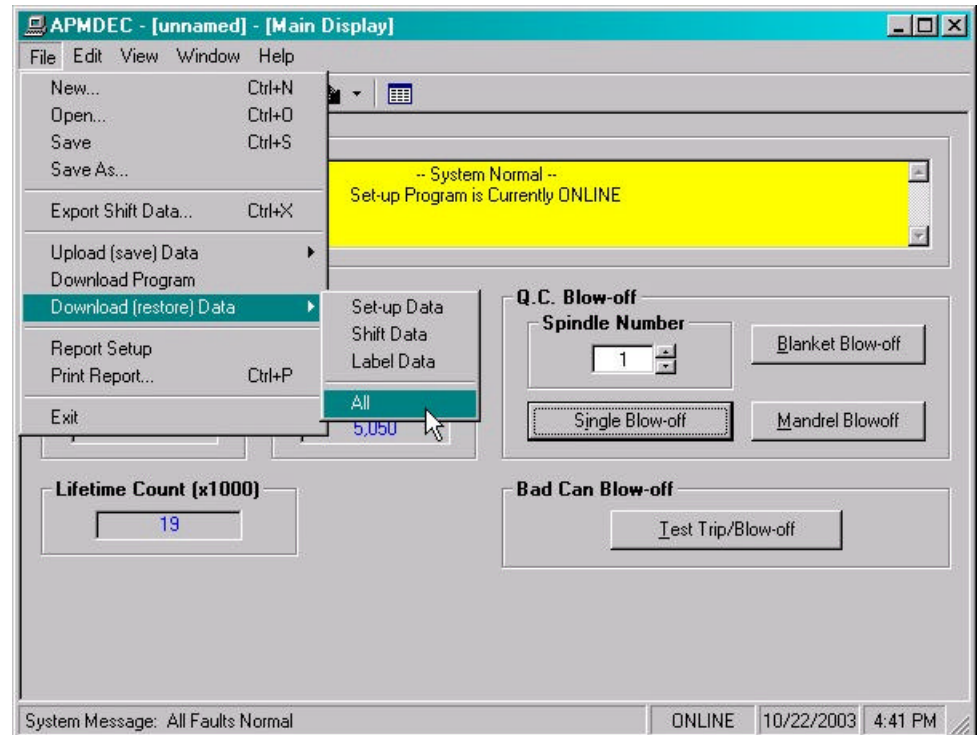
The user must confirm their selection by clicking the “Yes” command button. After the user confirms their choice, program download is initiated and the current program download address is displayed. When program download is complete, the user is prompted to acknowledge. Control is passed back to the main program and the set-up program remains in an “Online” edit mode.

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4.2.4 DOWNLOAD (RESTORE) DATA

The “Set-up” program allows the user to download set-up parameters, shift data and label data settings to the M4508 from a “Set-up Data” file. This function is accessed from the “File” menu and the user is given the choice of the following options:



Set-up Data: This option downloads only the “Set-up” data to the M4508 without changing any values for the shift data or label data parameters.

Shift Data: This option downloads only the “Shift Data” to the M4508. This will restore the “Trips per Spindle” data, the “Current Shift” data, the “Last Shift” data, as well as the “Lifetime Can Count” data.

Label Data: This option downloads only the “Label Data” used for the pneumatic ductor color control to the M4508. Once selected, the user is prompted to either download all 100 labels or specify a range. This allows the user to upload the label information from one processor and download it to another, without altering any of the other set-up parameters or shift data registers.

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All: This option allows the user to completely download “All” of the set-up parameters, shift data and label data registers to the M4508.

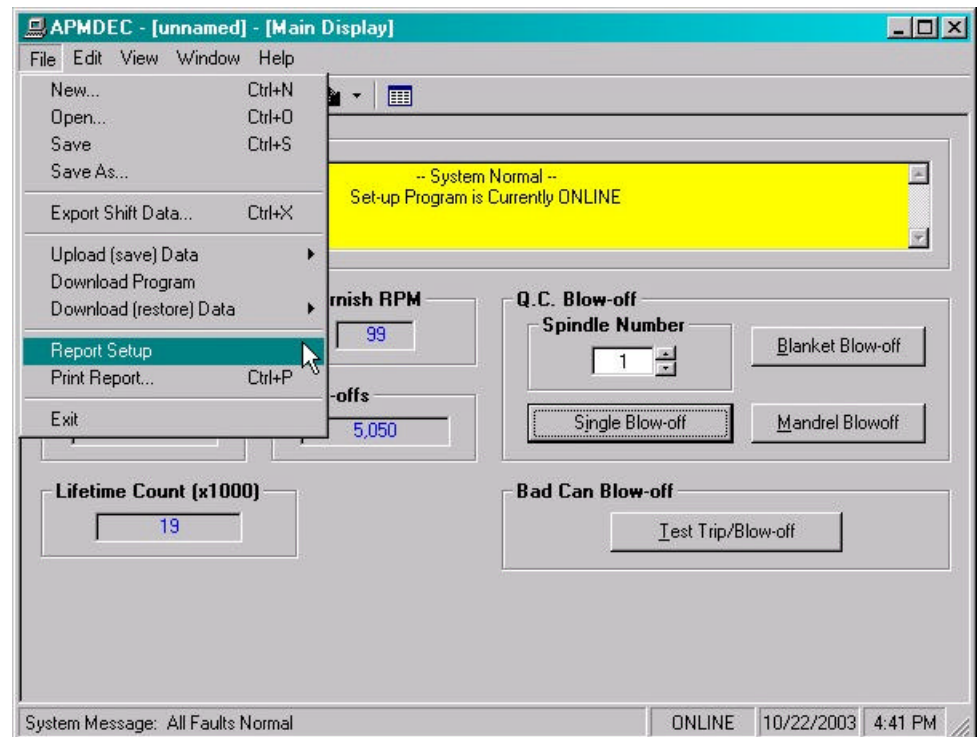
Note: Only the values contained within the current data file are downloaded. If unsure of the validity of the current data file, review the set-up parameters, shift data and label data in an “Offline” edit mode prior to download.

4.2.5 PRINT REPORT

The “Set-up” program allows the user to generate a “Report” printout of all set-up parameters, shift data and label data settings. This function is accessed from the “File” menu.

To printout a report of the settings contained in the set-up “Data File”, perform the following:

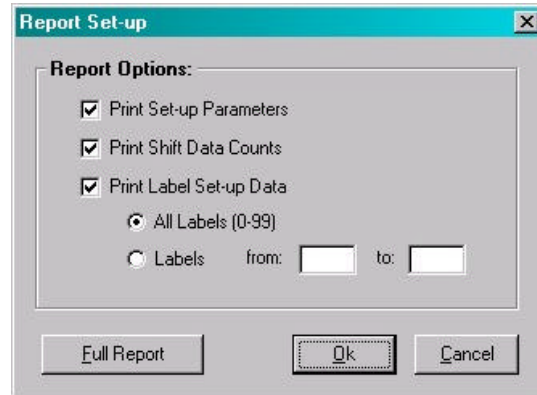
- 1) From the “File” menu, select “Report Setup”.



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- 2) This will display a dialog box, allowing the user to select the data to be printed in the report.



- 3) From the “File” menu, select “Print Report” or press “Ctrl + P”. This displays the “Print Setup” dialog box, allowing the user to select a printer, as well as, the paper size and orientation. Once the user selects “OK”, the report is generated and sent to the specified printer device. This function makes use of the windows print manager, which allows the user to continue with their work while the document is being printed.

At the top of each page, the report displays the name of the set-up program and the set-up file being printed. At the bottom of each page is the date and time the document was printed, as well as, the page number.

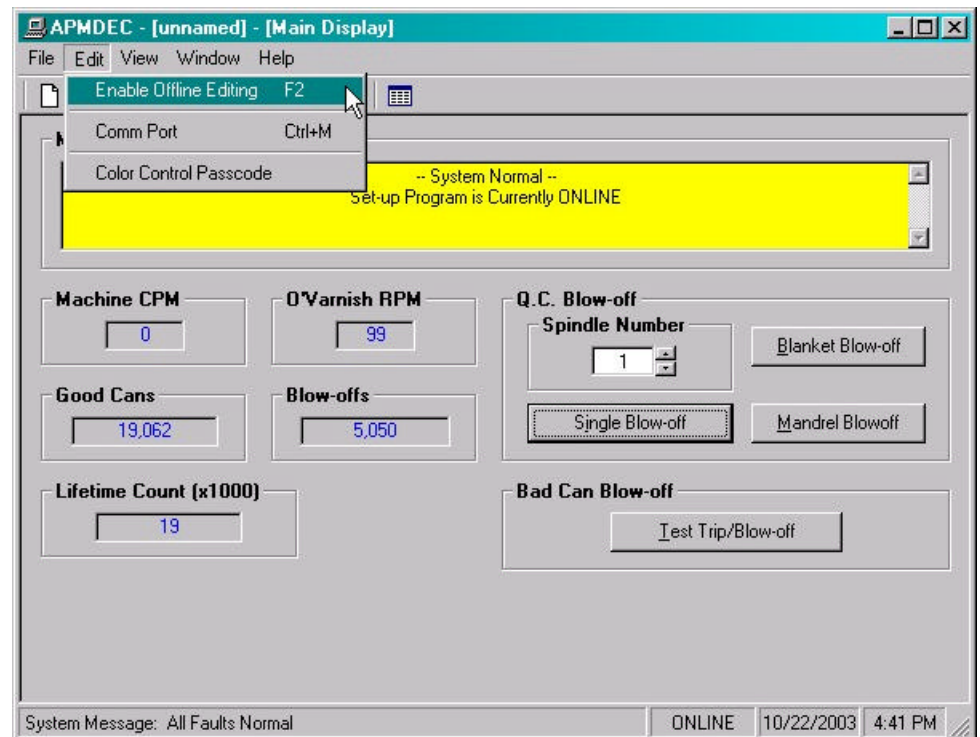
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4.3 THE EDIT MENU

The “Edit” menu allows the user to perform the following functions:

- Enable/Disable Offline Editing.
- Set-up the Comm Port.
- Edit the “Color Control” Passcode



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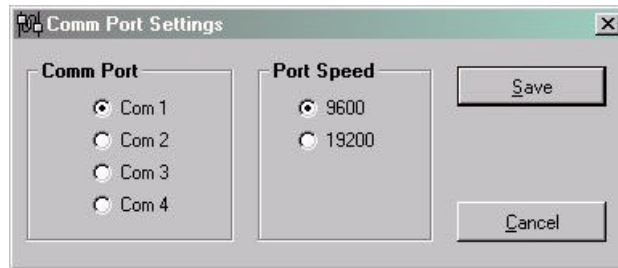
4.3.1 ENABLE OFFLINE EDITING

This function allows the user to perform “Offline” editing on the currently loaded set-up data file. This allows the user the ability to make any necessary changes to the set-up parameters or label data values while not online with the processor.

If offline editing is not enabled, the user is only able to view the set-up parameters and shift data. When the program is first invoked, the default setting is offline editing disabled. The user will need to specifically select “Enable Offline Editing” from the edit menu (or press function key F2) to enable/disable this feature.

4.3.2 SETUP COMM PORT

This function allows the user to specify the serial communications port and rate to talk to the M4508. The programming port of the M4508 is set to 9600 baud.



Once selected, a dialog box requesting the user to select a “Comm Port” and “Baud Rate” will be displayed. The default setting is COM1 at 9600 baud. The option to select the 19200 baud rate is to allow the user to communicate with the processor via the S4516 serial communications board.

In most cases, the user will only need to specify the communications port and leave the baud rate at 9600. If communication problems occur, make sure there is a secure connection from the PC to the PLC. Then check the Comm port. In most cases, the user will only need to select a new Comm port. If communication problems persist, there may be another program causing a conflict with the port. Check the port configuration from the “Settings” folder.

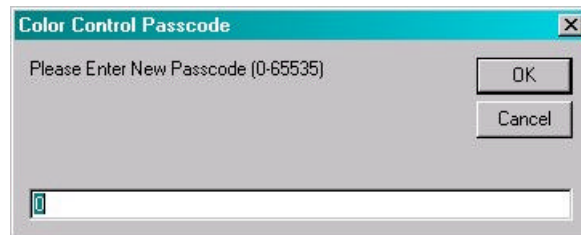
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4.3.3 COLOR CONTROL PASSCODE

The edit “Color Control Passcode” is an “Online” function only. This allows the user the ability to directly change the value of the “Color Control Passcode”.

Once selected, an input box is displayed, allowing the user to view the current “Passcode” setting and to change the value if necessary.



If the passcode is set to zero, passcode entry is disabled. The operator can press the Color Control key on the Keypad/Display and simply press the <ENTER> key to gain access to the color control settings without having to enter a zero.

If the value of the “Color Control Passcode” is set somewhere between 1 and 65,000, “Passcode Entry” is enabled. This requires the operator to enter in the “Correct” passcode to gain access to the color control parameters.

Note: Passcode entry is only in effect when the “Set-up Enable” selector switch is in the “Disable” position.

If an invalid value is entered, the passcode value will not be reset and a message box notifying the user of the error is displayed.

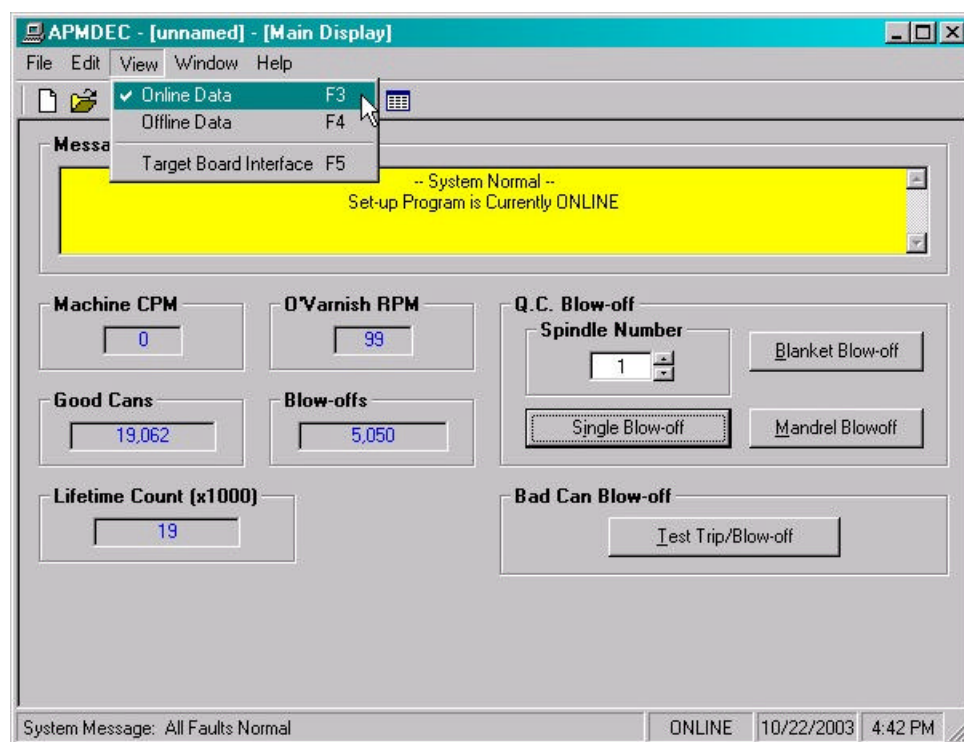
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4.4 THE VIEW MENU

The “View” menu allows the user to perform the following functions:

- View “Online” Data
- View “Offline” Data
- View the “Target Board Interface”



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4.4.1 VIEW ONLINE DATA

This function allows the user to place the set-up program “Online” with the processor. This is accessed from the “View” menu, by selecting “Online Data” or by simply pressing the “F3” function key.

Note: The program can be toggled between “Offline” and “Online” by simply double clicking on the “Online” or “Offline” panel displayed in the status bar at the bottom of the window.

Once invoked, the set-up program will attempt to open the Comm port and communicate with the M4508. If communications can not be established, a warning message will be displayed prompting the user to either “Retry” or “Cancel” the operation. If the operation is canceled or communication with the processor cannot be established the system will be placed in an “Offline” edit mode.

Note: Anytime while the set-up program is “Online” with the processor and communication is interrupted, a warning message will be displayed, prompting the user to either “Retry” or “Cancel” the operation.

4.4.2 VIEW OFFLINE DATA

This function allows the user to place the set-up program in an “Offline” mode. This is accessed from the “View” menu, by selecting “Offline Data” or by simply pressing the “F4” function key. This allows the user to perform “Offline” editing. All values displayed in “Offline” edit mode reflect the actual values contained in the currently loaded set-up data file.

Note: The program can be toggled between “Online” and “Offline” by simply double clicking on the “Online” or “Offline” panel displayed in the status bar at the bottom of the window.

Once invoked, the set-up program will close the Comm port and cease communication with the M4508.

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4.4.3 TARGET BOARD INTERFACE

This function allows the user to view fault codes, S3000 network communication error codes and review the current “Ident” and “Revision” of the application program. This is accessed by the “View” menu, by selecting “Target Board Interface” or by simply pressing the “F5” function key.

Once invoked, the set-up program will prompt the user to select a program to compare with the one existing in the processor. the setup program will then attempt to communicate with the M4508. If unsuccessful or the operation is canceled and communication with the processor cannot be established the system will be placed in an “Offline” mode, however the “Target Board Interface” window will still be displayed.

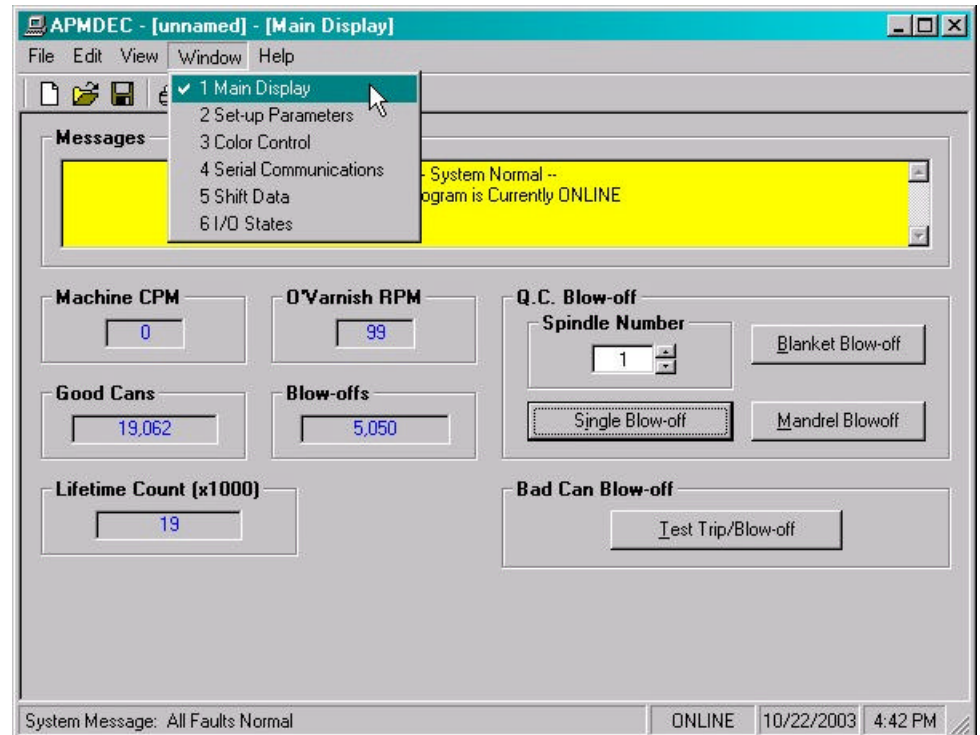
The screenshot shows a Windows-style window titled "Target Board Interface". It has a tabbed interface with four tabs: "Fault Codes / Status", "Program Ident/Revision", "Set Network Address", and "Set Time & Date". The "Fault Codes / Status" tab is active. Inside this tab, there are two main sections. The first section is titled "Internal Fault Code:" and contains three text boxes. The first two are labeled "Current Fault: Code = 00H" and "Last Fault: Code = 00H", both containing the text "No Internal Fault has Occurred.". To the right of these is a "Reset Faults" button. Below these is a "Corrective Action:" label and a dropdown menu currently set to "None". The second section is titled "Communications Network Error Codes:" and also contains two text boxes labeled "Current Comm Error: Code = 00H" and "Last Comm Error: Code = 00H", both containing the text "No Network Comm Error.". At the bottom right of the window is an "Ok" button.

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4.5 THE WINDOW MENU

The “Window” menu allows the user to select one of six different Display/Set-up windows to modify set-up parameters, view shift data, adjust color control parameters or receive feedback about the current status of the control system.



Once a window menu item is selected, a check mark is placed next to the selected item and the selected window is displayed with the name changed in the title bar of the main window.

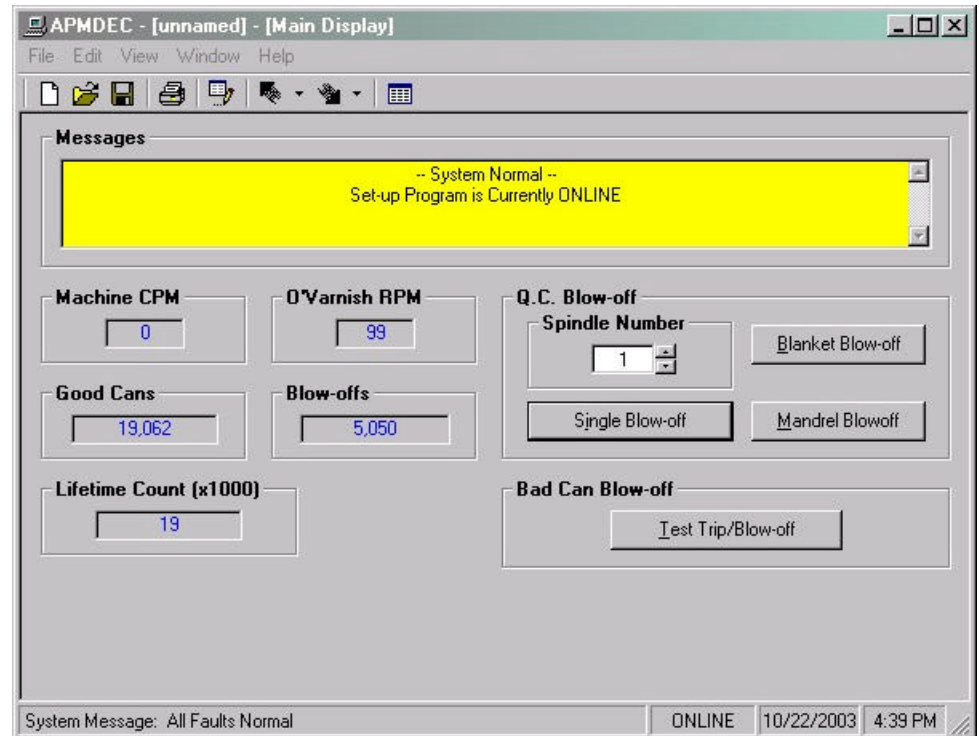
Note: “Read” only variables are displayed in blue with a gray background. Any variables that can be altered by the user are displayed in black with a white background. In most cases, a parameter that can be changed by the user will have associated with it increment and decrement controls. The user can either click on the desired parameter and enter in a new value, or use the increment/decrement control to change the value by 1 unit.

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4.5.1 THE MAIN DISPLAY WINDOW

The “Main Display” window is used to display the general state of the control system. This window is selected from the “Window” menu.



The following is a list of the functions of the “Main Display” window.

Messages: The “Messages” display is continuously updated. It displays alarm and status messages specific to the M4508, as well as, the current “Online” or “Offline” status of the set-up program. By simply scrolling the display, the user is able to view all active alarm and status messages. If no alarm or status messages are active, a default message is displayed.

Machine CPM: This display is only active while “Online” and displays the current speed of the machine in “Cans Per Minute”.

O’Varnish RPM: This display is only active while “Online” and displays the current speed to the over varnish roll speed in “Revolutions Per Minute”.

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Good Cans: This display is the “Current Shift” good can count.

Blow-offs: This display is the “Current Shift” total blow-off count.

Lifetime Count (x1000): This is the total number of good cans produced since the control system was installed, module replaced or the data register restored. This value is in “Thousands” of cans and is never reset.

Q.C. Blow-off: This function is only active while “Online” and it allows the operator to perform a “QC Select-A-Can” blow-off.

- A “Single” blow-off can be performed by entering in the desired spindle number and clicking the “Single Blow-off” command button.
- A “Blanket” blow-off can be performed by clicking the “Blanket Blow-off” command button. The blanket blow-off will initiate a blow-off sequence such that a can printed by each blanket is blown off at the QC blow-off port, starting with a can printed by blanket #1.
- A “Mandrel” Blow-off can be performed by clicking the “Mandrel Blow-off” command button. The mandrel blow-off will initiate a blow-off sequence such that a can printed on each mandrel will be consecutively blown off at the QC blow-off port, starting with mandrel #1.

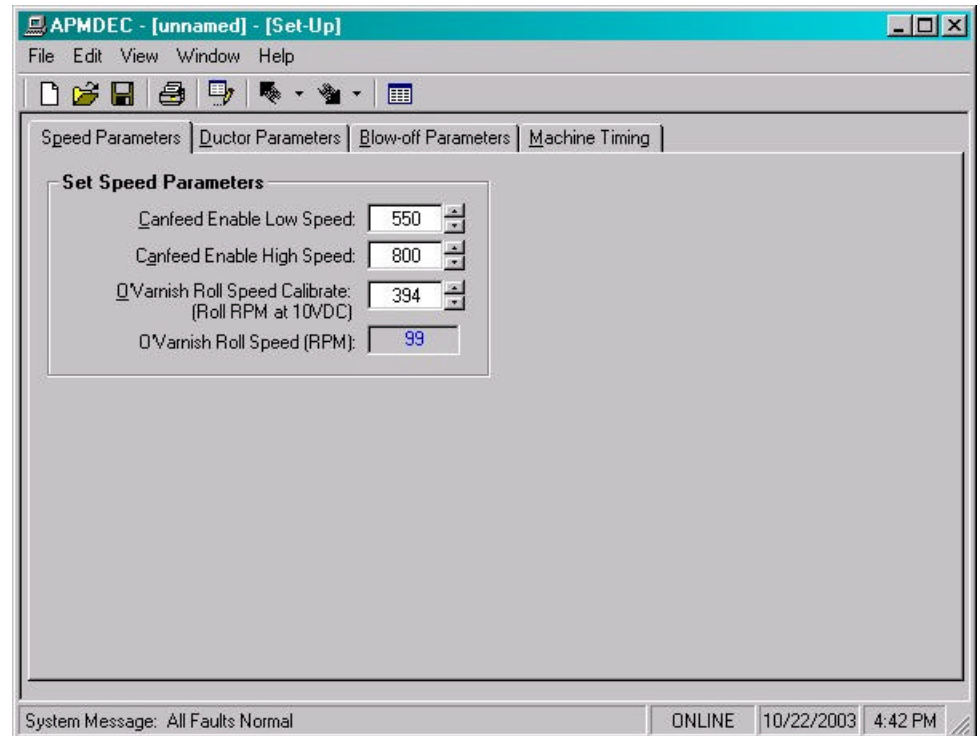
Bad Can Blow-off: This function is only active while “Online” and allows the operator to test the action of the control system by electronically inducing a mis-loaded or “Bad Can” into the system. By clicking on the Test Trip/Blow-off command button, a “Bad Can” will be electronically induced into the system to test the response of the control system due to a “Mis-Loaded” can.

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4.5.2 THE SETUP PARAMETERS WINDOW

The “Set-up Parameters” window is used to view and adjust any of the set-up parameters. This window is selected from the “Window” menu.



This window utilizes a “TAB” control to divide the set-up parameters into five categories, similar to that of the Keypad/Display. These sections are as follows:

Speed Parameters: This section is used to set the canfeed enable speed window and the calibration of the O’Varnish roll speed in the M4508. This section contains the following selections:

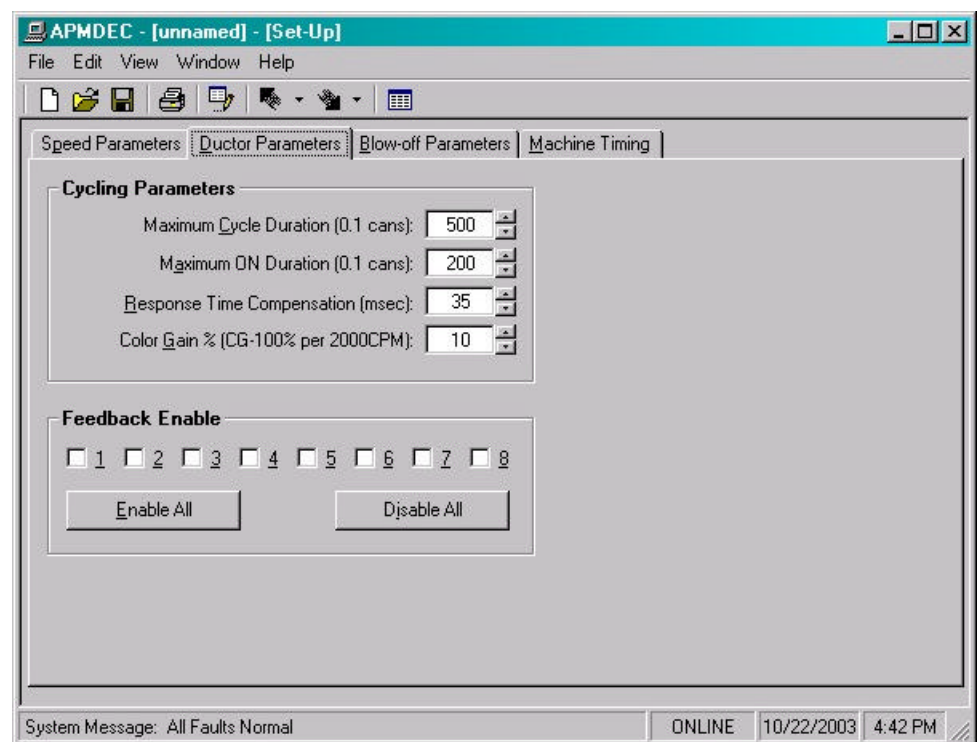
- 1) **Canfeed Enable Low Speed:** This is the minimum speed the can gate is allowed to open, to enable cans to be loaded into the machine. This defines the lower limit of the canfeed enable window. As the machine speed increases above this threshold, the can gate will be enabled to be opened.

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- 2) **Canfeed Enable High Speed:** This is the maximum speed the can gate is allowed to open or close to enable cans to be loaded into the machine. This defines the upper limit of the canfeed enable window. With the machine operating at production speed, the M4508 will only activate/deactivate the can gate solenoid within the canfeed enable window. When the machine goes to a stand-by condition, the speed of the machine will need to be decreased below this threshold for the can gate solenoid to be deactivated. The M4508 will activate and deactivate the can gate solenoid on the “Can Gate Timing ON” signal.
- 3) **O’Varnish Roll Speed Calibrate:** The O’Varnish drive speed input is a 0-10VDC signal from the O’Varnish drive (if available). The roll speed calibrate is used to scale this signal to display the “O’Varnish RPM”. The number entered here should equal the O’Varnish roll speed when the drive is at full speed (input = 10VDC).

Ductor Parameters: This section is used to set the ductor solenoid control parameters in the M4508. This section contains the following selections:



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- 1) **Maximum Cycle Duration (0.1 cans):** The maximum cycle duration is the maximum cycle time (in 0.1 cans) for one cycle of the ductor. This parameter limits the upper value that the operator can enter for the cycle duration. If the operator attempts to enter a value higher than this limit, the value will default back to the original number. The range of this parameter is 140 - 999.
- 2) **Maximum ON Duration (0.1 cans):** This parameter limits the upper value that the operator can enter for the “ON” duration. The cycle duration is the total cycle time (in 0.1 cans) that the ductor roll is in contact with the fountain roll. If the operator attempts to enter a number higher than the maximum “ON” duration, the value will default back to the previous value. The range of this parameter is 0 – 200.
- 3) **Response Time Compensation (msec):** This parameter is the difference (in msec) between the “ON” and “off” response times of the ductor solenoid. This is used to adjust the “ON” duration to compensate for the mechanical response time of the whole mechanism. As an example, if the “ON” response time was 40 msec. and the “off” response time was 15 msec. Then the value entered for this parameter would be 25 msec.

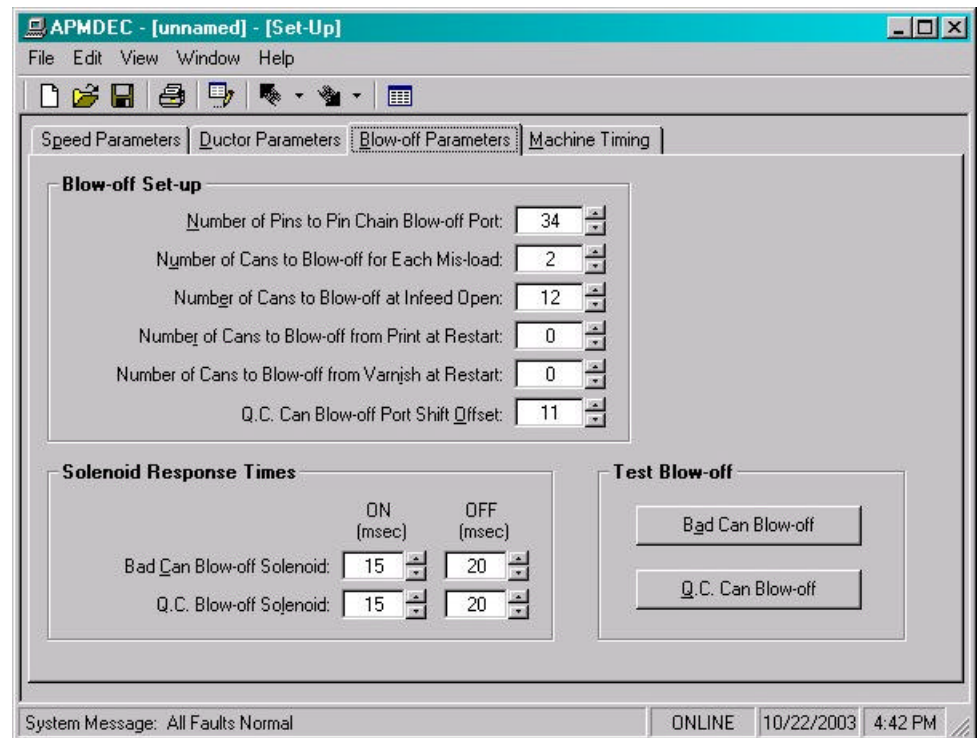
Note: If the optional feedback sensors are used, set this parameter to 0. The feedback sensors will automatically adjust the “ON” duration based on the response time of the solenoids.

- 4) **Color Gain:** This parameter allows the color density to be increased proportionately up or down as a function of machine speed. The valid range of this parameter is 50% to 150% per 2000 CPM. When set to 100%, no increase or decrease, as a function of speed will occur. When set to 50%, the color density will drop 50% from 0 to 2000CPM. When set to 150% the color density will increase by 50% from 0 to 2000CPM. This parameter is used to compensate for ink atomization (misting) as a function of speed (higher speed = proportionately higher ink misting).
- 5) **Enable/Disable Ductor Feedback Fault:** This selection is used to enable or disable the feedback fault detection. When the optional feedback sensors are installed, the ductor feedback faults should be enabled. The feedback sensor verifies the cycling of the ductor and resets the “ON” duration as the speed of the machine changes based on the response time of the solenoid.

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Blow-off Parameters: This section is used to set the “Pin Chain/QC Blow-off” parameters in the M4508. This section contains the following selections:



Note: The “Bad Can Blow-off” command button will electronically induce a mis-loaded can into the system, as well as, the “Q.C. Can Blow-off” will blow-off a can printed on spindle #1 at the QC blow-off port.

- 1) **Number of Pins to Pin Chain Blow-off Port:** This is the number of pins from the spindle wheel to disk transfer location to the first can blown off at the Pin Chain blow-off port minus two. This can be a number from 0 to 999.
- 2) **Number of Cans to Blow-off for Each Mis-load:** This is the number of cans blown off at the pin chain port when one mis-loaded can is detected (typically set at 1 can).
- 3) **Number of Cans to Blow-off at Infeed Open:** This is the number of cans which will be blown off when the infeed is first opened. To blow off no cans at infeed open, set equal to 0, to blow off one can set equal to 1, etc.

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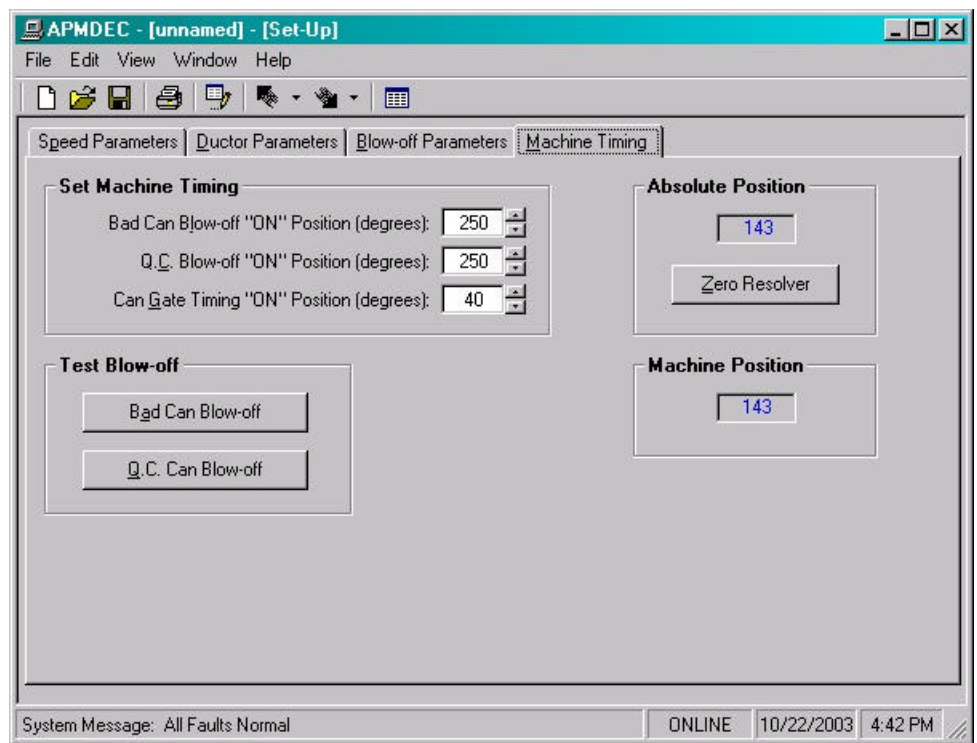
- 4) **Number of Cans to Blow-off from Print at Restart:** This is the number of cans that will be blown off from the print station when the machine is restarted. To blow off no cans at restart, set equal to 0, to blow off one can set equal to 1, etc.
- 5) **Number of Cans to Blow-off from Varnish at Restart:** This is the number of cans that will be blown off from the varnish station when the machine is restarted. To blow off no cans at restart, set equal to 0, to blow off one can set equal to 1, etc.
- 6) **Q.C. Can Blow-off Port Shift Offset:** This is the number of spindles difference from detection of the spindle #1 flag to the QC blow-off port. This is a number between 1 and 24 and is empirically set by selecting spindle #1 for blow-off and adjusting this value until the can from spindle #1 is the can that is blown off.
- 7) **Bad Can Blow-off Solenoid “ON” Response Time:** This is the time used as the “ON” response time of the pin chain blow-off port (time from “ON” solenoid actuation to first air out port) in milliseconds. The M4508 will activate the solenoid “ON” this amount of time ahead of the Pin Chain blow-off “ON” position (usually set at 15 to 20 milliseconds).
- 8) **Bad Can Blow-off Solenoid “Off” Response Time:** This is the time used as the “off” response time of the pin chain blow-off port (time from “off” solenoid actuation to air stopping at port) in milliseconds. The M4508 will activate the solenoid “OFF” this amount of time ahead of the Pin Chain blow-off “ON” position (usually set at 15 to 20 milliseconds for double acting solenoids and set at 25 to 30 milliseconds for single acting solenoids).
- 9) **Q.C Can Blow-off Solenoid “ON” Response Time:** This is the time used as the “on” response time of the QC blow-off port (time from “ON” solenoid actuation to first air out port) in milliseconds. The M4508 will activate the solenoid “ON” this amount of time ahead of the QC blow-off timing “ON” position (usually set at 15 to 20 milliseconds).

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- 10) **Q.C. Can Blow-off Solenoid “Off” Response Time:** This is the time used as the “off” response time of the QC blow-off port (time from “off” solenoid actuation to air stopping at port) in milliseconds. The M4508 will activate the solenoid “OFF” this amount of time ahead of the QC blow-off timing “ON” position (usually set at 15 to 20 milliseconds for double acting solenoids and set at 25 to 30 milliseconds for single acting solenoids).

Machine Timing: This section is used adjust the timing channel set-points. This section contains the following selections:

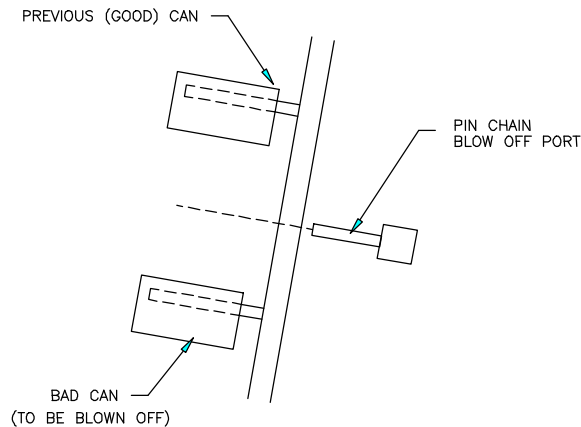


Note: The “Bad Can Blow-off” command button will electronically induce a mis-loaded can into the system, as well as, the “Q.C. Can Blow-off” will blow-off a can printed on spindle #1 at the QC blow-off port.

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- 1) **Bad Can Blowoff “ON” Position:** Set this signal to turn “ON” when the pin chain blow-off port is centered between pins on the chain, (see figure below).



- 2) **Q.C. Blow-off Timing “ON” Position:** Set this signal to turn “on” when the select-a-can chain blow-off port is centered between pins on the chain, (see figure above).

Warning: The blow-off “ON” timing can not be set within ± 20 degrees of the Cam Reset timing (CH03 set at 320 degrees). If the optimum position for the blow-off “ON” set-point is within this window (300 to 340 degrees), the blow-off must be physically moved approximately 1 inch from its current location. The blow-off “ON” position timing can then be properly set.

- 3) **Can Gate Timing “ON” Position:** This signal is used to open and close the can gate. Adjust the “ON” Position for proper can gate operation.

Note: View the “Machine Position” field when adjusting the above timing setpoints. Machine position will increase linearly from 0 to 359 (360 degrees per mandrel) as the machine is rotated forward.

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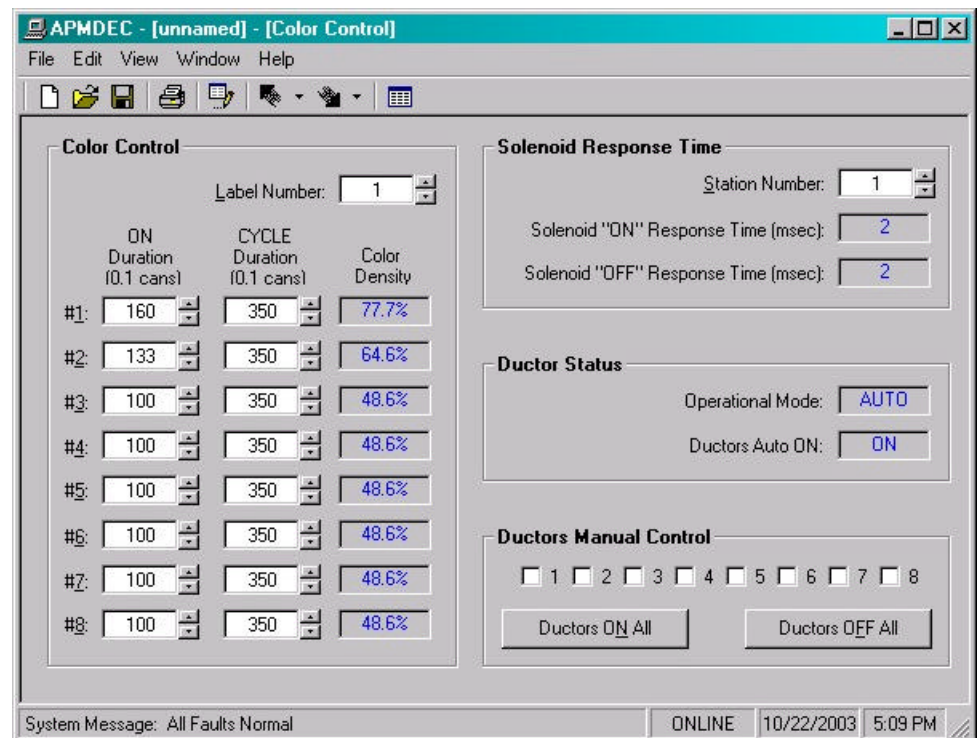
“APMDEC” WINDOWS BASED SETUP PROGRAM REFERENCE

- 4) **Zero Resolver:** To set the “Machine Zero” position (set resolver offset) follow the procedure outlined in section 2.9.2, (Set Machine Zero). Verify that as the machine is rotated forward (either jogged or barred), that the “Absolute Position” field increases linearly from 0 to 1079 for “Rotary Trip” machines and from 0 to 719 for “Interposer Trip” machines.

Note: The “Zero Resolver” command button is only active at “Zero Speed” (main drive off & no motion detected). Once the user has clicked the command button, a message box will be displayed confirming their choice to “Zero” the resolver.

4.5.3 THE COLOR CONTROL WINDOW

The “Color Control” window is used to view and adjust any of the color control settings. This window is selected from the “Window” menu.



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Note: For virtually all fields, the user may either use the increment/decrement control or simply select the field and enter in a number. Once a value has been changed or the “Enter” key pressed, the new value is validated for proper range and then written to the M4508.

Color Control Parameters: The label number, “On” duration and “Cycle” duration are used to adjust the color control settings in the M4508.

The following is a description of each of these settings:

- 1) **Label Number:** The M4508 is capable of storing the settings for up to 100 labels (0-99). Select desired label number to adjust the “On” and “Cycle” duration settings.

Note: The user may only adjust the “Label Number” when the machine is at “Zero Speed” (main drive off and no motion detected).

- 2) **On Duration:** The “On” duration can be individually set for each ink station, for each label. The “On” duration is the amount of time (cans) the ductor roll is in contact with the fountain roll. Follow the procedure outlined in the Pneumatic Ductor Color Control, (section 6.10 – Light/Dark Color Adjustment) to properly adjust the “On” duration.

Note: The user cannot adjust the “On” duration to within 14 cans (140 tenths) of the “Cycle” duration. To disable a ductor from cycling, set this variable to zero.

- 3) **Cycle Duration:** The “Cycle” duration can be individually set for each ink station, for each label. The “Cycle” duration is the frequency at which the ductor is activated. This is the duration (number of cans) between one complete cycle. Follow the procedure outlined in the Pneumatic Ductor Color Control section, (section 6.10 – Light/Dark Color Adjustment) to properly adjust the “Cycle” duration.

Note: The user cannot adjust the “Cycle” duration to within 14 cans (140 tenths) of the “On” duration.

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- 4) **Color Density:** The “Color Density” display is used as an indication of the amount of ink being transferred by the ductor. Different settings of the “On” and “Cycle” durations will achieve the same “Color Density”. Follow the procedure outlined in the Pneumatic Ductor Color Control, (section 6.8 – Recommended Procedure for Using the Color Control).

Solenoid Response Time: The “Solenoid Response” time is an indication of the reaction time of pneumatic ductor. The response times are only valid when the optional feedback sensors are used. The response times for each ink station can be easily viewed by adjusting the station number.

The following is a description of each of these settings:

- 1) **Station Number:** The ink station mask to view the response time of the ductor solenoid.
- 2) **Solenoid “On” Response Time (msec):** This displays the amount of time (msec) from first activation of the solenoid to contact with the fountain roll.
- 3) **Solenoid “Off” Response Time (msec):** This displays the amount of time (msec) from first deactivation of the ductor solenoid to lift-off from fountain roll.

Ductor Status: The ductor “Status” gives the user an indication of the status of the input signals used to control the pneumatic ductor, these are as follows:

- 1) **Operational Mode:** A three position selector switch is used to set the operation mode of the ductors (auto/off/manual). This display reflects the position of the selector switch.
- 2) **Ductors Auto On:** This displays the state of the ductors “Auto On” input to the M4508

Ductors Manual Control: The ductors “Manual” control allows the user to toggle individual ductor solenoids when the ductors operational mode is “Manual” and the machine is at “Zero” speed (main drive off, machine not in motion). The individual solenoids can be toggled “On” and “Off” by clicking on the individual stations. The user may also toggle “All” the ink stations “On” by clicking the

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“Ductors ON All” command or toggle all “Off” by clicking the
“Ductors OFF All” command button.

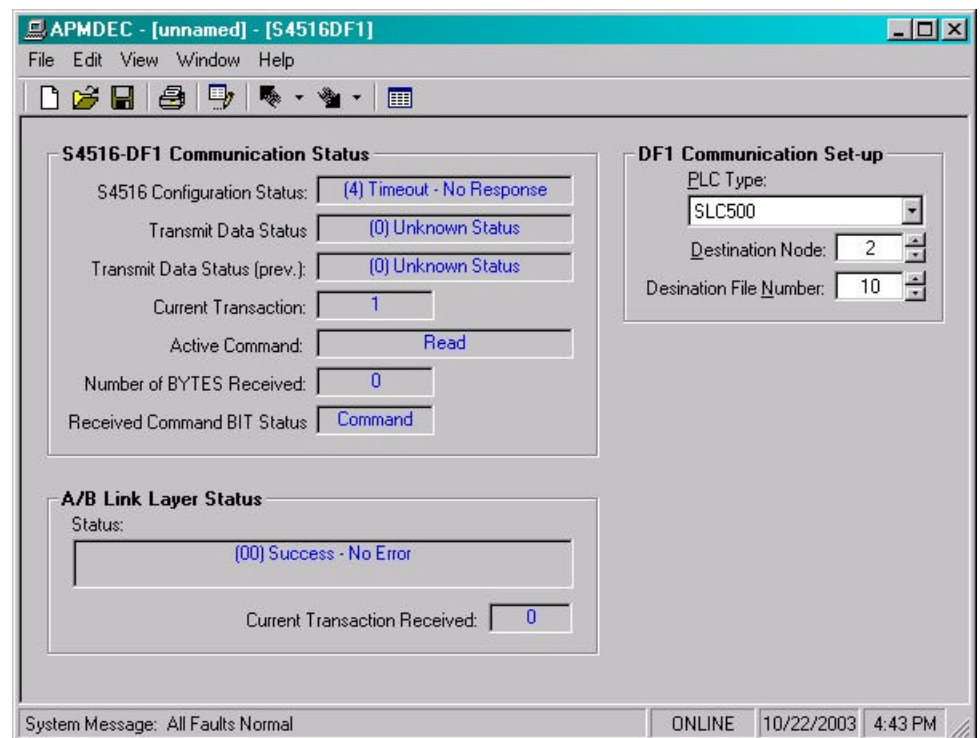
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4.5.4 THE SERIAL COMMUNICATIONS WINDOW

The Serial Communications window is used to view the configuration status of the S4516 serial communications board (if installed), as well as, view the status of the Allen-Bradley DF1 communication protocol and set-up the communication parameters. From this window the user can view or adjust the following parameters:

- View the S4516 configuration status.
- View the S4516-DF1 serial communication status.
- View the Allen-Bradley Link Layer serial communication status.
- Select the Allen-Bradley PLC type (PLC5 or SLC500) to communicate to.
- View/Set the Allen-Bradley PLC destination node.
- Select the starting Allen-Bradley PLC destination file number.



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S4516 Configuration Status: This displays the current state of the configuration of the S4516 serial communications board. System function `sfunc19()`; (S4516 configuration) is used to set the S4516 configuration (network node address, network baud rate and USER port baud rate). This must be executed prior to executing ether system functions 10, 11 or 13. System function 19 is generally executed in the “Initialization” file of the user program.

The following values are returned from a system function 19 call:

- 1 = Busy.
- 2 = Done (S4516 Successfully configured).
- 3 = Invalid Parameter (either network node address, network baud rate or USER port baud rate is invalid).
- 4 = Timeout (no response from S4516)
- 32 = Hardware ACK error from S4516
- 34 = Invalid S4516 Slot Address (W8156 must be loaded with the slot address of the S4516, prior to executing system function 19).

Transmit Data Status: This represents the state of the data packet transmission. This will typically display either “Busy” or “Done”. If there are problems delivering the message packet, the response code, along with a description, will be displayed.

Note: The “Transmit Data Status (prev.)” is used to view the last or previous status.

Current Transaction: This is the “Transaction” number delivered to the Allen-Bradley PLC.

Active Command: This displays either “Read” or “Write”. This is used to view the command type of the current transaction.

Number of BYTES Received: This displays the current number of bytes received from either a “Command” or “Reply” message packet.

Received Command BIT Status: This displays the state of the command received. If this displays a “Reply”, then the command was sent from the M4508. If this displays “Command”, then a command action was received by the M4508.

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“APMDEC” WINDOWS BASED SETUP PROGRAM REFERENCE

A/B Link Layer Status: This displays the status of the receipt of the message packet sent to the Allen-Bradley PLC. If the delivery is not successful, an error code along with a description is displayed. Refer the to the Allen-Bradley Communication Protocol and Command Set reference manual for more information on “Link Layer” error codes.

A/B Link Layer – Current Transaction Received: This is the “Transaction” number received from the Allen-Bradley PLC.

PLC Type: This is used to specify the “Type” of PLC the M4508 will communicate to. The user can choose from “PLC5” or “SLC500”.

Note: This parameter should be set prior to communicating with an A/B processor.

Destination Node: This is used to set the node number of the A/B PLC to send and receive data from. This also displays the node number of the A/B PLC that send a “Command” message packet.

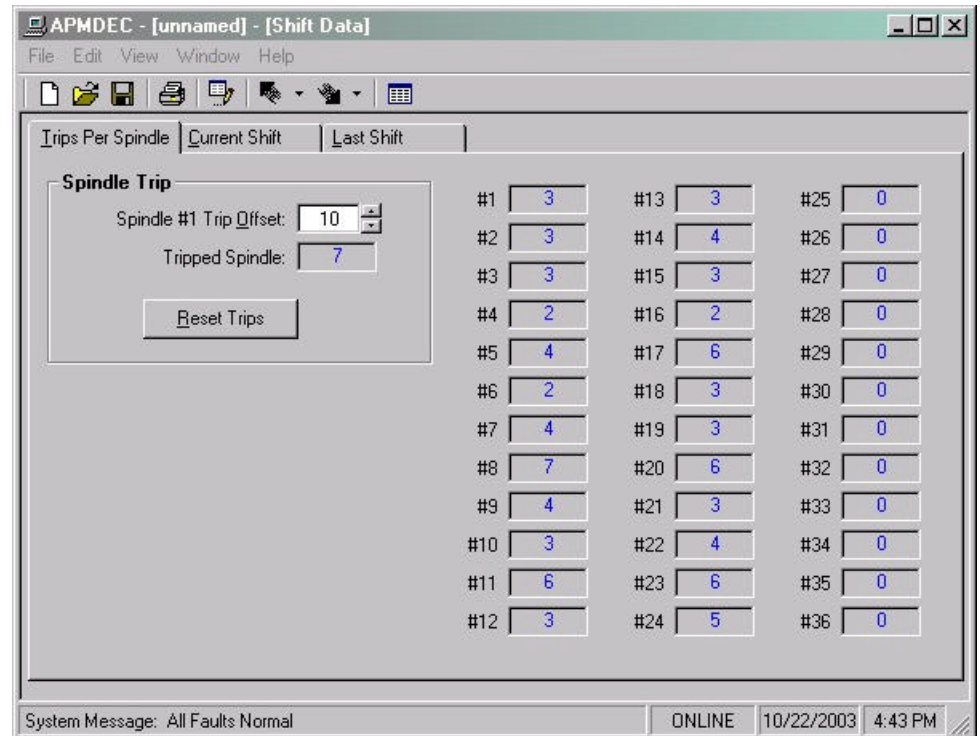
Destination File Number: This is the file number the M4508 will read and write data from. See Appendix A for a description of the data read from and written to an Allen-Bradley PLC.

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“APMDEC” WINDOWS BASED SETUP PROGRAM REFERENCE

4.5.5 THE SHIFT DATA WINDOW

The “Shift Data” window is used to view the shift data collected by the M4508. This window is selected from the “Window” menu.



This window utilizes a “TAB” control to divide the shift data similar to that of the Keypad/Display. These sections are as follows:

Trips per Spindle: The Number of trips per spindle display is provided to aid in the trouble-shooting of a loading problem with a spindle or spindles. The total number of trips for each spindle since the last reset or end of shift is displayed and can reset at anytime.

The following data is displayed in the “Trips per Spindle” section:

- 1) **Spindle #1 Trip Offset:** The “Spindle Trip Offset” can be entered from this section. This is used to compensate for the location of the can/no can sensor and the spindle #1 I.D. sensor location. Use the “Tripped Spindle” display to adjust the offset value. Follow the procedure outlined section 2.9.8, (Set Spindle Trip Shift Offset).

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- 2) **Spindle #xx Trips:** This is the total number of trips for each spindle. This data is displayed and updated continuously in the respective field for each spindle. A disproportionately high count for a particular spindle indicates a loading problem for that spindle.

Current Shift Data: This section is used to view the “Current Shift” data. This data is the totals so far into the shift. This data is transferred to the “Last shift” at the end of either an 8 or 12 hour shift or alternatively could be done at label changes such that the data collected would be for label runs rather than complete shifts. This data can be reset by the user from this section.

Note: The “Transfer Data” command button is only active while “Online”.

- 1) **Total Good Cans:** This is the total number of good cans printed so far into the shift. This is essentially a can counter.

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“APMDEC” WINDOWS BASED SETUP PROGRAM REFERENCE

- 2) **Total Blow-offs:** This is the total number of cans blown-off the machine. This includes all types of blow-offs: the can(s) blown-off for each mis-load, infeed open blow-offs, restart blow-offs, manual blow-offs, select-a-can QC blow-offs, etc.
- 3) **Total Bad Cans or Mis-loads:** This is the total number of mis-loaded cans (trips). These would be the actual number of damaged cans that did not load properly on the machine. This gives an indication of conveying/can handling problems.
- 4) **Manual Blow-offs:** This is the total number of cans blown-off by the operator using the Manual Blow-off PB or selector switch.
- 5) **QC Blow-offs:** This is the total number of cans blown-off by the operator with the Select-A-Can QC station or QC Blow-off key on the M4508 keypad for quality verification.
- 6) **Restart Blow-offs:** This is the total number of cans blown off when the infeed opened and from the print station and varnish station at machine restart.
- 7) **Spindle #01 through #24 or #36 trips:** This is the total trips (mis-loads) for each spindle. A disproportionately high count for a particular spindle indicates a loading problem for that spindle.

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Last Shift Data: The “Last Shift” data is identical to the current shift data except it is for the previous 8, 12 hour shift or label run, however the shift collection is set-up. This allows data collection and diagnostics to take place automatically over a two-shift period.

The screenshot shows the APMDEC - [unnamed] - [Shift Data] window. The window has a menu bar (File, Edit, View, Window, Help) and a toolbar with icons for file operations. The main area is divided into three tabs: "Trips Per Spindle", "Current Shift", and "Last Shift". The "Last Shift" tab is selected. It contains a "Last Shift" section with six input fields: "Total Good Cans:", "Total Blow-offs:", "Bad Can Blow-offs:", "Manual Blow-offs:", "Q.C. Blow-offs:", and "Restart Blow-offs:". Each field has a value of 0. To the right of these fields is a grid of 36 input fields, numbered #1 through #36, arranged in three columns of 12. Each field has a value of 0. At the bottom of the window, there is a status bar with the text "System Message: All Faults Normal", a button labeled "ONLINE", and the date and time "10/22/2003 4:44 PM".

Last Shift					
Total Good Cans:	0	#1	0	#13	0
Total Blow-offs:	0	#2	0	#14	0
Bad Can Blow-offs:	0	#3	0	#15	0
Manual Blow-offs:	0	#4	0	#16	0
Q.C. Blow-offs:	0	#5	0	#17	0
Restart Blow-offs:	0	#6	0	#18	0
		#7	0	#19	0
		#8	0	#20	0
		#9	0	#21	0
		#10	0	#22	0
		#11	0	#23	0
		#12	0	#24	0
				#25	0
				#26	0
				#27	0
				#28	0
				#29	0
				#30	0
				#31	0
				#32	0
				#33	0
				#34	0
				#35	0
				#36	0

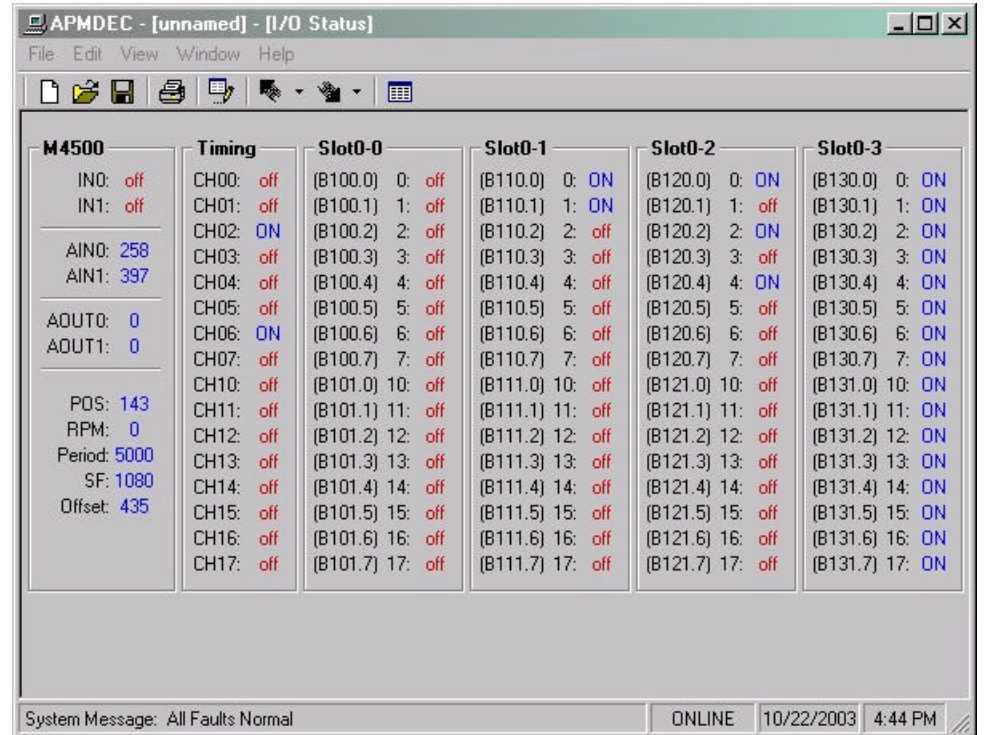
System Message: All Faults Normal ONLINE 10/22/2003 4:44 PM

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4.5.6 THE I/O STATES WINDOW

The “I/O States” window displays the states of the inputs and outputs of the control boards, the timing channels, as well as states of the interrupt inputs (IN0 and IN1), the analog I/O and the resolver of the M4508.



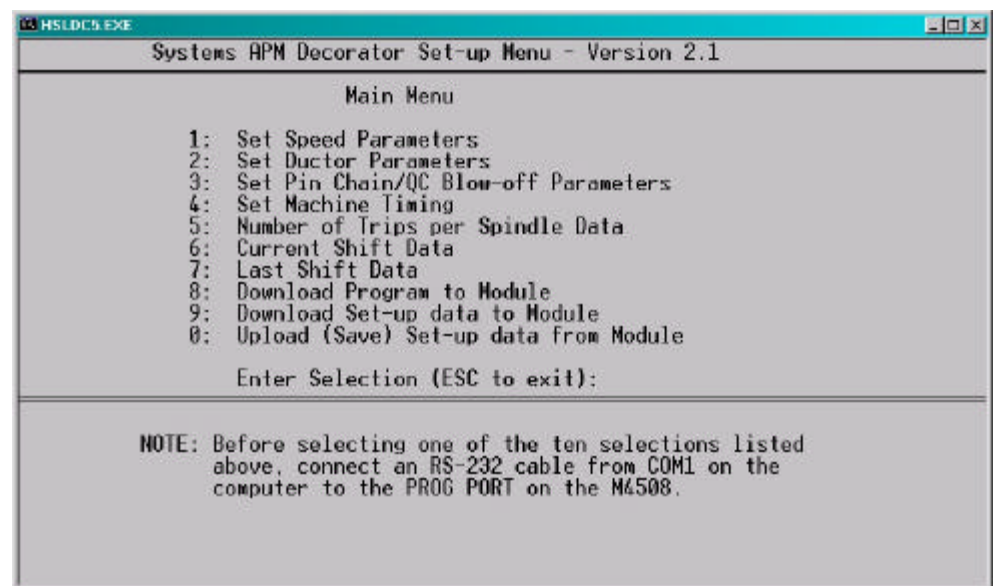
Positioning the cursor over a selected item will display either a description or an address for the value being displayed.

SECTION 5

“HSLDC5” DOS BASED SETUP PROGRAM REFERENCE

The “HSLDC5” DOS based set-up program is menu driven, that allows the user to easily view data or alter set-up variables using a laptop or PC. In addition to adjusting the set-up variables, the set-up program can be used to set the machine timing (machine offset, timing signal locations, etc.). The set-up variables are used to configure and tune the M4508 to match the configuration and performance of the specific decorator (see section 2.9 – Tuning the M4508).

The main menu of the set-up program incorporates the following menu selections:



Note: The set-up program is an on-line communications program used to interface with the M4508 module. The data displayed in the menus and set in the menus is communicated directly to the module. Therefore, prior to selecting any of the selections, make sure an RS-232 cable is connected from the COM port on the computer to the “PROG” port on the M4508.

The following sections are a complete description of the set-up program selections and menus.

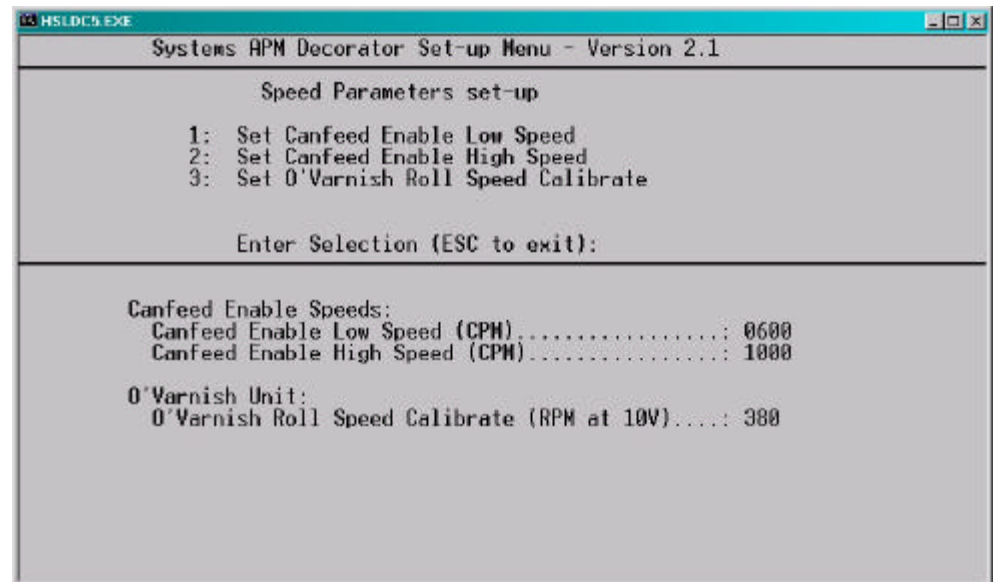
SECTION 5

“HSLDC5” DOS BASED SETUP PROGRAM REFERENCE

5.1 SET SPEED PARAMETERS

This selection is used to set the canfeed enable speed window and the calibration of the O’Varnish roll speed in the M4508. When selected, the “Set Speed Parameters Set-Up” menu is invoked.

The “Set Speed Parameters Set-Up” Menu contains the following selections:



1: Set Canfeed Enable Low Speed: This is the minimum speed the can gate is allowed to open, to enable cans to be loaded into the machine. This defines the lower limit of the canfeed enable window. As the machine speed increases above this threshold, the can gate will be enabled to be opened.

2: Set Canfeed Enable High Speed: This is the maximum speed the can gate is allowed to open or close to enable cans to be loaded into the machine. This defines the upper limit of the canfeed enable window. With the machine operating at production speed, the M4508 will only activate/deactivate the can gate solenoid within the canfeed enable window. When the machine goes to a stand-by condition, the speed of the machine will need to be decreased below this threshold for the can gate solenoid to be deactivated. The M4508 will activate and deactivate the can gate solenoid on the “Can Gate Timing ON” signal.

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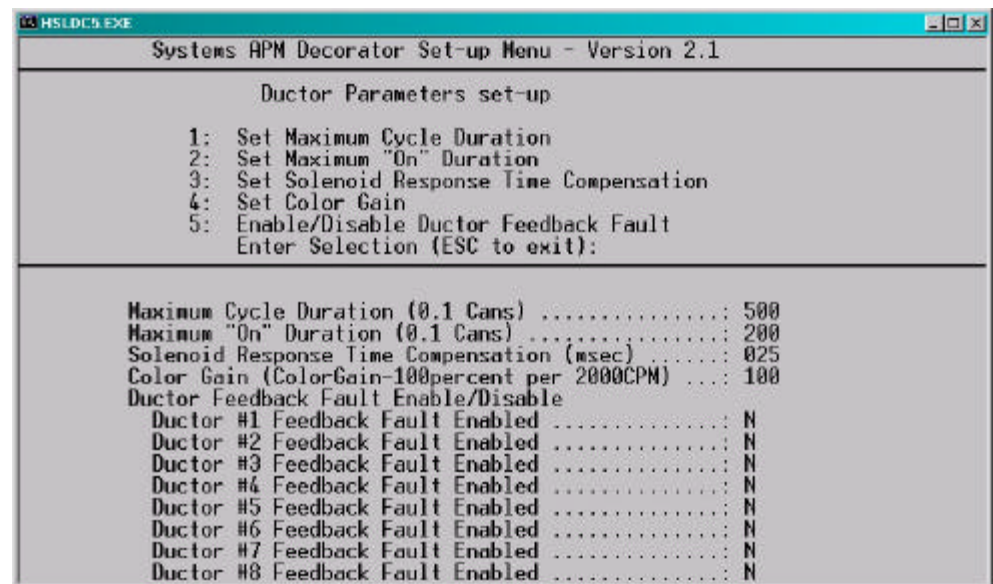
“HSLDC5” DOS BASED SETUP PROGRAM REFERENCE

- 3: Set O’Varnish Roll Speed Calibrate:** The O’Varnish drive speed input is a 0-10VDC signal from the O’Varnish drive (if available). The roll speed calibrate is used to scale this signal to display the “O’Varnish RPM”. The number entered here should equal the O’Varnish roll speed when the drive is at full speed (input = 10VDC).

5.2 SET DUCTOR PARAMETERS

This selection is used to set the ductor solenoid control parameters in the M4508.

The “Set Ductor Parameters” menu contains the following selections:



- 1: Set Maximum Cycle Duration (0.1 Cans):** The maximum cycle duration is the maximum cycle time (in 0.1 cans) for one cycle of the ductor. This parameter limits the upper value that the operator can enter for the cycle duration. If the operator attempts to enter a value higher than this limit, the value will default back to the original number. The range of this parameter is 140 - 999.

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2: Set Maximum On Duration (0.1 Cans): This parameter limits the upper value that the operator can enter for the “ON” duration. The cycle duration is the total cycle time (in 0.1 cans) that the ductor roll is in contact with the fountain roll. If the operator attempts to enter a number higher than the maximum “ON” duration, the value will default back to the previous value. The range of this parameter is 0 – 200.

3: Set Solenoid Response Time Compensation (Msec): This parameter is the difference (in msec) between the “ON” and “off” response times of the ductor solenoid. This is used to adjust the “ON” duration to compensate for the mechanical response time of the whole mechanism. As an example, if the “ON” response time was 40 msec. and the “off” response time was 15 msec. Then the value entered for this parameter would be 25 msec.

Note: If the optional feedback sensors are used, set this parameter to 0. The feedback sensors will automatically adjust the “ON” duration based on the response time of the solenoids.

4: Set Color Gain: This parameter allows the color density to be increased proportionately up or down as a function of machine speed. The valid range of this parameter is 50% to 150% per 2000 CPM. When set to 100%, no increase or decrease, as a function of speed will occur. When set to 50%, the color density will drop 50% from 0 to 2000CPM. When set to 150% the color density will increase by 50% from 0 to 2000CPM. This parameter is used to compensate for ink atomization (misting) as a function of speed (higher speed = proportionately higher ink misting).

5: Enable / Disable Ductor Feedback Fault: This selection is used to enable or disable the feedback fault detection. When the optional feedback sensors are installed, the ductor feedback faults should be enabled. The feedback sensor verifies the cycling of the ductor and resets the “ON” duration as the speed of the machine changes based on the response time of the solenoid.

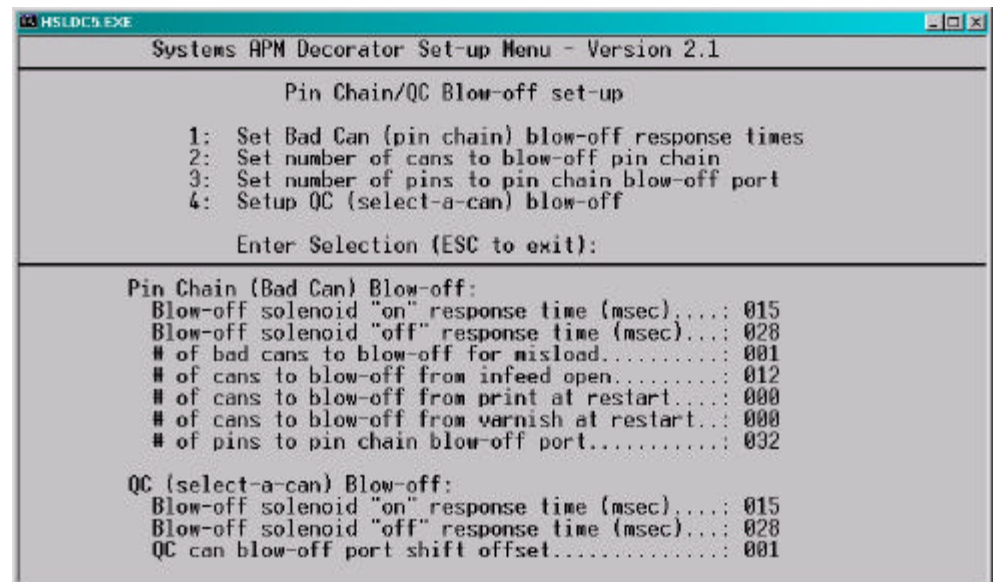
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5.3 SET PIN CHAIN/QC BLOW-OFF PARAMETERS

This selection is used to set the pin chain / QC blow-off parameters in the M4508. When selected, the “Pin Chain / QC Blow-off Set-up” menu is invoked.

The “Pin Chain/QC Blow-off Set-up” menu contains the following selections:



1: Set Bad Can (Pin Chain) Blow-off Response Times:

Bad Can Blowoff Solenoid “ON” Response Time: This is the time used as the “on” response time of the pin chain blow-off port (time from “on” solenoid actuation to first air out port) in milliseconds. The M4508 will activate the solenoid “ON” this amount of time ahead of the Pin Chain blow-off “ON” position (usually set at 15 to 20 milliseconds).

Bad Can Blowoff Solenoid “Off” Response Time: This is the time used as the “off” response time of the pin chain blow-off port (time from “off” solenoid actuation to air stopping at port) in milliseconds. The M4508 will activate the solenoid “OFF” this amount of time ahead of the Pin Chain blow-off “ON” position (usually set at 15 to 20 milliseconds for double acting solenoids and set at 25 to 30 milliseconds for single acting solenoids).

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2: Set Number of Cans to Blow-off Pin Chain:

of Bad Cans to Blowoff for Misload: This is the number of cans blown off at the pin chain port when one mis-loaded can is detected (typically set at 1 can).

of Cans to Blowoff from Infeed Open: This is the number of cans which will be blown off when the infeed is first opened. To blow off no cans at infeed open, set equal to 0, to blow off one can set equal to 1, etc.

of Cans to Blowoff from Print at Restart: This is the number of cans which will be blown off from the print station when the machine is restarted. To blow off no cans at restart, set equal to 0, to blow off one can set equal to 1, etc.

of Cans to Blowoff from Varnish at Restart: This is the number of cans which will be blown off from the varnish station when the machine is restarted. To blow off no cans at restart, set equal to 0, to blow off one can set equal to 1, etc.

3: Set Number of Pins to Pin Chain Blow-off Port: This is the number of pins from the spindle wheel to disk transfer location to the first can blown off at the Pin Chain blow-off port minus two. This can be a number from 0 to 999.

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4: Set Qc (Select-A-Can) Blow-Off:

QC Can Blowoff Solenoid “ON” Response Time: This is the time used as the “on” response time of the QC blow-off port (time from “on” solenoid actuation to first air out port) in milliseconds. The M4508 will activate the solenoid “ON” this amount of time ahead of the QC blow-off timing “ON” position (usually set at 15 to 20 milliseconds).

QC Can Blowoff Solenoid “Off” Response Time: This is the time used as the “off” response time of the QC blow-off port (time from “off” solenoid actuation to air stopping at port) in milliseconds. The M4508 will activate the solenoid “OFF” this amount of time ahead of the QC blow-off timing “ON” position (usually set at 15 to 20 milliseconds for double acting solenoids and set at 25 to 30 milliseconds for single acting solenoids).

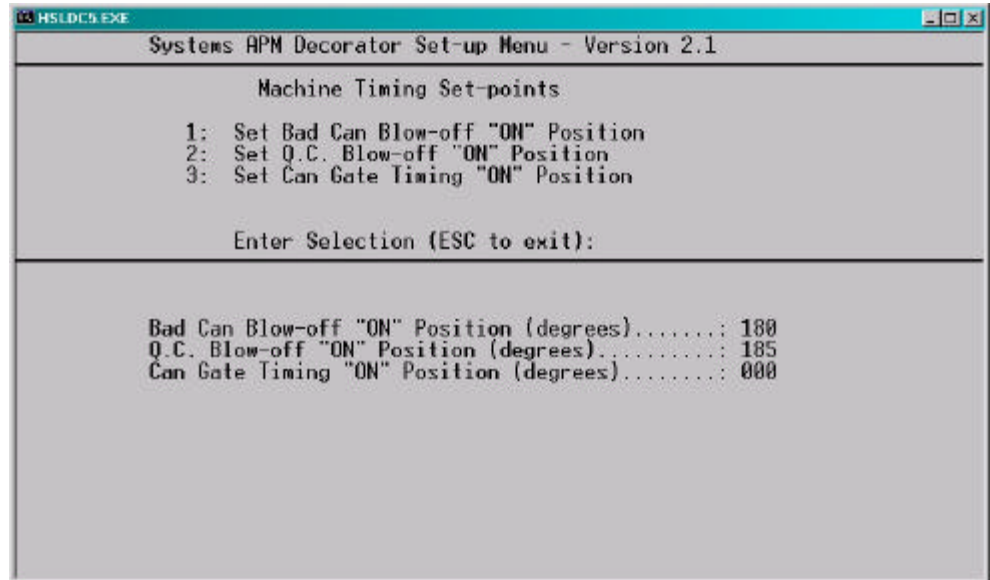
QC Can Blowoff Port Shift Offset: This is the number of spindles difference from detection of the spindle #1 flag to the QC blow-off port. This is a number between 1 and 24 and is empirically set by selecting spindle #1 for blow-off and adjusting this value until the can from spindle #1 is the can that is blown off.

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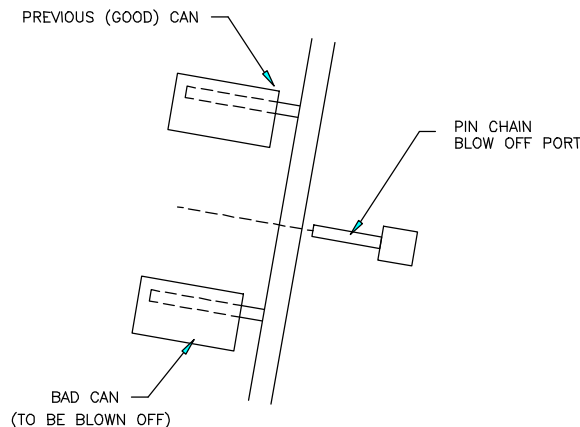
"HSLDC5" DOS BASED SETUP PROGRAM REFERENCE

5.4 ADJUST TIMING SET-POINTS

The following is a general description of the timing signals and the locations they should be set at:



- 1: Bad Can Blowoff "ON" Position:** Set this signal to turn "ON" when the pin chain blow-off port is centered between pins on the chain, (see figure below).



- 2: Q.C. Blow-off Timing "ON" Position:** Set this signal to turn "ON" when the select-a-can chain blow-off port is centered between pins on the chain, (see figure above).

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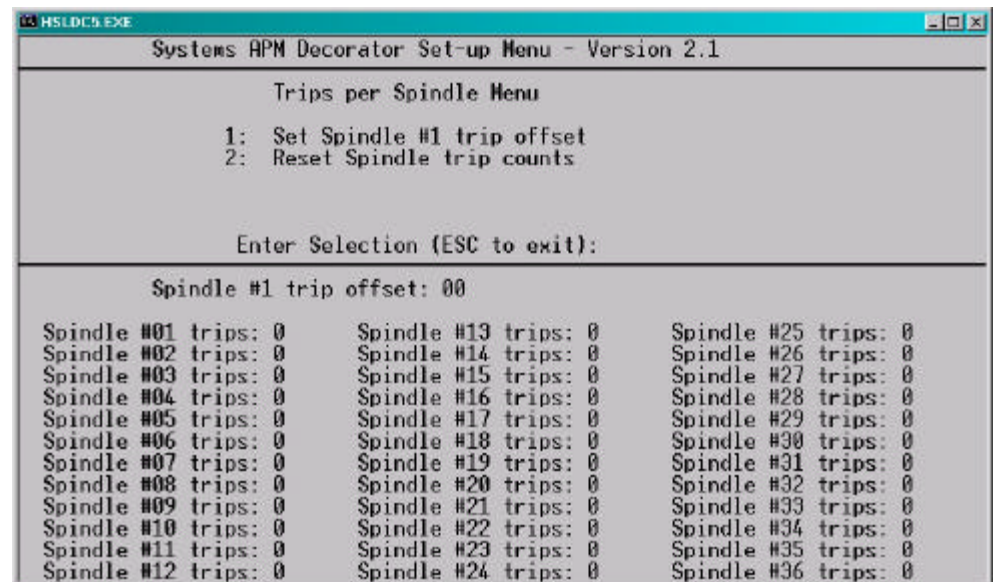
Warning: The blow-off “ON” timing can not be set within +/- 20 degrees of the Cam Reset timing (CH03 set at 320 degrees). If the optimum position for the blow-off “ON” set-point is within this window (300 to 340 degrees), the blow-off must be physically moved approximately 1 inch from its current location. The blow-off “ON” position timing can then be properly set.

3: Can Gate Timing “ON” Position: This signal is used to open and close the can gate. Adjust the “ON” Position for proper can gate operation.

5.5 NUMBER OF TRIPS PER SPINDLE DATA

The Number of trips per spindle menu is provided to aid in the trouble-shooting of loading problems with decorator. The total number of trips for each spindle since the last reset or end of shift is displayed and can be reset at anytime to aid in the trouble-shooting process. In addition, the “Spindle Trip Offset” is used to compensate for the location of the spindle #1 I.D. sensor location.

The following data is displayed in the “Trips per Spindle” menu:



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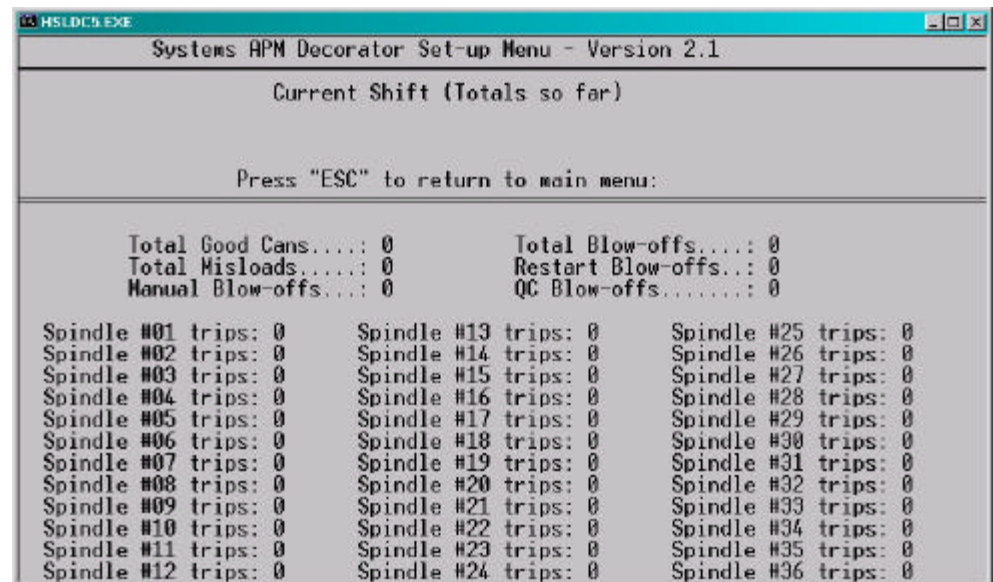
To set the spindle trip offset, select “1” and enter the required offset (see section 2.9.8 – Set Spindle Trip Shift Offset, Tuning the HSL-DC5). To reset the spindle trip counts press “2”. The counts will be reset in the M4508. To return to the main menu, press <ESC>.

Spindle #xx Trips: This is the total number of trips for each spindle. This data is displayed and updated continuously in the respective field for each spindle. A disproportionately high count for a particular spindle indicates a loading problem for that spindle.

5.6 CURRENT SHIFT DATA

This selection is used to view the Current Shift data and is the totals so far into the shift. This data is transferred to the “Last shift” when the end of shift input transfers from a “0” to a “1”. This can be at the end of either an 8 or 12 hour shift or alternatively could be done at label changes such that the data collected would be for label runs rather than complete shifts. This data is reset at the end of shift input transition. To return to the main menu, press <ESC>.

The following data is displayed in the “Current Shift” menu:



Total Good Cans: This is the total number of good cans printed so far into the shift. This is essentially a can counter.

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Total Blow-offs: This is the total number of cans blown-off the machine. This includes all types of blow-offs: cans blown-off for every mis-loaded can, infeed open blow-offs, restart blow-offs, manual blow-offs, select-a-can QC blow-offs, etc.

Total Mis-loads: This is the total number of mis-loaded cans (trips). These would be the actual number of damaged cans that did not load properly on the machine. This gives an indication of conveying/can handling problems.

Restart Blow-offs: This is the total number of cans blown off when the infeed opened and from the print station and varnish station at machine restart.

Manual Blow-offs: This is the total number of cans blown-off by the operator using the Manual Blow-off PB or selector switch.

QC Blow-offs: This is the total number of cans blown-off by the operator with the Select-A-Can QC station or QC Blow-off key on the M4508 keypad for quality verification.

Spindle #01 through #24 or #36 trips: This is the total trips (mis-loads) for each spindle. A disproportionately high count for a particular spindle indicates a loading problem for that spindle.

5.7 LAST SHIFT DATA

The “Last Shift” data is identical to the current shift data except it is for the previous 8 or 12 hour shift or previous label run, however the shift collection is set-up. This allows data collection and diagnostics to take place over a two shift period. Refer to the previous section for definitions of the data fields in the “Last Shift” data menu.

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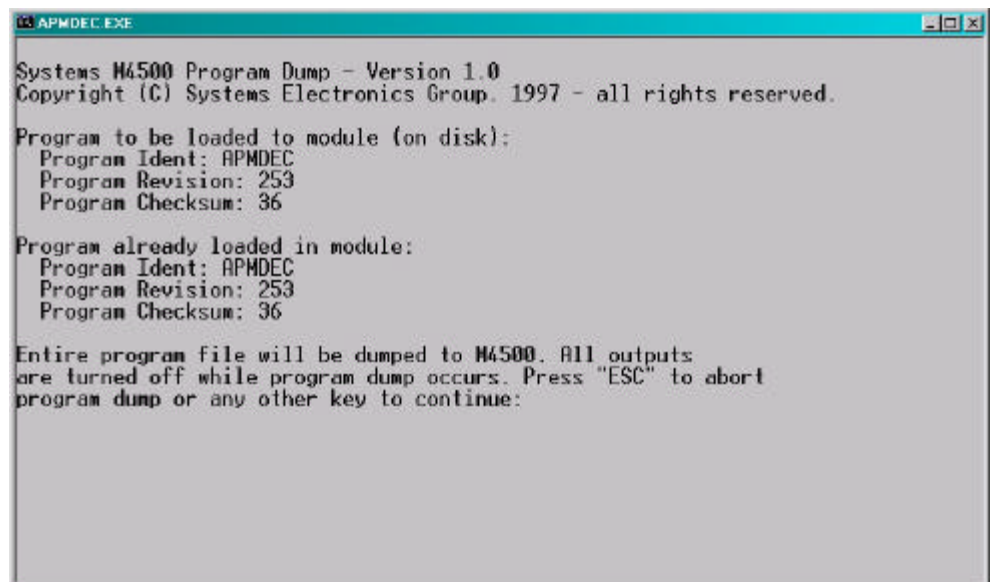
“HSLDC5” DOS BASED SETUP PROGRAM REFERENCE

5.8 DOWNLOAD PROGRAM TO MODULE

This selection is used to download the application program to the M4508 module. This should only be performed when replacing the module or when the program has been changed. To download the program, perform the following:

Note: Program download should not be performed while the decorator is running. All outputs on the M4508 are turned “off” and no program execution is performed. The decorator should therefore be stopped before the download takes place.

- 1) Connect the RS-232 cable from the COM port on the computer to the “PROG” port on the M4508.
- 2) Select “8: Download Program to Module” from the Main Menu. The current program ident, revision, and checksum for both the program on disk and already loaded in the module will be displayed. A prompt will be displayed asking to continue or abort. Press any key to continue or press the <ESC> key to abort. If a prompt stating that the file could not be opened is displayed, then the application program is not installed in the current directory.

A screenshot of a DOS-style window titled "APMDEC.EXE". The window contains text that reads: "Systems M4500 Program Dump - Version 1.0", "Copyright (C) Systems Electronics Group, 1997 - all rights reserved.", "Program to be loaded to module (on disk):", "Program Ident: APMDEC", "Program Revision: 253", "Program Checksum: 36", "Program already loaded in module:", "Program Ident: APMDEC", "Program Revision: 253", "Program Checksum: 36", and "Entire program file will be dumped to M4500. All outputs are turned off while program dump occurs. Press 'ESC' to abort program dump or any other key to continue:". The window has a standard Windows 95-style title bar with minimize, maximize, and close buttons.

```
APMDEC.EXE
Systems M4500 Program Dump - Version 1.0
Copyright (C) Systems Electronics Group, 1997 - all rights reserved.

Program to be loaded to module (on disk):
Program Ident: APMDEC
Program Revision: 253
Program Checksum: 36

Program already loaded in module:
Program Ident: APMDEC
Program Revision: 253
Program Checksum: 36

Entire program file will be dumped to M4500. All outputs
are turned off while program dump occurs. Press "ESC" to abort
program dump or any other key to continue:
```


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- 3) Once program download is initiated, program execution will cease, the current address being downloaded will be displayed, and the “RUN” LED on the module will flash continuously.
- 4) Once the download is complete, the “RUN” LED on the module will illuminate solid and program execution in the M4508 will resume. Press any key to return to the main menu.
- 5) This selection can also be used to verify the program ident, revision, and checksum without downloading the program. Perform steps 1 and 2 above but instead of initiating the download in step 2, press the <ESC> key to abort the download (once the ident, revision, and checksum have been displayed).

5.9 DOWNLOAD (RESTORE) SET-UP DATA TO MODULE

This selection is used to download the previously uploaded (saved) set-up variables to the M4508 module. This should only be performed when replacing the module.

Note: The set-up data consists of the speed parameters, pin chain/QC blow-off parameters, ductor label data and the spindle trip shift offset.

To download the set-up data, perform the following:

- 1) Connect the RS-232 cable from the COM port on the computer to the “PROG” port on the M4508.
- 2) Select “9: Download Set-up data to Module”. A prompt will be displayed asking to continue or abort. Press any key to continue, press the <ESC> key to abort.
- 3) Once data download is initiated, the current address being downloaded will be displayed.

Note: M4508 program execution is not ceased, therefore data download can be performed while the machine is running.

- 4) Once set-up data download is complete, press any key to return to the main menu.

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5.10 UPLOAD (SAVE) SET-UP DATA FROM MODULE

This selection is used to save set-up variables from the M4508 module to the hard drive (current directory selected). This should be performed anytime any of the set-up variables have been changed.

Note: When the set-up variables are changed, they are changed directly in the module, not on the file in the computer. By uploading (saving) the set-up variables to disk, they can be downloaded to the module in the event the module must be replaced.

The set-up data consists of the speed parameters, pin chain/QC blow-off parameters, ductor label data and the spindle trip shift offset. To upload the set-up data, perform the following:

- 1) Connect the RS-232 cable from the COM port on the computer to the “PROG” port on the M4508.
- 2) Select “0: Upload (Save) Set-up data from Module”. A prompt will be displayed asking to continue or abort. Press any key to continue, press the <ESC> key to abort.
- 3) Once data upload is initiated, the current address being uploaded will be displayed.

Note: M4508 program execution is not ceased, therefore data upload can be performed while the machine is running.

- 4) Once set-up data upload is complete, press any key to return to the main menu.

SECTION 6

PNEUMATIC DUCTOR COLOR CONTROL

This section describes the features of the pneumatic ductor color control. This includes the functional description, the user and operator selectable parameters, etc.

6.1 FEATURES

- Replaces the mechanically cammed ductors on the decorator.
- Directly controls the cyclic ductor solenoids to a resolution of one tenth of a can, at speeds up to 2400CPM.
- Enables the operator to perform quick label changes by recalling the ductor “Cycle” and “On” duration used the last time the particular label was run.
- Incorporates optional ductor feedback sensor inputs to compensate for the response time of the solenoid and verify that the ductors are cycling.
- Keypad adjustment of label parameters (label number, cycle duration and on duration).
- Stores label parameters for up to 100 labels.
- User selectable ductor configuration parameters including, maximum “Cycle” duration, maximum “On” duration, response time compensation and individual ductor feedback enable.
- Passcode security access for adjusting label parameters.
- Manual/Off/Auto modes of operation.
- Provides control for up to 8 ink station machines.

SECTION 6

PNEUMATIC DUCTOR

COLOR CONTROL

6.2 FUNCTIONAL DESCRIPTION

The pneumatic ductor color control replaces the mechanically cammed ductors with pneumatically controlled ductors. The ductors are now activated by air cylinders controlled by solenoids driven by the M4508. This allows the cycle duration (number of cans between one complete ductor cycle) and the duty cycle (the time the ductor is in contact with the fountain roll or “On” duration) to be adjusted independently for each ink station. This allows the ink flow rate of each station to be adjusted based on the amount of ink required for each particular color on the label.

The maximum “Cycle” duration, maximum “On” duration and “Response Time” compensation are set using the Keypad/Display. These values are used with all labels. The color control allows up to 100 labels to be saved. This allows the operator to perform quick label changes by recalling the settings used the last time the particular label was run. Thus when a label change is made, the corresponding label number is selected and settings for each ink station, used for that label previously, are used again.

When the machine first starts up, the ductors are staged “ON” in one-can increments. At the beginning of each cycle, the ductor solenoid is activated and the ductor roll comes in contact with the fountain roll. Once the “On” duration is complete, the solenoid is deactivated and the ink is transferred to the first steel roll. At the completion of the cycle, there is a 5-can dwell period before the next cycle starts. During this dwell period ductor cycling operation is checked and adjustments made to the “On” duration for the response time of the solenoids.

6.3 DUCTOR FEEDBACK

Sensors mounted on the machine sense the actuation of the ductor arm, verifies that the ductor is cycling and compensates for the response time of the solenoid. As the speed of the machine changes, the feedback sensor is used to adjust the amount of time the ductor is in contact with the fountain roll. This allows consistent ink transfer throughout the entire speed range of the machine.

If a ductor is not detected as cycling, an output is activated to indicate a fault in the ductors cycling operation.

Note: The feedback sensor must go “ON” when the ductor is in contact with the fountain roll.

6.4 OPERATOR ADJUSTABLE PARAMETERS

The following parameters can be adjusted through the “Color Control” key on the Keypad/Display:

- Label Number (0-99)
- Ink Station “On” Duration
- Ink Station “Cycle” Duration

Note: The above values are passcode protected to prevent unauthorized personnel from making adjustments. Also, the “On” duration and “Cycle” duration cannot be set with in 14 cans of one another.

Passcode protection can be enabled or disabled via the passcode itself. If the passcode is set to zero or the “Set-Up Enable” input is ON then passcode protection is disabled, otherwise passcode protection is enabled. If passcode protection is enabled, the operator must enter the proper passcode in order to make adjustments to the color control parameters. If the “Set Passcode” input is ON then a new passcode can be entered. If a passcode is not entered, the value is reset to zero.

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6.5 SET-UP PNEUMATIC DUCTOR PARAMETERS

This menu is activated when the “2” key (SET PNEUMATIC DUCTOR PARAMETERS) is pressed while the primary set-up menu is active (using the Keypad/Display). The following four set-up parameters may then be adjusted or viewed:

Note: For virtually all the menus, the <NEXT> and <PREV> keys can be used to advance to the next or previous parameter respectively. To change the currently displayed parameter, enter the new value on the numeric keypad and press <ENTER>. The value will be entered and the next parameter will automatically be displayed. When the last parameter in a section is entered, the primary set-up menu is again displayed. Pressing <ESC> at anytime will exit back to the primary set-up menu.

The following parameters are used to define the ductor configuration:

Maximum “Cycle” Duration: The maximum “Cycle” duration is set to 1/10th of a can resolution. The range of this parameter is from 140 to 650 and defines the upper limit or the longest amount of time between ductor cycles. Care should be taken not to set this parameter too low, as this would restrict the operators range of adjustment. The “Cycle” duration is set individually for each ink station and is the rate at which ink is transferred from the fountain roll.

Maximum “On” Duration: The maximum “On” duration is set to 1/10th of a can resolution. The range of this parameter is from 0 to 200 and defines the upper limit or the longest amount of time the ductor roll can be in contact with the fountain roll. The “On” duration is set individually for each ink station and is the amount of time the ductor roll is in contact with the fountain roll.

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Response Time Compensation: The response time compensation parameters is used to adjust the “On” duration based on the difference between the “ON” and “off” response time of the ductor solenoid. As an example, if the “ON” response time were 40 msec. and the “off” response time was 15 msec., then this parameter would need to be set to 25 msec.

The “ON” response time is defined as the time ductor is activated to the time it comes in contact with the fountain roll. The “off” response time is the time the ductor is deactivated to the time it lifts off of the fountain roll. If the optional feedback sensors are to be used, this parameter should be set to zero.

Color Gain: This parameter allows the color density to be increased proportionately up or down as a function of machine speed. The valid range of this parameter is 50% to 150% per 2000 CPM. When set to 100%, no increase or decrease, as a function of speed will occur. When set to 50%, the color density will drop 50% from 0 to 2000CPM. When set to 150% the color density will increase by 50% from 0 to 2000CPM. This parameter is used to compensate for ink atomization (misting) as a function of speed (higher speed = proportionately higher ink misting).

Feedback Enable (stations 1 – 8): This parameter enables the individual feedback faults and should only be used when the optional feedback sensors are used. Once enabled, the M4508 will verify that the ductor is cycling properly. If a ductor is not detected as cycling properly, the “Ductor Feedback Fault” is energized, indicating a problem with the ductor cycling control.

If a “Ductor Feedback Fault” does occur, the ductors should be manually activated to verify proper cycling operation, as well as, the sensor for proper feedback operation. The feedback sensor should be set such that it is only “ON” when the ductor is in contact with the fountain roll.

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COLOR CONTROL

6.5.1 DEFAULT DUCTOR CONFIGURATION SETTINGS

As shipped, the ductor configuration settings are as follows:

Maximum Cycle Duration (0.1 cans) _____: 500
Maximum ON Duration (0.1 cans) _____: 200
Response Time Compensation (msec) _____: 25
Color Gain (CG-100% per 2000CPM) _____: 100%
Feedback Enable (Stations 1 – 8) _____: N

6.6 MANUAL/OFF/AUTO CONTROL

The ductor MANUAL/OFF/AUTO selector switch is used to determine the mode of the ductors. The three different modes operate as follows:

MANUAL: Ductors cycle normally while the decorator is running (Ductor Auto “On” input from host PLC ignored). Ductors turn “off” (rest on first steel roll) when the decorator reaches zero speed. While the decorator is stopped, each individual ductor can be toggled “on” and “off” by pressing the keypad number corresponding to it's station. This provides a test method to verify the operation of each ductor.

OFF: Ductors always “off” (resting against first steel roll).

AUTO: Ductors cycle normally while decorator is running and the Ductor Auto “On” input from the host PLC is “on”. Ductors turn “off” when decorator reaches zero speed or when Ductor Auto “On” input from host PLC is “off”.

6.7 OVERVIEW OF KEYS RELATING TO THE COLOR CONTROL

<COLOR CONTROL>: Pressing this key allows the operator to select a new label number, adjust the “Cycle” and “On” durations, independently for each ink stations or program a new label from scratch. This key is passcode protected when the “Set-Up Enable” switch is not disabled.

When the “Color Control” key is depressed, the label selection screen is displayed. The operator may enter in a new label number or press either the <NEXT> or <ENTER> keys to advance to the next station.

<NEXT>: Pressing this key moves to the next adjustment field. Holding this key depressed for one second will move to the next field continuously. If selection has reached bottom of the order, this key will have no effect.

<PREV> (Previous): Pressing this key moves to the previous adjustment field. Holding this key depressed for one second will move to the previous field continuously. If selection is returned to the top of the order, this key will have no effect.

<INC> (Increment): Pressing this key once increments the currently selected value by one. Holding this key depressed for one second will increment the currently selected value continuously. This key is only active in the “Color Control” mode.

<DEC> (Decrement): Pressing this key once decrements the currently selected value by one. Holding this key depressed for one second will decrement the currently selected value continuously. This key is only active in the “Color Control” mode.

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6.8 RECOMMENDED PROCEDURE FOR USING THE COLOR CONTROL

With a mechanically cammed ductor, the keys on the fountain are used to control the areas the ink is applied, as well as the color quality (light or dark). The keys are adjusted proportionally to where the color was located as well as how much area the color covered and how dark the color was.

With the pneumatic ductor, the color quality is now controlled by the frequency and duty cycle of the ductor (as set through the Keypad/Display). The fountain keys are simply used to define the locations (top, bottom, middle, etc.) the color is located on the can. The keys should not be adjusted proportional as before, but should be either closed at areas where there will be no color on the can, or opened (a predefined number of turns) on areas where the color is located on the can.

This allows label changes to occur quicker by simply setting the keys open or closed at the locations required on the can, and selecting the label number for the respective label on the Keypad/Display (thus setting the color quality to the same level as previously set for that label).

The M4508 is capable of saving the settings for up to 100 labels in the internal memory. As different labels are run on the machine, different labels can be programmed and added to the internal database. When a label, which has already been programmed, is run again, simply recall the label number and the ductors will oscillate at the same frequency and duty cycle they did the last time the label was run. The only additional set-up required at label change is to set the keys open and closed at the required areas on the can.

The following sections describe the recommended procedure for setting up a label and the recommended procedure for a label change over using a label, which has previously been programmed into the color control.

6.9 SELECTING THE LABEL NUMBER

To select a label, perform the following:

- 1) Press the <COLOR CONTROL> key to enter the adjustment mode.
- 2) If the prompt “ENTER PASSCODE:” is displayed, enter the corresponding 1 to 5 digit passcode on the numeric keypad and press <ENTER>. If the prompt “ENTER PASSCODE: INCORRECT PASSCODE” is displayed, enter the correct passcode and press <ENTER>.
- 3) The “LABEL” field is displayed. Enter a new label (0-99) on the numeric keypad and press <ENTER> or press the <NEXT> key to use the existing label.

Note: The decorator must be stopped in order to change the label number.

- 4) If no further changes are to be made to the ink stations settings, press <ESC> to exit.

6.10 LIGHT/DARK COLOR ADJUSTMENT

The “On” duration and “Cycle” duration for each ink station can be set individually for each label number. The “On” duration can be viewed as a “Course” adjustment and the “Cycle” duration can be viewed as a “Fine” adjustment. Observe how changing either the “On” duration or “Cycle” duration, changes the relative “Color Density”.

Note: If an ink station is not used, simply set its “On” duration to zero to disable the cycling operation.

Use the “Color Density” display as an indication of the amount of ink being transferred by the ductor. Different settings of the “On” and “Cycle” durations will achieve the same “Color Density”.

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Note: To reduce “Light” and “Dark” variations in print between cycle times, adjust both the “On” duration and “Cycle” duration down to achieve the same “Color Density”.

For a new label or existing label that needs color adjustment, perform the following:

- 1) Press the <COLOR CONTROL> key to enter the adjustment mode if not already in adjustment mode.
- 2) To select the desired ink station for adjustment, press the <NEXT> or <PREV> keys until the desired ink station is displayed.
- 3) To lighten the color, start by decreasing the “On” duration or increasing the “Cycle” duration. Watch the “Color Density” to see how your adjustments change this value. Remember, think of the “On” duration as a “Course” adjustment and the “Cycle” duration as a “Fine” adjustment.
- 4) To darken the color, start by increasing the “On” duration or decreasing “Cycle” duration. Watch the “Color Density” to see how your adjustments change this value. Once again, think of the “On” duration as a “Course” adjustment and the “Cycle” duration as a “Fine” adjustment.
- 5) Check the color quality and continue to increase or decrease the “Color Density” until the desired color quality is achieved.
- 6) Perform steps (2) through (4) above for all ink stations used as necessary.
- 7) Once the label quality is satisfactory, press the <ESC> key to exit the adjustment mode and save the changes for the selected label.

SECTION 6

PNEUMATIC DUCTOR

COLOR CONTROL

6.11 CHANGEOVER USING AN EXISTING LABEL

When a label is run again, perform following to set-up the label at change over.

- 1) Select the respective label number on the Keypad/Display.
- 2) Set the keys open (predefined number of turns, a number which is used for all ink stations on all labels) on the areas of the can that will have ink and closed on areas that will not have ink.
- 3) Run the machine and verify that ink is being distributed on the can correctly. The ink will be metered at the same rate as previously set the last time the label was run. Only minor adjustments to the keys may be necessary to assure that ink is not distributed to areas where no color is applied (resulting in slinging due to ink build up).

SECTION 6
PNEUMATIC DUCTOR
COLOR CONTROL

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SECTION 7

RECOMMENDED SPARE PARTS

The following are recommended spares for the HSL-DC5. These parts are available through Systems Engineering Assoc. Inc.

<u>Quantity</u>	<u>Part Number</u>	<u>Description</u>
1ea.	M4508	PLC/PLS Processor/Chassis – 4 Slot
1ea.	P4500	Power Supply
1ea.	S4563	16 Point 10-30VDC Input Board
1ea.	S4573	16 point 10-30VDC Output Board
1ea.	D4591	Display/Keypad

SECTION 6
PNEUMATIC DUCTOR
COLOR CONTROL

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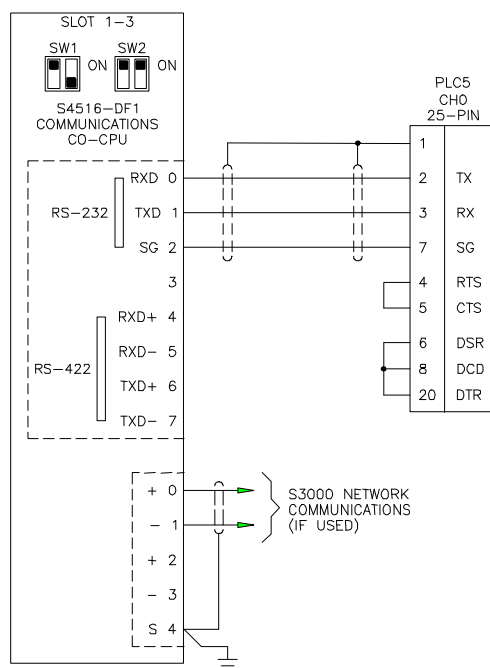
APPENDIX A

DF1 COMMUNICATIONS

HARDWARE

DF1 communication takes place via the Channel 0 port of the Allen Bradley PLC. The RS-232 cable should be constructed and connected as shown below:

S4516-DF1 to PLC5



Internally, the PLC-5 should be set up for RS-232C communication. Refer to the dip-switch settings guide on the side of the processor.

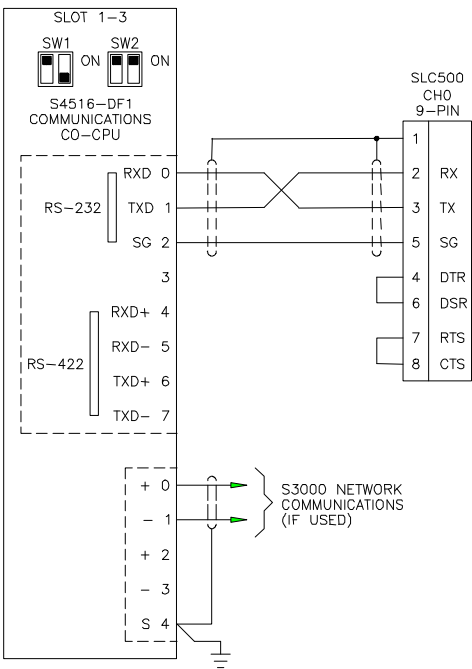
Note: The S4516-DF1 should be switched for RS-232 communication.

Dip switch SW1 is the RS-232/RS-422 dip switch should be set to:
POLE 1 = ON
POLE 2 = OFF

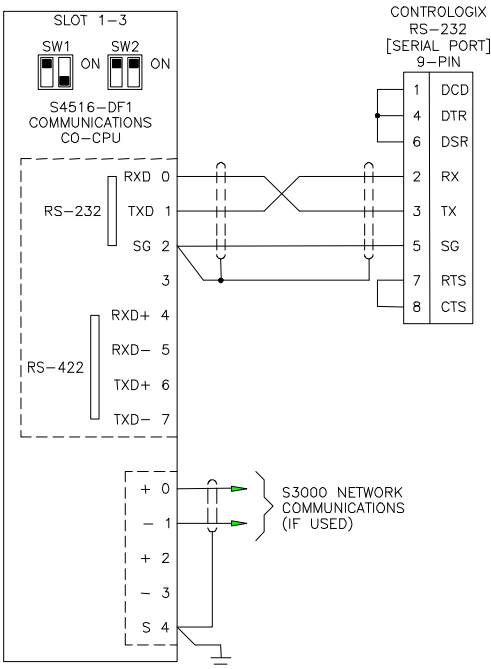
Dip switch SW2 is the slot address, and is dependent upon the rest of the cards in the M4500 rack and should be set to:
POLE 1 = ON
POLE 2 = ON

APPENDIX A
DF1 COMMUNICATIONS

S4516-DF1 to SLC



S4516-DF1 to ControLogix

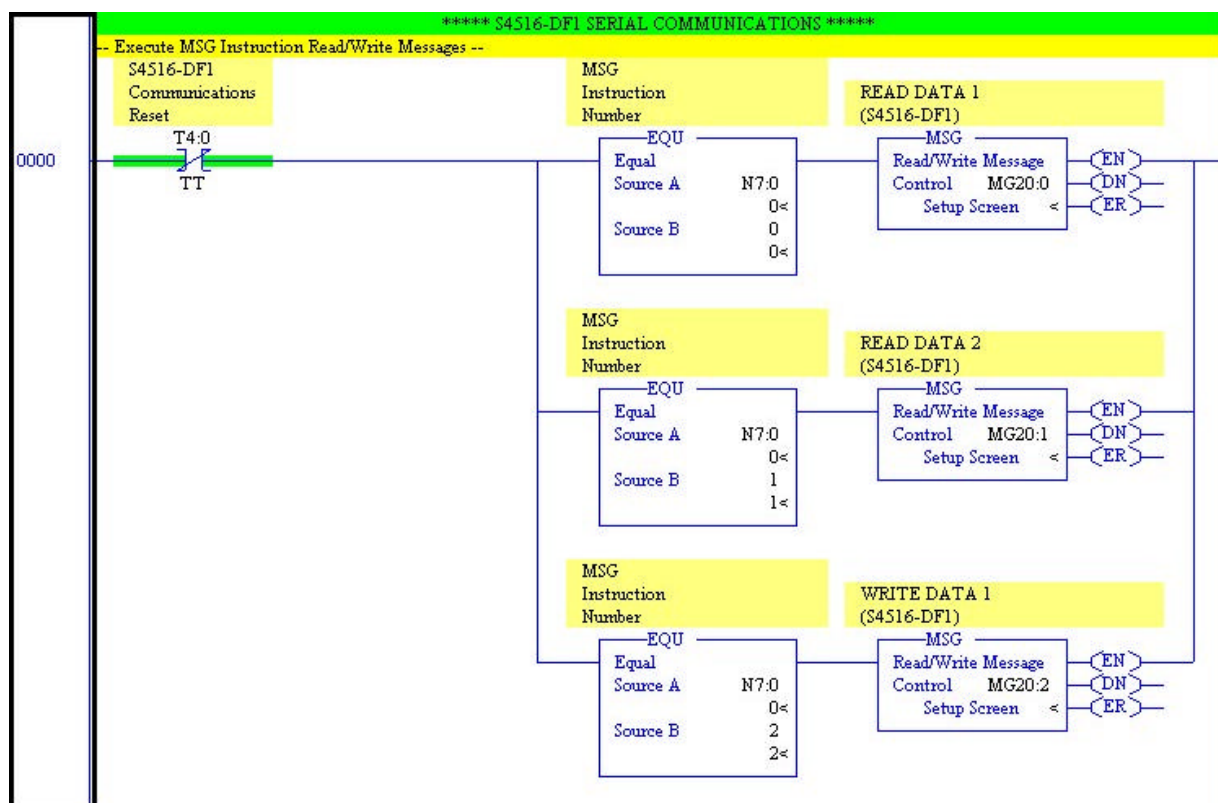


APPENDIX A DF1 COMMUNICATIONS

SOFTWARE

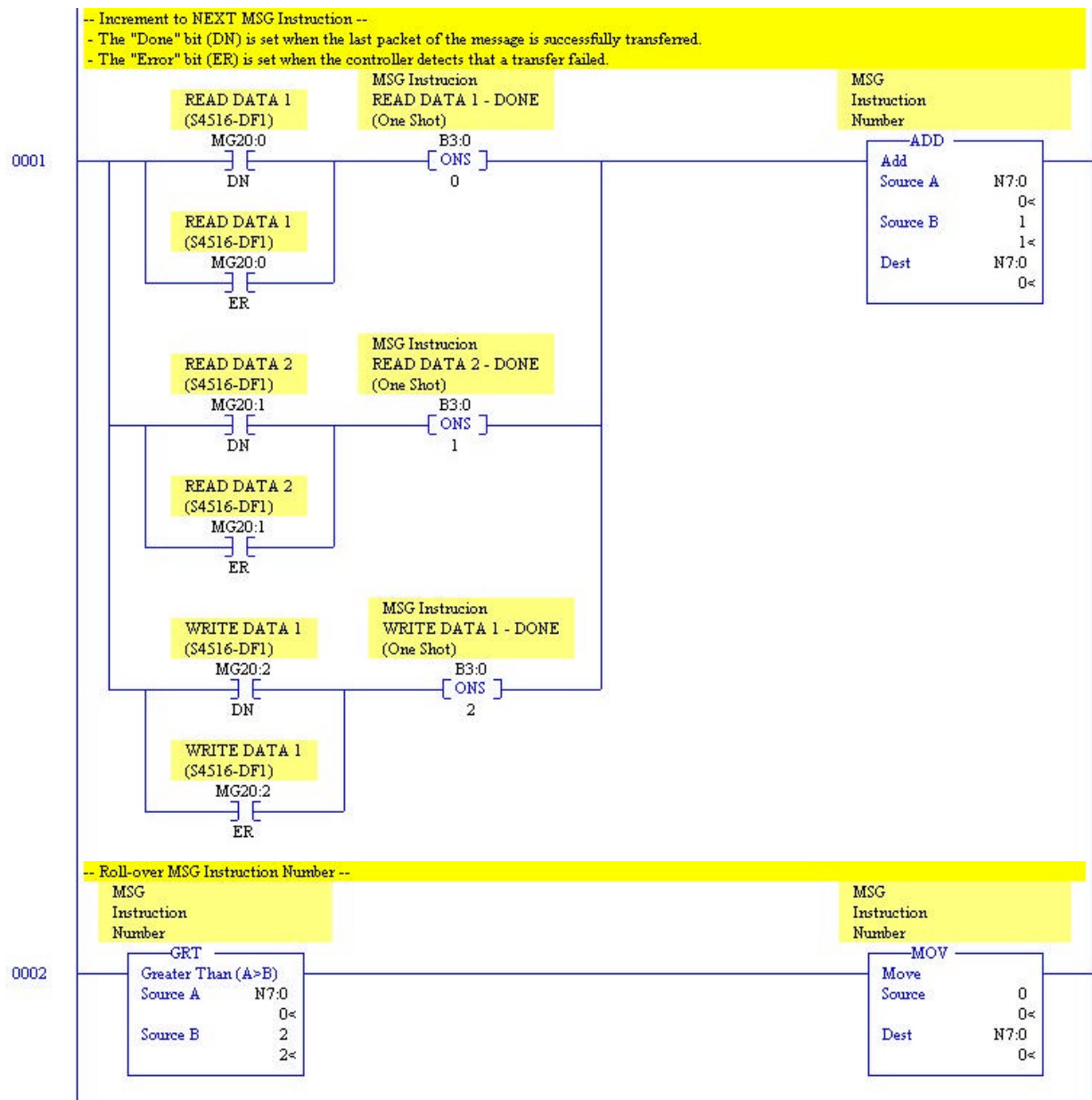
PLC5

The following sample RSLogix5 code is used to execute the message control function to allow a PLC5 processor to communicate with the S4516-DF1 serial communications board.



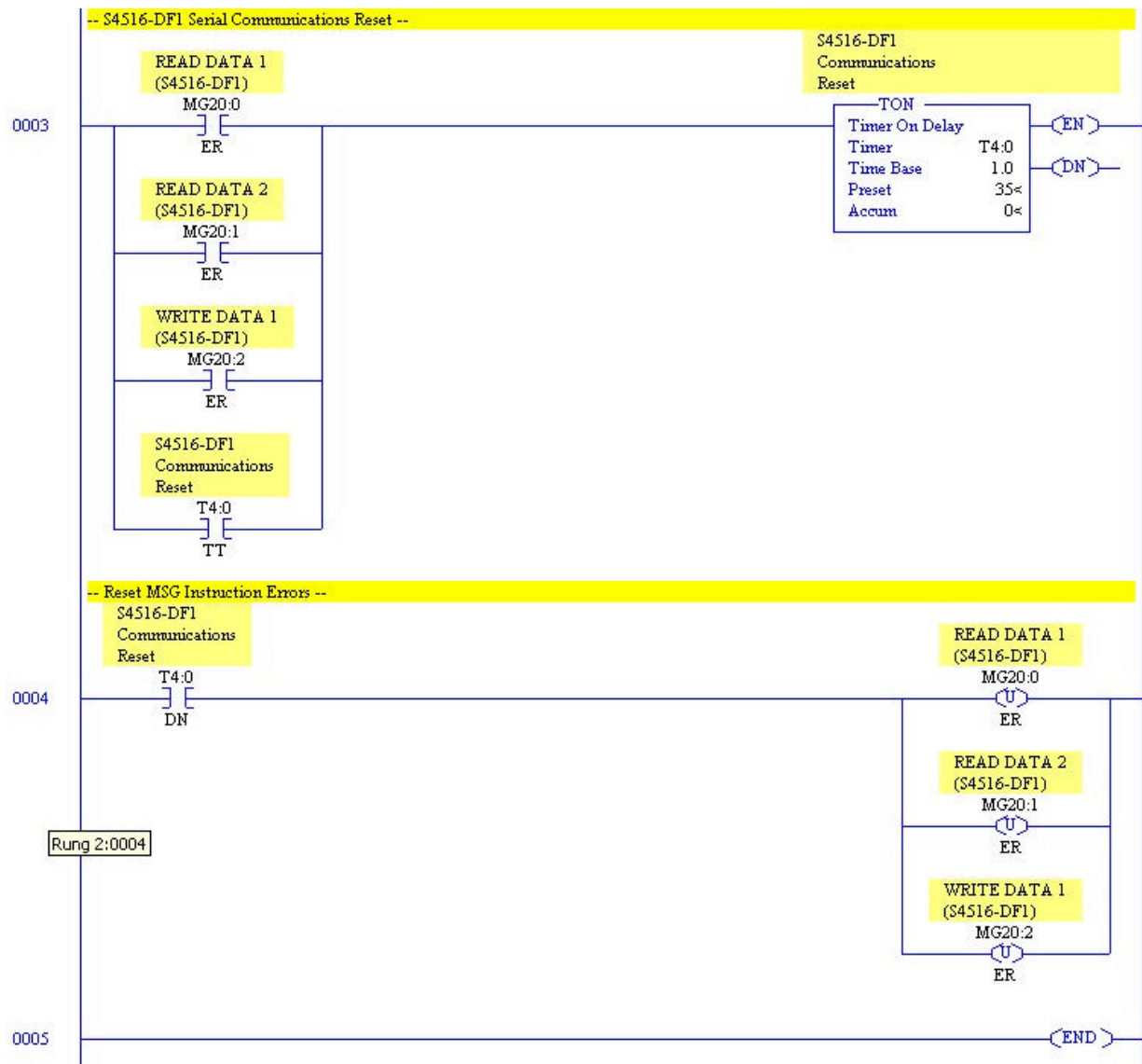
APPENDIX A

DF1 COMMUNICATIONS



APPENDIX A

DF1 COMMUNICATIONS

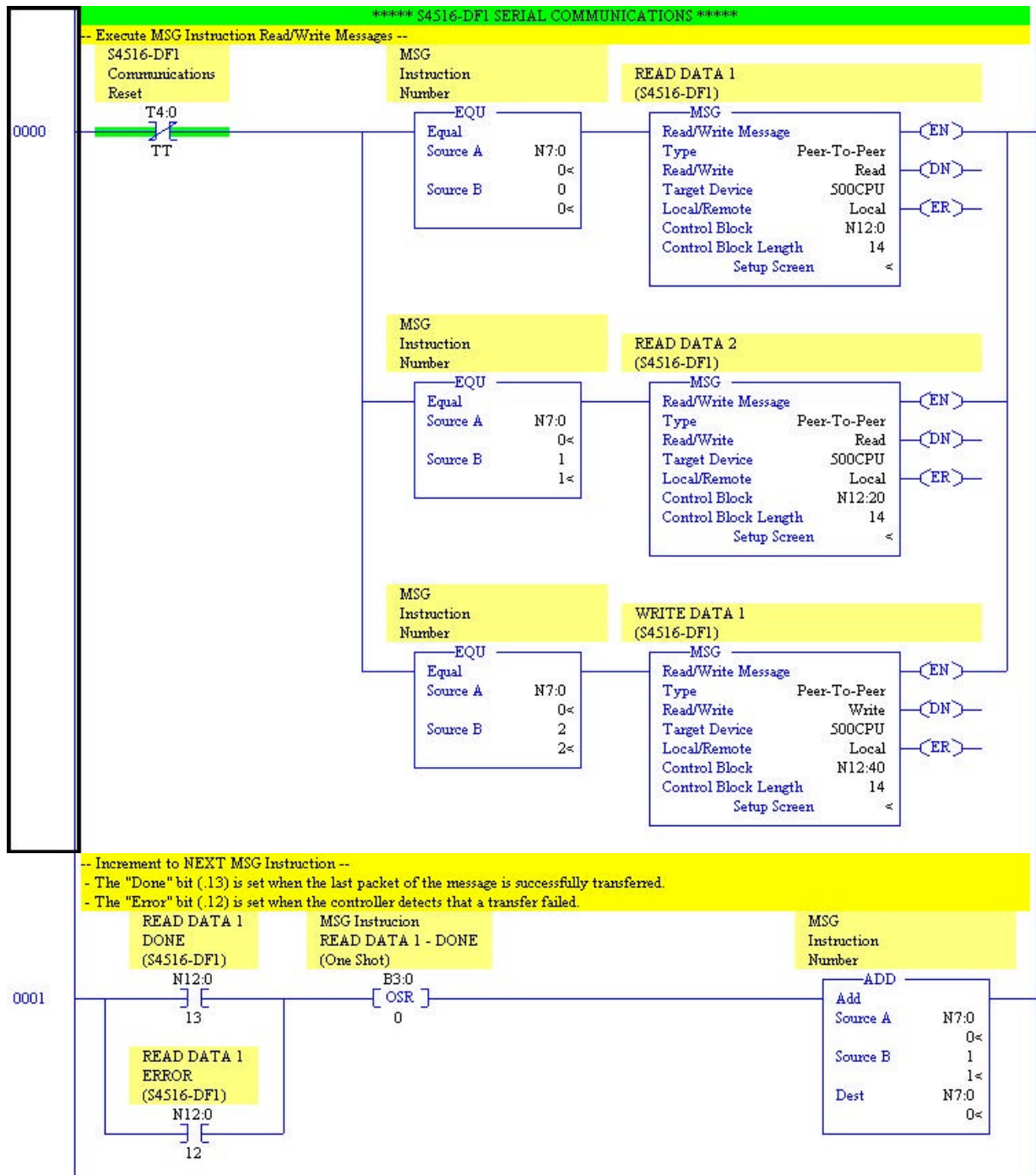


APPENDIX A

DF1 COMMUNICATIONS

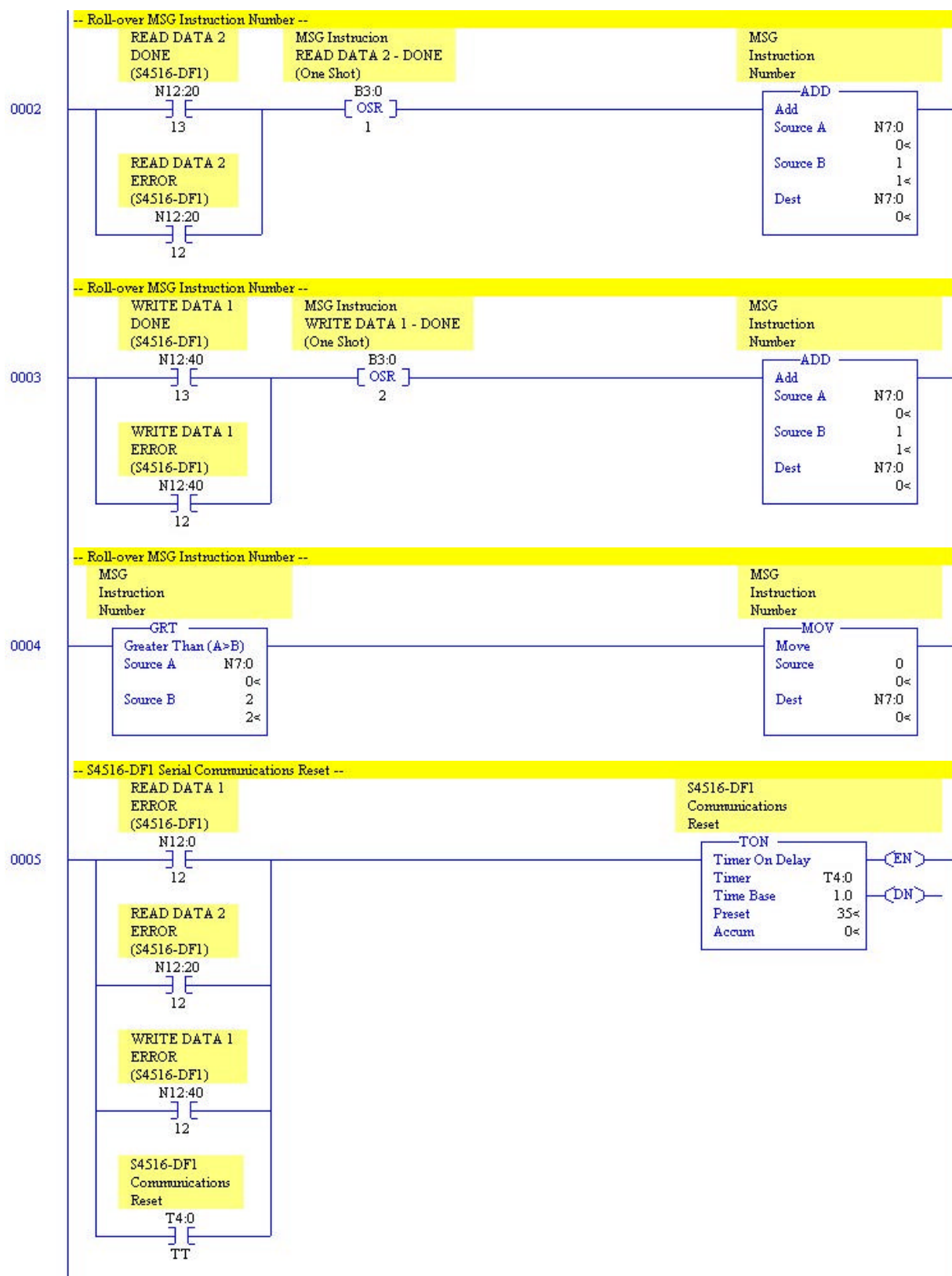
SLC500

The following sample RSLogix500 code is used to execute the message control function to allow a SLC500 processor to communicate with the S4516-DF1 serial communications board.



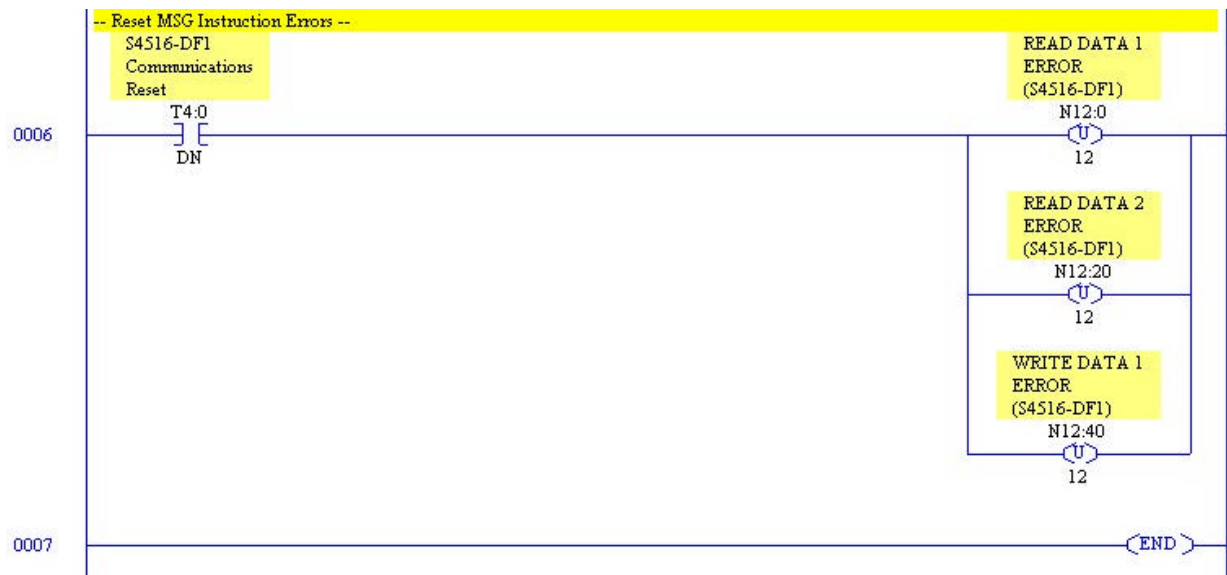
APPENDIX A

DF1 COMMUNICATIONS



APPENDIX A

DF1 COMMUNICATIONS

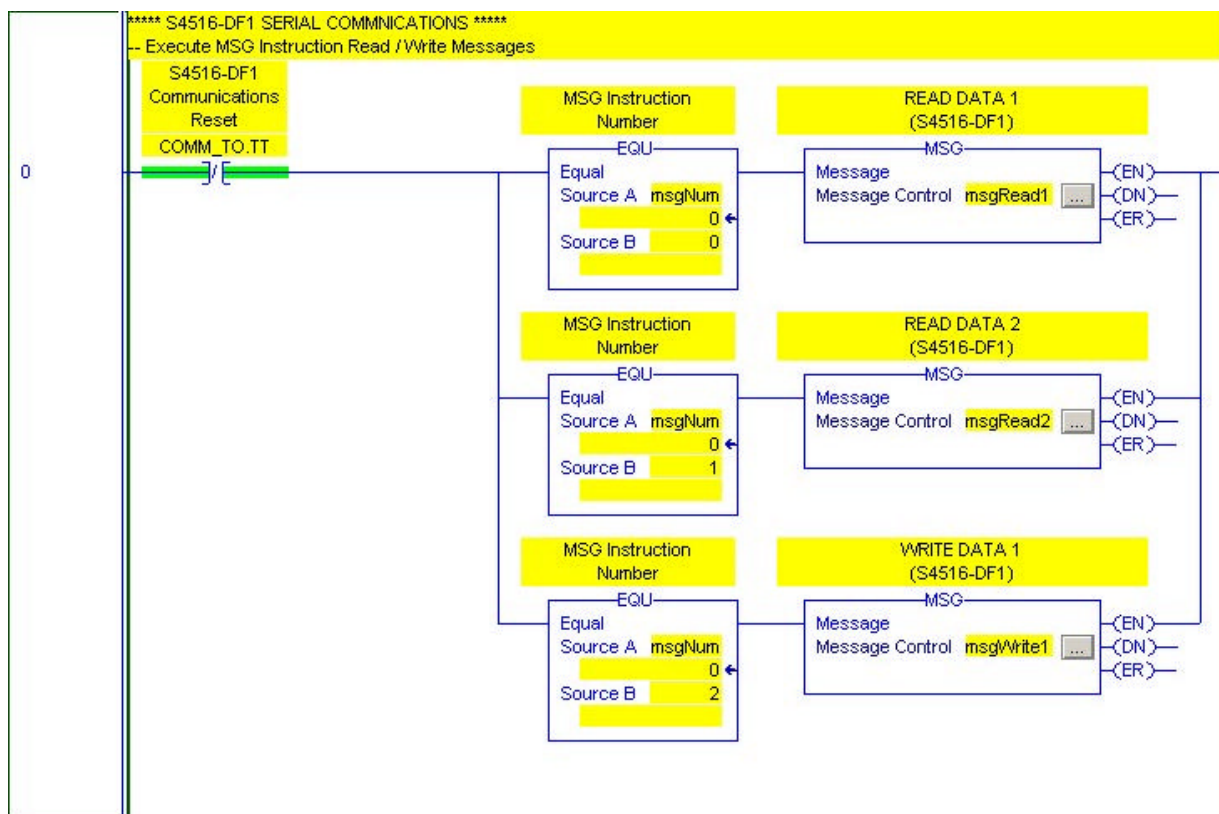


APPENDIX A

DF1 COMMUNICATIONS

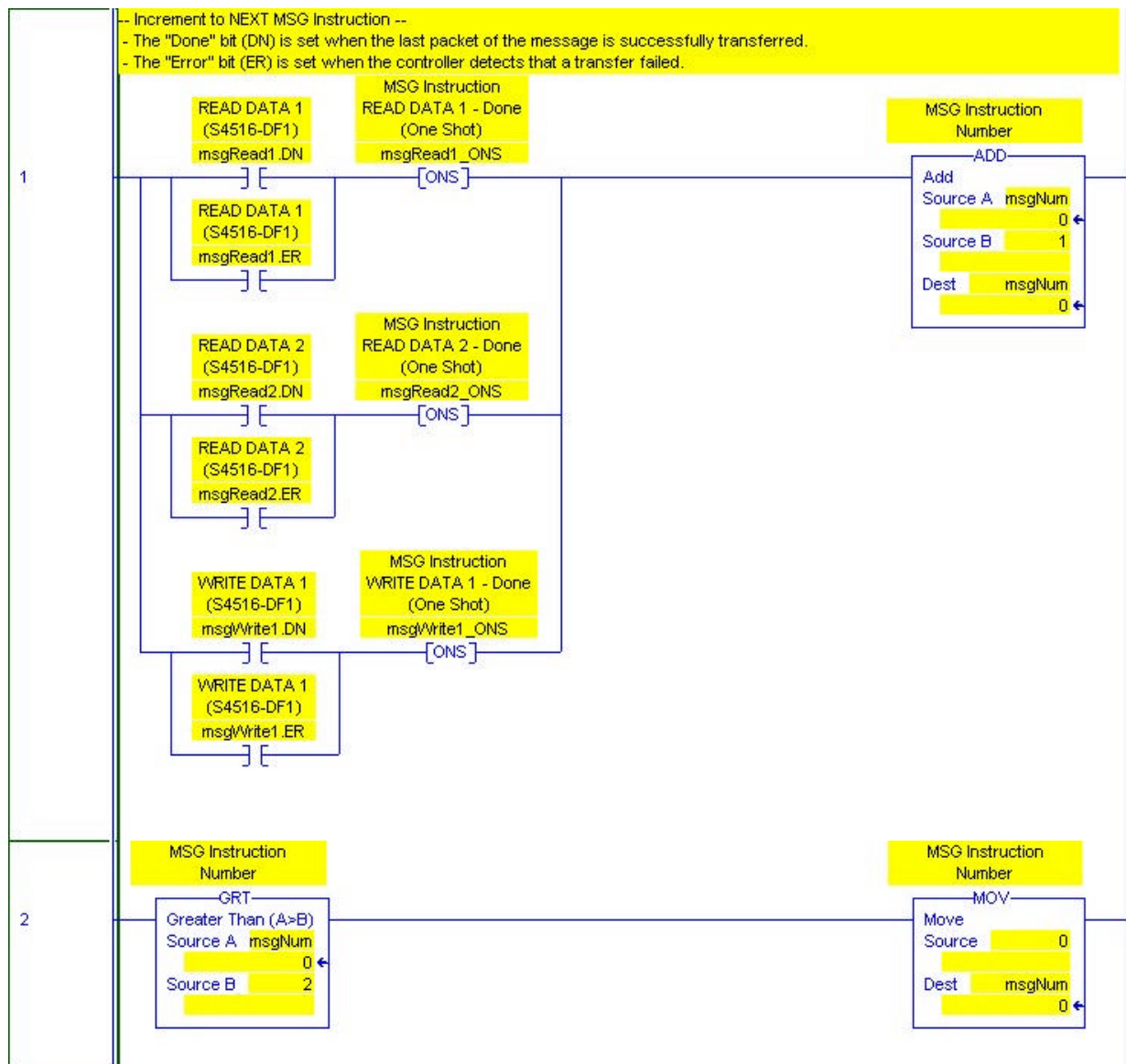
ControlLogix and CompactLogix

The following sample RSLogix5000 code is used to execute the message control function to allow a ControlLogix or CompactLogix processor to communicate with the S4516-DF1 serial communications board.

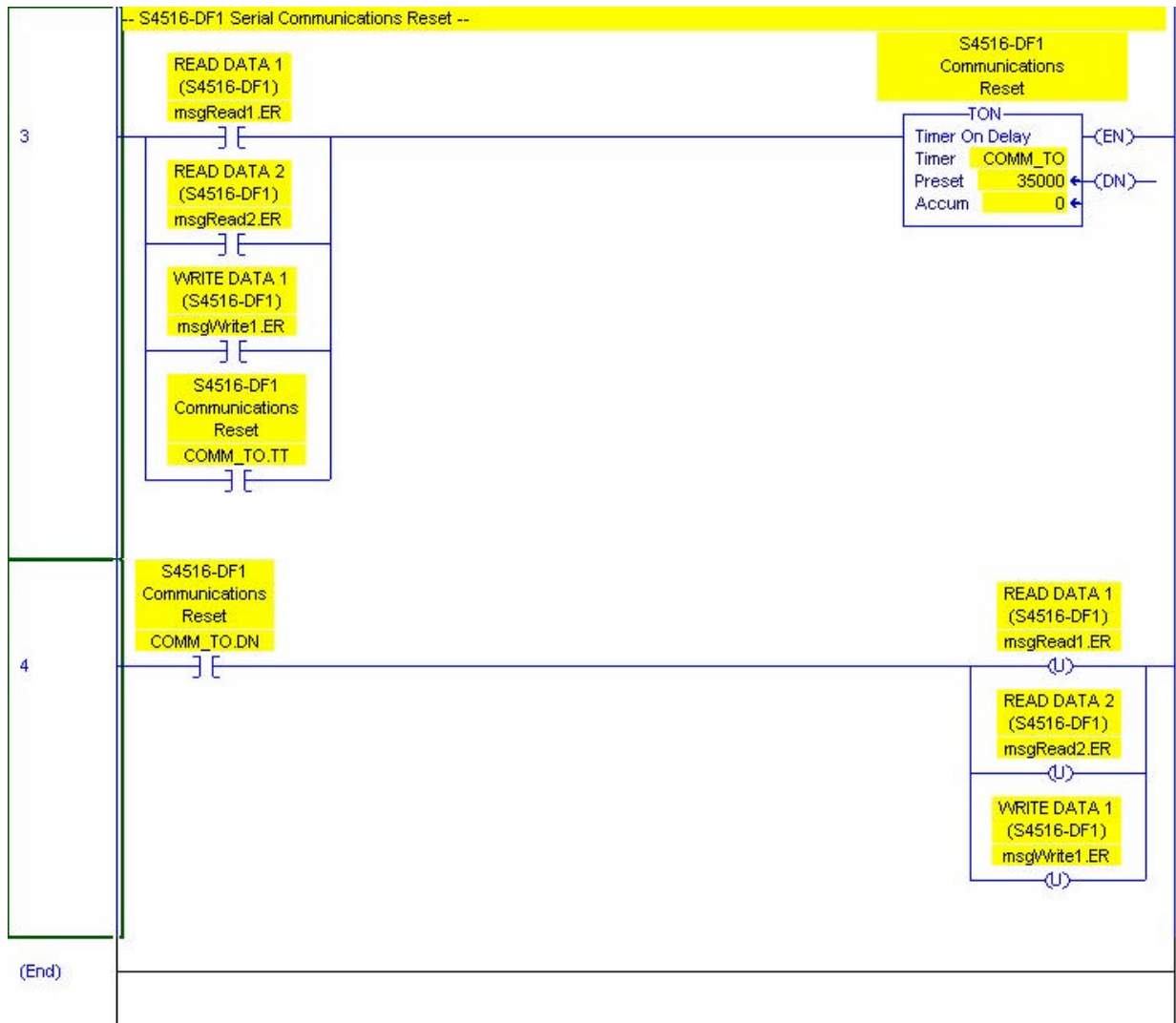


APPENDIX A

DF1 COMMUNICATIONS



APPENDIX A DF1 COMMUNICATIONS



APPENDIX A

DF1 COMMUNICATIONS

USING THE MSG INSTRUCTION

READ INSTRUCTION – PLC5

The read message (MSG) command for a PLC5 is setup as follows:

MSG - MG20:0 : (1 Elements)

General

This PLC-5

Communication Command : SLC Typed Logical Read

Data Table Address : N10:0

Size in Elements : 100

Port Number : 0

Target Device

Data Table Address : N7:0

Local Station Address (oct) : 1 (dec) : 1

Local / Remote : Local

Control Bits

Ignore if timed out (TO) : 0

To be retried (NR) : 0

Awaiting Execution (EW) : 0

Continuous Run (CO) : 0

Error (ER) : 0

Message done (DN) : 0

Message Transmitting (ST) : 0

Message Enabled (EN) : 0

Error

Error Code(Hex): 0

Error Description

No errors

MSG - MG20:1 : (1 Elements)

General

This PLC-5

Communication Command : SLC Typed Logical Read

Data Table Address : N10:100

Size in Elements : 50

Port Number : 0

Target Device

Data Table Address : N7:100

Local Station Address (oct) : 1 (dec) : 1

Local / Remote : Local

Control Bits

Ignore if timed out (TO) : 0

To be retried (NR) : 0

Awaiting Execution (EW) : 0

Continuous Run (CO) : 0

Error (ER) : 0

Message done (DN) : 0

Message Transmitting (ST) : 0

Message Enabled (EN) : 0

Error

Error Code(Hex): 0

Error Description

No errors

APPENDIX A

DF1 COMMUNICATIONS

Note: The “Communication Command is SLC Typed Logical Read. The Data Table Address can be any integer file address. The 150 elements (total) read from the M4500 PLC are defined in the last section – Read/Write Data Definitions.

The Local Station Address is only necessary to define if communications with the S4516-DF1 is executed over a Data Highway network (via a DataLink Module).

WRITE INSTRUCTION – PLC5

The write message (MSG) command for a PLC5 is setup as follows:

MSG - MG20:2 : (1 Elements)

General

This PLC-5

Communication Command : SLC Typed Logical Write

Data Table Address : N11:0

Size in Elements : 10

Port Number : 0

Target Device

Data Table Address : N7:150

Local Station Address (oct): 1 (dec): 1

Local / Remote : Local

Control Bits

Ignore if timed out (TO): 0

To be retried (NR): 0

Awaiting Execution (EW): 0

Continuous Run (CO): 0

Error (ER): 0

Message done (DN): 0

Message Transmitting (ST): 0

Message Enabled (EN): 0

Error

Error Code(Hex): 0

Error Description

No errors

Note: The “Communication Command” is SLC Typed Logical Write. The Data Table Address can be any integer file address. The 10 elements written to the M4500 PLC are defined in the last section – Read/Write Data Definitions.

APPENDIX A

DF1 COMMUNICATIONS

READ INSTRUCTION – SLC500

The read message (MSG) command for a SLC500 is setup as follows:

MSG - N12:0 : (14 Elements)

General

This Controller

Communication Command: 500CPU Read

Data Table Address: N10:0

Size in Elements: 100

Channel: 0

Target Device

Message Timeout: 5

Data Table Address: N7:0

Local Node Addr (dec): 1 (octal): 1

Local / Remote: Local

Control Bits

Ignore if timed out (TO): 0

To be retried (NR): 0

Awaiting Execution (EW): 0

Continuous Run (CO): 0

Error (ER): 0

Message done (DN): 0

Message Transmitting (ST): 0

Message Enabled (EN): 0

Waiting for Queue Space: 0

Error

Error Code(Hex): 0

Error Description

No errors

MSG - N12:20 : (14 Elements)

General

This Controller

Communication Command: 500CPU Read

Data Table Address: N10:100

Size in Elements: 50

Channel: 0

Target Device

Message Timeout: 5

Data Table Address: N7:100

Local Node Addr (dec): 1 (octal): 1

Local / Remote: Local

Control Bits

Ignore if timed out (TO): 0

To be retried (NR): 0

Awaiting Execution (EW): 0

Continuous Run (CO): 0

Error (ER): 0

Message done (DN): 0

Message Transmitting (ST): 0

Message Enabled (EN): 0

Waiting for Queue Space: 0

Error

Error Code(Hex): 0

Error Description

No errors

Note: The Data Table Address can be any integer file address. The 150 elements (total) read from the M4500 PLC are defined in the last section – Read/Write Data Definitions.

APPENDIX A

DF1 COMMUNICATIONS

The Local Station Address is only necessary to define if communications with the S4516-DF1 is executed over a Data Highway network (via a DataLink Module).

WRITE INSTRUCTION – SLC500

The write message (MSG) command for a SLC500 is setup as follows:

MSG - N12:40 : (14 Elements)

General

This Controller

Communication Command: 500CPU Write

Data Table Address: N11:0

Size in Elements: 10

Channel: 0

Target Device

Message Timeout: 5

Data Table Address: N7:150

Local Node Addr (dec): 1 (octal): 1

Local / Remote: Local

Control Bits

Ignore if timed out (TO): 0

To be retried (NR): 0

Awaiting Execution (EW): 0

Continuous Run (CO): 0

Error (ER): 0

Message done (DN): 0

Message Transmitting (ST): 0

Message Enabled (EN): 0

Waiting for Queue Space: 0

Error

Error Code(Hex): 0

Error Description

No errors

Note: The Data Table Address can be any integer file address. The 10 elements written to the M4500 PLC are defined in the last section – Read/Write Data Definitions.

APPENDIX A DF1 COMMUNICATIONS

READ INSTRUCTION CONFIGURATION – CONTROLOGIX

The read message (MSG) configuration for a ControLogix PLC is setup as follows:

The screenshot shows the 'Message Configuration - msgRead1' dialog box. It has three tabs: 'Configuration', 'Communication', and 'Tag'. The 'Configuration' tab is active. The 'Message Type' is set to 'SLC Typed Read'. The 'Source Element' is 'N7:0'. The 'Number Of Elements' is '100'. The 'Destination Element' is 'DF1_Read[0]'. There is a 'New Tag...' button. At the bottom, there are radio buttons for 'Enable', 'Enable Waiting', 'Start', and 'Done'. The 'Done Length' is '0'. There are also radio buttons for 'Error Code' and 'Extended Error Code', and a checkbox for 'Timed Out' with a blue arrow icon. At the bottom right are buttons for 'OK', 'Cancel', 'Apply', and 'Help'.

The screenshot shows the 'Message Configuration - msgRead2' dialog box. It has three tabs: 'Configuration', 'Communication', and 'Tag'. The 'Configuration' tab is active. The 'Message Type' is set to 'SLC Typed Read'. The 'Source Element' is 'N7:100'. The 'Number Of Elements' is '50'. The 'Destination Element' is 'DF1_Read[100]'. There is a 'New Tag...' button. At the bottom, there are radio buttons for 'Enable', 'Enable Waiting', 'Start', and 'Done'. The 'Done Length' is '0'. There are also radio buttons for 'Error Code' and 'Extended Error Code', and a checkbox for 'Timed Out' with a blue arrow icon. At the bottom right are buttons for 'OK', 'Cancel', 'Apply', and 'Help'.

Note: The “Message Type” is SLC Typed Read. The Destination Element can be any integer array. The 150 elements (total) read from the M4500 PLC are defined in the last section – Read/Write Data Definitions.

APPENDIX A DF1 COMMUNICATIONS

WRITE INSTRUCTION CONFIGURATION – CONTROLOGIX

The write message (MSG) configuration for a ControLogix PLC is setup as follows:

The screenshot shows the 'Message Configuration - msgWrite1' dialog box. It has three tabs: 'Configuration', 'Communication', and 'Tag'. The 'Configuration' tab is selected. Inside the dialog, there are several fields and controls:

- Message Type:** A dropdown menu set to 'SLC Typed Write'.
- Source Element:** A dropdown menu set to 'DF1_Write[0]'. There is a 'New Tag...' button to the right.
- Number Of Elements:** A numeric field set to '10'.
- Destination Element:** A text field set to 'N7:150'.
- Enable/Disable Options:** Four radio buttons: 'Enable', 'Enable Waiting', 'Start', and 'Done'. 'Enable' is selected.
- Done Length:** A numeric field set to '0'.
- Error Handling:** Two radio buttons: 'Error Code' and 'Extended Error Code'. 'Error Code' is selected. There is also a checkbox for 'Timed Out' which is unchecked.
- Error Path:** A text field.
- Error Text:** A text field.
- Buttons:** 'OK', 'Cancel', 'Apply', and 'Help' at the bottom.

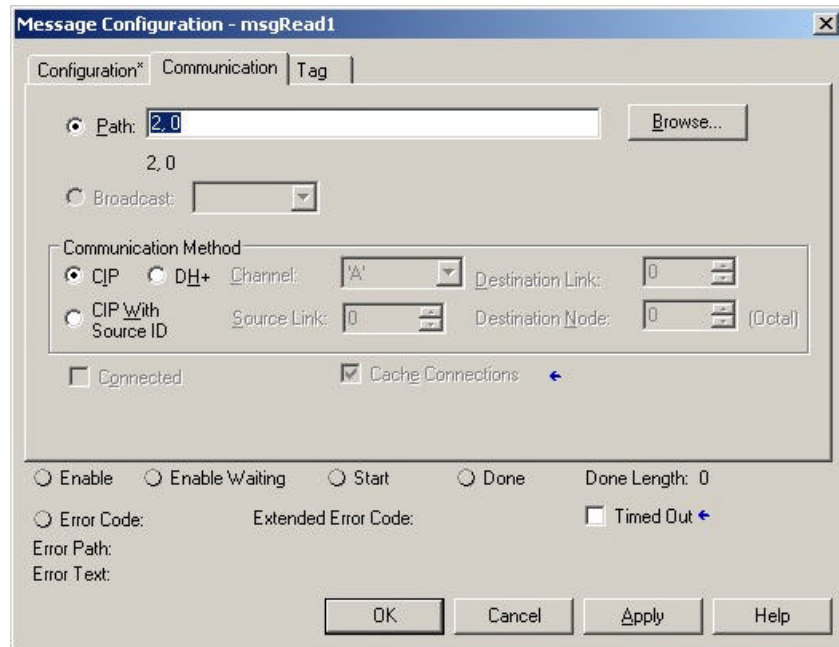
Note: The “Message Type” is SLC Typed Write. The Source Element can be any integer array. The 10 elements written to the M4500 PLC are defined in the last section – Read/Write Data Definitions.

APPENDIX A

DF1 COMMUNICATIONS

COMMUNICATION TAB - CONTROLOGIX

The communication configuration for a ControLogix PLC is setup as follows:



The “Path” describes the route the message takes to get to the destination. The format of the “Path” uses this format:
port, next_address

For serial DF1 communications, the *port* is “DF1 serial, channel 0” (Type = 2), *next_address* is for the station address (0-254). Since there is only the direct link from channel 0 to the User Port on the S4516-DF1 board, the *next_address* is set for station 0.

APPENDIX A DF1 COMMUNICATIONS

TAG TAB - CONTROLOGIX

The Tag configuration for a ControlLogix PLC is setup as follows:

The screenshot shows a software window titled "Message Configuration - msgRead1" with three tabs: "Configuration*", "Communication", and "Tag". The "Tag" tab is selected. Inside the tab, there are several fields and controls:

- Name:** A text box containing "msgRead1".
- Description:** A list box containing "READ DATA 1 (S4516-DF1)".
- Type:** A dropdown menu set to "Base".
- Data Type:** A dropdown menu set to "MESSAGE".
- Scope:** A dropdown menu set to "S4516DF1_CLX".
- External Access:** A dropdown menu set to "Read Only".
- Buttons:** "Enable", "Enable Waiting", "Start", "Done", "Done Length: 0", "Error Code", "Extended Error Code:", "Timed Out" (with a dropdown arrow), "Error Path:", and "Error Text:".
- Bottom Buttons:** "OK", "Cancel", "Apply", and "Help".

Note: The Tag “Data Type” must be MESSAGE and must be defined at the “Controller” scope level.

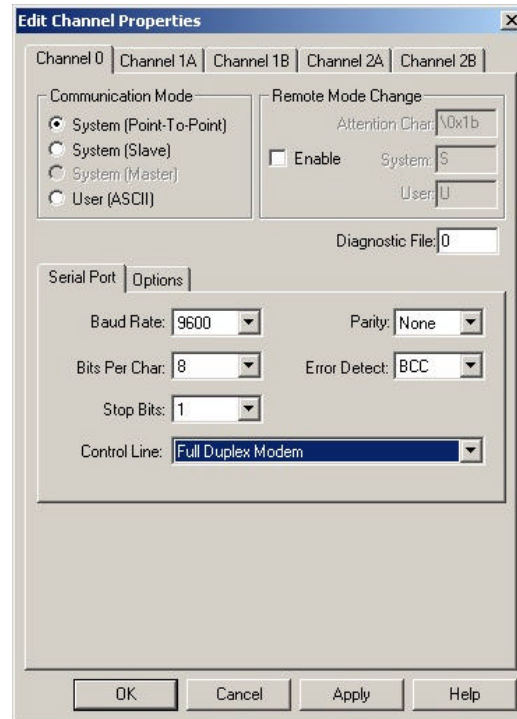
APPENDIX A

DF1 COMMUNICATIONS

CHANNEL 0 SETUP

PLC5

The Channel 0 Serial Port should be setup as follows:



Note: The Communication Mode is setup for System (Point-to-Point).

APPENDIX A

DF1 COMMUNICATIONS

PLC5

The Channel 0 Options are setup as follows:

The screenshot shows the 'Edit Channel Properties' dialog box with the 'Channel 0' tab selected. The 'Communication Mode' section has four radio buttons: 'System (Point-To-Point)' (selected), 'System (Slave)', 'System (Master)', and 'User (ASCII)'. The 'Remote Mode Change' section has an 'Attention Char' field set to '\0x1b', an 'Enable' checkbox (unchecked), and 'System' and 'User' fields set to 'S' and 'U' respectively. The 'Diagnostic File' field is set to '0'. Below these are tabs for 'Serial Port' and 'Options'. The 'Options' tab is active, showing 'NAK Receive' set to 3, 'DF1 ENQs' set to 3, and 'ACK Timeout (20ms)' set to 50. There is an unchecked checkbox for 'Detect Duplicate Messages' and a 'Message Application Timeout' dropdown menu set to '30 seconds'. At the bottom are 'OK', 'Cancel', 'Apply', and 'Help' buttons.

Note: The “Detect Duplicate Messages” should be unchecked.

APPENDIX A

DF1 COMMUNICATIONS

SLC500

The Channel 0 Serial Port should be setup as follows:

The image shows a 'Channel Configuration' dialog box with four tabs: 'General', 'Chan. 1 - System', 'Chan. 0 - System', and 'Chan. 0 - User'. The 'Chan. 0 - System' tab is selected. The dialog is divided into two sections: 'Channel 1' and 'Channel 0'.

Channel 1 settings:

- Driver: Ethernet
- ☐ Write Protected
- Passthru Link ID (dec): 2
- Edit Resource/Owner Timeout (x1 sec): 60
- Diagnostic File: 0

Channel 0 settings:

- System Driver: DF1 Full Duplex
- Mode: System (dropdown menu)
- ☐ Write Protected
- Passthru Link ID (dec): 1
- Edit Resource/Owner Timeout (x1 sec): 60
- Diagnostic File: 0
- User Driver: ASCII
- ☐ Mode Change Enabled
- Mode Attention Character: \1b
- System Mode Character: S
- User Mode Character: U

At the bottom of the dialog are four buttons: OK, Cancel, Apply, and Help.

APPENDIX A DF1 COMMUNICATIONS

SLC500

The Channel 0 Options are setup as follows:

The image shows a 'Channel Configuration' dialog box with four tabs: 'General', 'Chan. 1 - System', 'Chan. 0 - System', and 'Chan. 0 - User'. The 'Chan. 0 - User' tab is selected. The settings are as follows:

Parameter	Value
Driver	DF1 Full Duplex
Baud	9600
Parity	NONE
Stop Bits	1
Source ID	9 (decimal)
Control Line	No Handshaking
Error Detection	BCC
Embedded Responses	Enabled
Duplicate Packet Detect	<input type="checkbox"/> (unchecked)
ACK Timeout (x20 ms)	50
NAK Retries	3
ENQ Retries	3

Buttons at the bottom: OK, Cancel, Apply, Help.

Note: The “Duplicate Packet Detect” should be unchecked.

APPENDIX A

DF1 COMMUNICATIONS

CONTROLOGIX

The Serial Port (Channel 0) should be setup as follows:

The screenshot shows the 'Controller Properties - S4516DF1_CLX' dialog box with the 'Serial Port' tab selected. The 'Mode' is set to 'System'. The 'Baud Rate' is 9600, 'Data Bits' is 8, 'Parity' is None, and 'Stop Bits' is 1. The 'Control Line' is set to 'No Handshake'. There is an unchecked checkbox for 'Continuous Carrier'. The 'RTS Send Delay' is 0 (x20 ms), 'RTS Off Delay' is 0 (x20 ms), and 'DCD Wait Delay' is 0 (x1 sec). A 'Show Offline Values' button is present. At the bottom are 'OK', 'Cancel', 'Apply', and 'Help' buttons.

The “System Protocol” should be setup as follows:

The screenshot shows the 'Controller Properties - S4516DF1_CLX' dialog box with the 'System Protocol' tab selected. The 'Protocol' is set to 'DF1 Point to Point'. The 'Station Address' is 0. The 'NAK Receive Limit' is 3, and the 'ENQ Transmit Limit' is 3. The 'ACK Timeout' is 50 (x20 ms). The 'Embedded Responses' are set to 'Autodetect'. Under 'Error Detection', 'BCC' is selected with a radio button, and 'CRC' is unselected. There is an unchecked checkbox for 'Enable Duplicate Detection'. At the bottom are 'OK', 'Cancel', 'Apply', and 'Help' buttons.

Note: The “Enable Duplicate Detection” should be unchecked.

APPENDIX A

DF1 COMMUNICATIONS

READ/WRITE DATA DEFINITIONS

Data Read From The M4508 (150 Elements), Defined As Follows:

	M4508	Mapped	PLC	
Description	Add	Add	Add	Function
<u>General:</u>				
M4508 Status Word 1 (to PLC)		W6100	N7:0	R/O
Zero Speed (Bit 00)	F119	B6100.0	N7:0/0	
Timing Signal Fail Alarm (Bit 01)	F124	B6100.1	N7:0/1	
No Can Transfer Alarm (Bit 02)	F97	B6100.2	N7:0/2	
Infeed Track Jam Alarm (Bit 03)	F96	B6100.3	N7:0/3	
Spare (Bit 04)		B6100.4	N7:0/4	
Spare (Bit 05)		B6100.5	N7:0/5	
thru		thru	thru	
Spare (Bit 14)		B6101.6	N7:0/14	
Spare (Bit 15)		B6101.7	N7:0/15	
Machine Speed CPM	W112	W6102	N7:1	R/O
OV Roll Speed RPM	W526	W6104	N7:2	R/O
Resolver Position	W180	W6106	N7:3	R/O
Resolver RPM	W182	W6108	N7:4	R/O
Resolver Scale Factor	W186	W6110	N7:5	R/O
Resolver Offset	W188	W6112	N7:6	R/O
<u>Trips Per Spindle Data:</u>				
Last Spindle Tripped	B599	W6114	N7:7	R/O
Trips Per Spindle #1	W1020	W6116	N7:8	R/O
thru	thru	thru	thru	R/O
Trips Per Spindle #36	W1090	W6186	N7:43	R/O

APPENDIX A

DF1 COMMUNICATIONS

	M4508	Mapped	PLC	
<u>Description</u>	<u>Add</u>	<u>Add</u>	<u>Add</u>	<u>Function</u>
<u>Current Shift Data:</u>				
Good Cans (Lo)	W1100	W6188	N7:44	R/O
Good Cans (Hi)	W1102	W6190	N7:45	R/O
Total Blowoffs (Lo)	W1104	W6192	N7:46	R/O
Total Blowoffs (Hi)	W1106	W6194	N7:47	R/O
Misload Count (Lo)	W1108	W6196	N7:48	R/O
Misload Count (Hi)	W1110	W6198	N7:49	R/O
Restart Blowoffs (Lo)	W1112	W6200	N7:50	R/O
Restart Blowoffs (Hi)	W1114	W6202	N7:51	R/O
Manual Blowoffs (Lo)	W1116	W6204	N7:52	R/O
Manual Blowoffs (Hi)	W1118	W6206	N7:53	R/O
QC Blowoffs (Lo)	W1120	W6208	N7:54	R/O
QC Blowoffs (Hi)	W1122	W6210	N7:55	R/O
Trips Per Spindle #1	W1124	W6212	N7:56	R/O
thru	thru	thru	thru	R/O
Trips Per Spindle #36	W1194	W6282	N7:91	R/O
Life Time Can Count x 1,000 (Lo)	W1304	W6284	N7:92	R/O
Life Time Can Count x 1,000 (Hi)	W1306	W6286	N7:93	R/O
<u>Last Shift Data:</u>				
Good Cans (Lo)	W1200	W6288	N7:94	R/O
Good Cans (Hi)	W1202	W6290	N7:95	R/O
Total Blowoffs (Lo)	W1204	W6292	N7:96	R/O
Total Blowoffs (Hi)	W1206	W6294	N7:97	R/O
Misload Count (Lo)	W1208	W6296	N7:98	R/O
Misload Count (Hi)	W1210	W6298	N7:99	R/O
Restart Blowoffs (Lo)	W1212	W6300	N7:100	R/O
Restart Blowoffs (Hi)	W1214	W6302	N7:101	R/O
Manual Blowoffs (Lo)	W1216	W6304	N7:102	R/O
Manual Blowoffs (Hi)	W1218	W6306	N7:103	R/O
QC Blowoffs (Lo)	W1220	W6308	N7:104	R/O
QC Blowoffs (Hi)	W1222	W6310	N7:105	R/O
Trips Per Spindle #1	W1224	W6312	N7:106	R/O
Thru	thru	thru	thru	R/O
Trips Per Spindle #36	W1294	W6382	N7:141	R/O
Spare		W6384	N7:142	R/O
Thru		thru	thru	R/O
Spare		W6398	N7:149	R/O

APPENDIX A

DF1 COMMUNICATIONS

Data Written To The M4508 (10 Elements), Defined As Follows:

	M4508	Mapped	PLC	
<u>Description</u>	<u>Add</u>	<u>Add</u>	<u>Add</u>	<u>Function</u>
<u>General:</u>				
PLC Status Word 1 (from PLC)		W6400	N7:150	W/O
Reset Spindle Trips (Bit 00)	B1016.0	B6400.0	N7:150/0	
End of Shift (Bit 01)	F137	B6400.1	N7:150/1	
QC Initiate (Bit 02)	F825	B6400.2	N7:150/2	
Trip Test (Bit 03)	F830	B6400.3	N7:150/3	
Spare (Bit 04)		B6400.4	N7:150/4	
Spare (Bit 05)		B6400.5	N7:150/5	
thru		thru	thru	
Spare (Bit 14)		B6401.6	N7:150/14	
Spare (Bit 15)		B6401.7	N7:150/15	
QC Spindle Number (1-36, 37,38)	B2088	W6402	N7:151	W/O
Spare		W6404	N7:152	W/O
Spare		W6406	N7:153	W/O
thru		thru	thru	thru
Spare		W6416	N7:158	W/O
Spare		W6418	N7:159	W/O