

**RTM-LT16
ALCOA Light Tester
Mechanical Reject Retrofit
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 RTM-LT16 Alcoa (Borden's) Light Tester mechanical reject control package. This includes the functional description, alarms detected, etc.

1.1 FEATURES

- Replaces the existing Hyde Park electronic reject control system as a complete retrofit / upgrade control package for the existing odd/even mechanical reject control.
- Performs high speed control functions of Alcoa Light Tester to speeds in excess of 3000 CPM (machine mechanically permitting). This includes detection of leaker cans (interfaces with existing Leak detection arrays), odd/even can reject, alarm detection and data acquisition.
- Two optional auxiliary reject inputs for use with Vision inspection systems.
- Alarm detection:
 1. Leak Detection Array Fault
 2. Reset Timing Fault
 3. Clock Timing Fault
- Data Acquisition (for both the current and previous shift):
 1. Total Good Cans
 2. Total Rejects
 3. Total Leaker Rejects
 4. Total Array Faults
 5. Aux1 (Vision Inspection) Rejects
 6. Aux2 (auxiliary fault input) Rejects
 7. Total Rejects per Pocket (1-16)

SECTION 1

GENERAL DESCRIPTION

- Built-in 2 Line X 40 character sealed display with 24 key membrane keypad allows viewing of collected data, as well as, setup of all user variables (passcode protected or key switch enabled).
- Interfaces directly to existing “Clock” and “Reset” timing inputs, driven off a two-channel shaft encoder (mounted to the main carrier wheel shaft) or sensors mounted inside the machine.
- Interfaces directly with existing Leak Detection Array Receiver, Array Fault Receiver and Run Relay.
- Based on high performance M4500 PLC/PLS, allowing easy trouble-shooting and user customization using SYSdev Program Development software.

1.2 GENERAL DESCRIPTION

The RTM-LT16 Alcoa (Borden's) Light Tester reject control package is an electronic retrofit upgrade for the MD-7, MD-10 and MD-16 micro controller based high speed interface boards designed by Hyde Park Electronics for use on the LT family of light testers. It continuously monitors the operation of the array heads and controls the reject of defective cans.

The existing counters and indicators are replaced with a Keypad/Display for operator interface and to display production data or adjust setup parameters.

The system receives the following input signals from the tester and the existing control system:

- Clock Timing pulse (one pulse per pocket).
- Reset Timing pulse (one pulse per revolution of the main carrier wheel)
- Array Reject Receiver
- Array Fault Receiver
- Two optional auxiliary fault inputs (Aux1 and Aux2)
- Fault reset input
- Machine Run input
- End of Shift data transfer input
- Setup Enable input

SECTION 1 GENERAL DESCRIPTION

All inputs are 10-30VDC differential inputs, which can be wired as either sinking or sourcing.

The system generates the following output signals to the tester and the existing control system:

- Even Reject solenoid
- Odd Reject solenoid
- Run Relay
- Good Can count pulse
- Leaker Reject count pulse
- Array Fault output
- Aux1 Reject count pulse
- Aux2 Reject count pulse
- Rejects per Pocket count pulse (1-16)

All outputs are 10-30VDC sinking outputs.

The individual ON/Off status of each I/O point is indicated with LED's located on the front of the board. The LED's provide the status of the actual I/O point (field side) rather than the internal logic status.

Input, output and user power wiring is implemented with a removable 18-pin field wiring connector, allowing for easy board replacement.

All alarms (when generated) extinguish the Run Relay output and are displayed on the front of the Keypad/Display. Either the Fault Reset input or use of the ESC key on the Keypad/Display will reset the alarm.

Shift data is collected for both the current shift and previous shift and can be displayed on the Keypad/Display. Production count data is also available through discrete pulse count outputs to the host PLC.

The package is not a dedicated "black box", but is instead implemented using the high performance Systems M4500 PLC/PLS module allowing easy customization by either SEA or the end user. The M4500 module is programmed using the DOS-based SYSdev Program Development software allowing 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.

SECTION 1 GENERAL DESCRIPTION

The M4500 module incorporates a built-in PLS which interfaces directly with the optional machine-mounted resolver to provide all machine timing and eliminating the two-channel shaft encoder or other timing sensors.

The M4500 is powered from 115-230 VAC, 50/60Hz, (1.2 Amps at 115 VAC). The P4500 power supply produces +5 VDC and +/- 12VDC for use by the M4500. The three S4569 digital DC I/O boards (as well as the Module Fault output) operate from +24 VDC. The +15VDC, 4 Amp DC power supply is used to supplement the +15 VDC supplied by the Hyde Park MD interface board.

1.3 ODD/EVEN REJECT SOLENOID CONTROL

Mounted on the main carrier wheel are the array heads in combinations of 8, 10, 12 or 16. As the machine is rotated in the forward direction, Cans from the infeed star wheel are loaded onto the array head and carried through the test area and then unloaded onto a discharge star wheel.

Just before a Can is loaded on the main carrier wheel the array head is checked by the Array Fault receiver to verify the operation of the Reject output. After a Can is unloaded from the main carrier wheel, the array head is exposed to ambient light and the reject output will be ON. If an array head fails to send a reject signal to the Array Fault receiver, an array head fault is generated, the run relay output is turned Off and reject information is shifted into a reject shift register.

After a Can is loaded on the main carrier wheel, the array head passes a fixed light source that resets the reject circuit and enters the test area. At the end of the test area, the array head passes the Reject receiver where the reject output is checked. Reject information from the Reject receiver is stored and later shifted into a reject shift register. The Can is then loaded onto the discharge star wheel.

The Clock timing, Reset timing, Reject, Array Fault, Aux1 and Aux2 inputs are activated by signal transitions at their respective inputs. These are differential inputs and can be wired to be sensitive to transitions from high-to-low (sinking) or low-to-high (sourcing). At the transition of any of the reject fault inputs (Reset, Array Fault, Aux1 or Aux2), the states are latched in and then acted upon at the next leading edge transition of the Clock timing input.

SECTION 1 GENERAL DESCRIPTION

The Reset timing input is used to determine the location of pocket number 1. The transition of this input resets the current pocket number count to 0. At the transition of the Clock timing input, the current pocket number is incremented by 1, as well as information regarding any of the reject inputs is shifted into their respective reject shift registers. In addition there is roll-over logic to limit the current pocket count to number of pockets of the machine. If a roll-over condition were to occur then a reset timing fault would be generated.

The length of any of the four reject shift registers is variable and can be set to any value from 0 to 29. The length is used to establish the number of pocket delays for the activation of the reject solenoids. The Odd reject solenoid is activated for rejects from odd numbered pockets and the Even reject solenoid is activated for even numbered pockets. The outputs will remain active for a minimum of two pockets.

All data collection counts are updated on the leading edge transition of the Clock timing input.

Optionally, the machine can be fitted with a resolver, mounted to the main carrier wheel to provide all machine timing functions. This would replace the two-channel shaft encoder or timing sensor inputs.

SECTION 1

GENERAL DESCRIPTION

1.4 DATA COLLECTION

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

- 1) Total number of Good Cans tested
- 2) Total number of Cans rejected
- 3) Total number of Leaker rejects
- 4) Total number of Array Faults
- 5) Total number of Aux1 rejects
- 6) Total number of Aux2 rejects
- 7) Total leaker rejects per pocket (for each pocket)

This data can be viewed locally on the display. This information is updated ("current" shift transferred to "Last" shift) based on the change of state of the End of Shift discrete input. This input can be activated on an 8 or 12 hour shift basis or alternatively activated manually on a label run basis depending on the user's preference. This data is also available to the host PLC via discrete pulse count outputs.

In addition to the shift data collection, a separate buffer is available to collect rejects per pocket counts as a diagnostics aid to the operator for trouble-shooting a bad seal on a specific pocket. Unlike the shift data, these counts can be reset manually as necessary. This allows the operator to note an abnormally high count on a specific pocket, attempt to correct the problem, reset the counts and then recheck the counts at a later time to determine if the problem still persists.

1.5 ALARM DETECTION

The package detects the following alarms:

Leak Detection Array Head Fault: At the leading edge transition of the Clock timing input, a check is done to verify the transition of state of the Array Fault receiver. If a transition of state was not detected, the following sequence of events occurs:

1. A “Leak Detection Array Head Fault” is generated
2. The output for the Run Relay is turned Off
3. The “Array Head Fault” output is turned ON
4. A message is displayed on the Keypad/Display indicating the array head number that caused the fault
5. Reject information is shifted into a reject shift register to activate the appropriate reject solenoid to reject the associated can.

Reset Timing Fault: At the leading edge transition of the Clock timing input, a check is made to verify the occurrence of the Reset timing input and to increment the current pocket count. If the current pocket count exceeds the number of pockets of the machine then a Reset Timing Fault is generated.

The Reset timing input determines the location of pocket number 1 and occurs once per revolution of the main carrier wheel in between Clock timing pulses. At the occurrence of the Reset timing input, the current pocket count is reset to zero. If a Reset Timing Fault is generated the following sequence of events occurs:

1. The current pocket count resets to 1
2. The output for the Run Relay is turned Off
3. The associated fault message is displayed on the Keypad/Display

Clock Timing Fault: After the machine starts and the Machine Run input is true, the system will periodically check for the occurrence of the Clock timing input approximately every 1.5 seconds. If this input fails to change state then a Clock Timing Fault is generated and the following sequence of events occurs:

1. The output for the Run Relay is turned Off
2. The associated fault message is displayed on the Keypad/Display

Note: The transition of the Fault Reset input or the ESC key on the Keypad/Display can be used to reset any of the faults.

SECTION 1 GENERAL DESCRIPTION

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SECTION 2 INSTALLATION

The RTM-LT16 is mounted on the inside the existing control cabinet of the tester and replaces the MD micro controller high speed interface board designed by Hyde Park Electronics.

2.1 WHAT'S INCLUDED

Verify that the following items are included when unpacking the RTM-LT16:

- 1ea. P4500 Power Supply
- 1ea. M4500 PLC/PLS with associated I/O boards (3 - S4569 DC In/Out Sinking)
- 1ea. 15 V DC Power Supply unit
- 1ea. RSV34-MS1 Resolver (optional)
- 1ea. RSV-RSCBLE-100 Resolver cable (supplied with resolver option)
- 1ea. RTM-LT16 User's Manual
- 1ea. M4500 User's Manual
- 1ea. RTM-LT16 Program Disk

2.2 SERVICES REQUIRED

Electrical Power:

The RTM-LT16 is powered from 115VAC/230VAC 50/60HZ at 2.8/1.5 Amps and +24VDC at 2.0 Amps. The 115VAC/230VAC is used to power the P4500 power supply and the +15 V DC power supply, while the +24VDC is used to power the +24VDC I/O (sensors and reject solenoids). The +24VDC current required by the RTM-LT16 is no more than the existing Hyde Park +24VDC current requirement, therefore the existing +24VDC power supply should be adequate.

SECTION 2 INSTALLATION

2.3 INSTALLATION

The following must be performed with the machine stopped and power “off”. Thus this is usually performed on a scheduled maintenance day.

- 1) Disconnect all wires and remove existing Hyde Park MD micro controller high speed interface board.
- 2) Mount the D4591 Keypad/Display on the front of the operator console in an area approximately 9-1/2 by 6 inches. The Keypad/Display replaces existing reject counters and rejected pocket displays
- 3) Route the display cable from the back of the Keypad/Display to the M4500 PLC/PLS and connect to the underside of the rack.
- 4) Mount the P4500 power supply and the M4500 PLC/PLS in a 7-1/2 by 9-1/8 inch opening inside the operator console.
- 5) Mount the 15 VDC power supply to DIN Rail with an approximate opening of 3 inches.
- 6) Mount the RSV34-MS1 resolver (if purchased), with provided bracket, to the main carrier wheel or discharge star wheel shaft.

Note: Resolvers are very noise sensitive. Be sure to keep the cable away from sources of high voltage as it is routed to the M4500. The resolver provides all the timing related functions of the machine. Therefore the two channel shaft encoder or timing sensors are no longer needed and can be removed.

SECTION 2 INSTALLATION

Wiring:

Refer to the electrical control schematic provided with this manual. Wires from the old control board may not reach terminals on the M4500 and may need to be extended or replaced.

Note: All inputs are 10-30VDC differential inputs and can be wired as either sinking or sourcing. All outputs are 10-30VDC sinking outputs (see wiring schematic for more detail).

Inputs:

- 1) Terminate wires for the Reject receiver (IN0) and Array Fault receiver (IN1).
- 2) Terminate wires for the Clock and Reset timing inputs (B100.0 and B100.1 respectively). These inputs can be derived from a two channel shaft encoder driven off the main carrier wheel or from sensors located inside the machine. The Clock timing occurs once per pocket. The Reset timing occurs once per revolution of the main carrier wheel, in between Clock timing pulses and determines the location of pocket 1.
- 3) Terminate wires for Aux1 (B100.2, vision system reject) and Aux2 (B100.3, optional, if used).
- 4) Terminate wires for the Fault Reset input (B110.0).
- 5) Terminate wires for the Machine Run (RR) input (B110.1). This signal should be ON when the main drive is enabled (running) and Off when the drive is disabled (not running). This signal can be derived from the main PLC logic and wired directly from an existing spare output.
- 6) Terminate wires for the End of Shift input (B110.2, optional). This signal can be wired from an existing spare output or from a momentary push button. The 0 to 1 transition of this input can be at the end of either an 8 or 12 hour shift or alternatively at label changes such the data collected would be for label runs rather than complete shifts.
- 7) Terminate wires for the Setup Enable input (B110.3, optional). This is generally wired form a key switch (if desired) to allow entry to setup variables through Keypad/Display without a passcode entry.

SECTION 2 INSTALLATION

Outputs:

- 1) Terminate wires for the Even (B101.0) and Odd (B101.1) reject solenoids.
- 2) Terminate wires for the Run Relay (B101.2). This output will turn Off whenever any of the following faults are present:
 - a) Leak Detection Array Fault
 - b) Reset Timing Fault
 - c) Clock Timing Fault
- 3) Terminate wires for the Module Fault Output (FLT). The M4500 contains comprehensive fault detection routines that verify the proper operation of the module at all times. If the module detects a fault condition, the "FLT" LED on the front of the module is illuminated. When a fault is detected, the following fault routine is executed:
 1. User program execution is suspended.
 2. "FLT" LED on the front of the module is illuminated.
 3. "RUN" LED is extinguished.
 4. Fault interlock is opened.
 5. Fault code representing the detected fault is saved in internal memory of the module for viewing with setup program.
- 4) Terminate wires for the Array Fault output (B101.5). This output is ON (maintained) whenever an Array Head fault is generated and Off once the fault is reset through the Fault Reset input or by pressing the ESC key on the Keypad/Display.
- 5) Terminate wires for the production (pulse) count outputs:
 1. Good Can count (B101.3)
 2. Leaker Reject count (B101.4)
 3. Aux1 (Vision) Reject count (B101.6)
 4. Aux2 Reject count (B101.7)
 5. Reject Per Pocket counts (1 – 16)

These outputs are triggered off of the Clock timing input and are on for approximately the same period as the Clock timing signal is true.

2.4 SETUP

Once power is re-applied to the system and the I/O is verified, perform the following to set the parameters of the RTM-LT16. Refer to section 3, “Using the Keypad Display”, for details of display menus and key sequences used to set the parameters.

Internally, the RTM-LT16 maintains four independent reject shift registers, one for each type of reject (leaker reject, array fault, Aux1 (vision) reject and Aux2 reject). Reject information is shifted into the reject shift registers at the leading edge of the Clock timing input. Reject information must be sampled ahead of the Clock timing input.

- 1) To start with, set the number of pockets of the machine (8, 10, 12 or 16).
- 2) Set the “Resolver Input Enable (0 = No, 1=Yes)”. For machines that have installed a resolver for machine timing, set this value to 1 to enable resolver feedback.
- 3) Initially set the “Pocket Number 1 Offset” and the “Array Head Offset” to 0.
- 4) The reject shift settings establish the number of pocket delays between the recording of the reject and the activation of the reject solenoid. Initially set the reject shifts as follows:
 - Reject Receiver Shifts (0-29): _____ 2
 - Array Fault Receiver Shifts (0-29): _____ 4
 - Aux1 Reject Input Shifts (0-29): _____ 2
 - Aux2 Reject Input Shifts (0-29): _____ 2
- 5) When a shaft mounted resolver is not used, the machine is electronically timed by rotating the shaft encoder (or adjusting the Clock timing sensor) such that the Clock pulse input turns ON when the reject mechanism must operate. The Reset timing must be positioned such that it comes ON in between Clock timing pulses.

SECTION 2 INSTALLATION

- 6) When a resolver is mounted to the shaft of the main carrier wheel (or discharge star wheel), the M4500 internally generates the Clock timing (one pulse per pocket) and the Reset timing (one pulse per revolution of the main carrier wheel). Perform the following when a resolver is installed for machine timing:
 - a. Verify the direction of rotation of the resolver. By hand, move the tester forward and verify the absolute position counts up from 0 through 3839 as the main carrier wheel makes one full revolution. If not, swap S1 and S3 at the resolver connector.
 - b. The resolver is timed by rotating the machine forward until a reject from pocket 1 will activate the Odd reject solenoid. This is the resolver “Zero” position.
 - c. Verify 360 degrees per pocket. Position the machine at 0 degrees. By hand, move the machine forward one pocket. The relative position of the machine (POS 360) should count up thru 359 and again be at 0 degrees. Do this for all the pockets.

Note: The position may deviate +/-20 degrees from pocket to pocket. This is normal and is not a problem. If it does deviate significantly more than +/-20 degrees, something is wrong with the resolver or resolver wiring (refer to section 5.2, to trouble-shoot).

- 7) Set the “Reject Receiver Shifts”. From the infeed, feed a can, with a big hole in it, into the machine. Rotate the machine forward until the pocket with this can turns ON the Reject Receiver input (IN0). Continue to rotate the machine forward until the “Clock” timing input just turns ON or POS 360 reads “000” and count this as “0”. Move the machine forward one pocket to the Clock timing position, count this as “1”. Continue doing this until the can is at the point where the reject mechanism must operate. Whatever the “count” is at this point is the number entered into the “Reject Receiver Shifts”.
- 8) Set the “Aux1 Reject Input Shifts” (vision system reject input) and “Aux2 Reject Input Shifts” to the same number as the “Reject Receiver Shifts”.

SECTION 2 INSTALLATION

- 9) Set the “Array Fault Receiver Shifts”. At the leading edge transition of the Clock timing input, a check is done to verify the transition of state of the Array Fault receiver. If a transition of state was not detected an “Array Head Fault” is generated and reject information is shifted into a reject shift register. Using electrical tape, cover the “Reject” IR output of array an array head. This will cause an “Array Head Fault” to be generated on the particular pocket.

Rotate the machine forward and feeding cans into the machine until the array head with the covered reject output just passes the “Array Fault” receiver. Continue to rotate the machine forward until the “Clock” timing input just turns ON or POS 360 reads “000” and count this as “0”. Move the machine forward one pocket to the Clock timing position, count this as “1”. Continue doing this until the can associated with the faulted array head is at the point where the reject mechanism must operate. Whatever the count is at this point is the number entered into the “Array Fault Receiver Shifts”.

For the remainder of the setup, the machine needs to be run in normal production.

WARNING: Until the setup is complete, bad cans and calibrated test cans may go down the line.

With the machine running and feeding cans, perform the following.

- 10) Press the “Test Reject” key and verify one can is cleanly rejected.
- 11) Verify a calibrated leak can is correctly rejected. If not adjust the “Reject Receiver Shifts” parameter until it is.
- 12) If the tester is equipped with a vision system, verify the input position of the Aux1 (vision) reject signal. This position must not be within +/-60 degrees of the “Clock” timing. Run a visually defective can through the machine and verify that the vision test can is correctly rejected.

Note: Depending on where the vision system reject signal is received, the “Aux1 Reject Input Shifts” may have to be adjusted until the correct can is rejected.

SECTION 2 INSTALLATION

- 13) Verify the “Pocket #1 Offset”. Cover the “Array Reset” pickup (center window of array head) for array head number 1 with electrical tape. Run cans through the machine and observe the pocket number of the Last Reject. A can from pocket #1 should be rejected every revolution of the main carrier wheel. Adjust the “Pocket #1 Offset” until rejects for pocket number 1 is continuously incrementing then remove the tape from the array head.
- 14) Verify the “Array Fault Offset” parameter. Cover the “Reject” IR output of array head number 1. This will cause an “Array Head Fault” to be generated on array head number 1. Jog the machine through several revolutions. A “Leak Detection Array Fault” alarm will be generated with the corresponding array head number indicated on the Keypad/Display. Reset the alarm, adjust the offset and jog the machine again. Continue adjusting this parameter until array head number 1 is displayed then remove the tape from the array head.

The setup is now complete. If problems are encountered in any of the previous setup steps, refer to the trouble-shooting section 5.2. Once all the parameters are set as required, upload and save them to disk using the “RTMLT16” setup program (see section 4.2.2 –Upload (Save) Data).

2.5 RTMLT16 SETUP SOFTWARE INSTALLATION

Follow the steps below to install the RTMLT16 setup software application program onto a computer that will be used to support the system. The Windows based RTMLT16 setup program is compatible with Windows 95, 98, NT, ME, 2000 and XP.

The setup software is used to interface to the M4500, tune (setup) the user adjustable variables of the RTM-LT16, save setup variables to disk and view production count data.

Run the “setup.exe” file located in the root directory of the supplied program disk. This will initiate the installation process. Follow the onscreen instructions to complete the installation.

If any problems are incurred during the installation process, try restarting your computer and running “setup.exe” again. Make sure all programs have been exited prior to installation.

2.6 SYSdev2000 PROGRAM DEVELOPMENT SOFTWARE INSTALLATION

The SYSdev2000 Program Development software is an optional software package used to perform on-line trouble-shooting and program modifications. If SYSdev2000 was purchased with the RTM-LT16 package and is not already installed on the your computer, run the “setup.exe” file located in the root directory of the supplied program disk. This will initiate the installation process. Follow the onscreen instructions to complete the installation.

SECTION 2 INSTALLATION

2.7 RTMLT16 APPLICATION PROGRAM INSTALLATION

The RTMLT16 application program is a SYSdev based program, loaded into the M4500 PLC/PLS. The application program is written in a combination of High-level (subset of C) and Ladder logic.

If the user desires to make program changes or perform on-line monitoring of the program execution, the files, which constitute the application program, will have to be loaded onto the hard drive of the computer used to support the system. The SYSdev2000 Program Development Software will also have to be installed.

Located on the supplied program disk is the RTMLT16 folder. This folder contains the source code files for the application program. Simply copy this folder to the hard drive of the computer used to support the system.

2.8 MODIFY EXISTING PLC PROGRAM

The RTM-LT16 replaces the existing Hyde Park electronic reject control system as a complete retrofit / upgrade control package for the existing odd/even mechanical reject control. Modify the logic of the existing control system PLC program to interface with the RTM-LT16, incorporating the following into the existing PLC ladder logic:

Note: All inputs to the M4500 are 10-30VDC differential inputs and can be wired as either sinking or sourcing. All outputs from the M4500 are 10-30VDC sinking outputs (see wiring schematic for more detail).

- 1) Add the "**Module Fault Output**" interlock as an input to the PLC. If a fault condition is detected, the "FLT" LED on the front of the module is illuminated, the application program execution is suspended and the Fault interlock is opened. The fault code representing the detected fault is saved in internal memory of the module for viewing with setup program.
- 2) Add the "**Machine Run**" output to the PLC logic. This should be ON when the drive is enabled (running) and should be "off" when the drive is disabled (not running). This is also true for jog mode.
- 3) Add the optional "**End of Shift**" output to the PLC logic. The 0 to 1 transition of this input transfers the "Current" shift data to the "Last" or previous shift data. This can be at the end of either an 8 or 12 hour shift or alternatively at label changes such the data collected would be for label runs rather than complete shifts.
- 4) The existing numeric data displays can be optionally removed as all production counts and reject information can be viewed on the Keypad/Display. All production data is available to the host PLC from pulsed outputs. This includes:
 - Good Can counts
 - Leaker, Aux1 and Aux2 reject counts
 - Rejects per Pocket counts (1-16)

Add these as inputs to the PLC for data collection as necessary.

SECTION 2 INSTALLATION

2.9 SETUP REFERENCE

The following sections are provided as a reference to setup operations performed in section 2.4.

2.9.1 DEFAULT SETUP VARIABLES

The following are the default parameters for the *LT-8* Tester

Reject Shift Registers:

Pocket #1 Offset (for rejected pocket Counts) _____ : 0
Array Head Fault Offset (for array head fault display) _____ : 0

Reject Receiver Shifts (0-29) _____ : 2
Array Fault Receiver Shifts (0-29) _____ : 4
Aux1 (vision) Reject Input Shifts (0-29) _____ : 2
Aux2 Reject Input Shifts (0-29) _____ : 2

The following are the default parameters for the *LT-10* Tester

Reject Shift Registers:

Pocket #1 Offset (for rejected pocket Counts) _____ : 0
Array Head Fault Offset (for array head fault display) _____ : 0

Reject Receiver Shifts (0-29) _____ : 2
Array Fault Receiver Shifts (0-29) _____ : 4
Aux1 (vision) Reject Input Shifts (0-29) _____ : 2
Aux2 Reject Input Shifts (0-29) _____ : 2

The following are the default parameters for the *LT-12* Tester

Reject Shift Registers:

Pocket #1 Offset (for rejected pocket Counts) _____ : 0
Array Head Fault Offset (for array head fault display) _____ : 0

Reject Receiver Shifts (0-29) _____ : 2
Array Fault Receiver Shifts (0-29) _____ : 4
Aux1 (vision) Reject Input Shifts (0-29) _____ : 2
Aux2 Reject Input Shifts (0-29) _____ : 2

SECTION 2 INSTALLATION

The following are the default parameters for the *LT-16* Tester

Reject Shift Registers:

Pocket #1 Offset (for rejected pocket Counts) _____ : 0
Array Head Fault Offset (for array head fault display) _____ : 0

Reject Receiver Shifts (0-29) _____ : 2
Array Fault Receiver Shifts (0-29) _____ : 4
Aux1 (vision) Reject Input Shifts (0-29) _____ : 2
Aux2 Reject Input Shifts (0-29) _____ : 2

2.9.2 MACHINE TIMING

When a shaft mounted resolver is not used, the machine is electronically timed by rotating the shaft encoder (or adjusting the Clock timing sensor) such that the Clock input turns ON when the reject mechanism must operate. The Reset timing must be positioned such that it comes ON in between Clock timing pulses.

When a resolver is used for machine timing, the M4500 internally generates the Clock timing (one pulse per pocket) and the Reset timing (one pulse per revolution of the main carrier wheel).

Perform the following when a resolver is installed for machine timing:

1. Time the resolver by rotating the machine forward until a reject from pocket 1 will activate the Odd reject solenoid. This is the resolver zero position.
2. With the machine located at “Zero”, set the resolver offset through the setup menu of the Keypad/Display, “3: Zero Machine (Set Resolver Offset)” selection.

SECTION 2 INSTALLATION

2.9.3 MACHINE TIMING SIGNALS

Clock Timing: The Clock timing is generally derived from a two channel shaft encoder driven off the main carrier wheel. It can also be from a sensor located inside the machine. The Clock timing occurs once per pocket. When the machine is fitted with a resolver (replacing the shaft driven encoder or timing sensors) the M4500 internally generates the necessary Clock timing pulse required for reject control.

Reset Timing: The Reset timing is generally derived from a two channel shaft encoder driven off the main carrier wheel. It can also be from a sensor located inside the machine. The Reset timing occurs once per revolution of the main carrier wheel, in between Clock timing pulses and determines the location of pocket 1. When the machine is fitted with a resolver (replacing the shaft driven encoder or timing sensors) the M4500 internally generates the necessary Reset timing pulse required for reject control.

2.9.4 CRITICAL INPUT POSITIONS

With a shaft mounted resolver installed and enabled for feedback, the “View Critical Input Positions” menu is used to view the input positions, (relative position in degrees, 360 degrees pocket to pocket reference) of the Reject Receiver, Array Fault Receiver, Aux1 (vision) and Aux2 reject signals. Primarily this is to verify that none of these signals are coincident with the “Clock” timing. The system could potentially miss clock the reject inputs causing the wrong Can to be intermittently rejected if these reject signals are too close to the “Clock” timing (approximately +/- 40 degrees).

The “4: View Critical Input Positions” menu is accessed from the main Setup display menu.

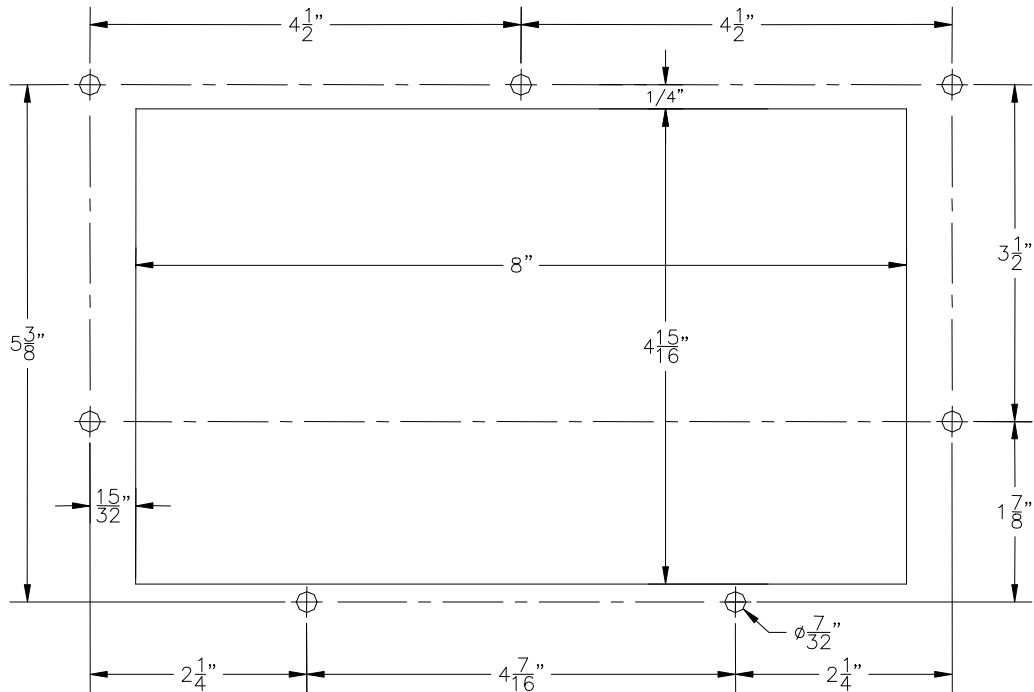
SECTION 2 INSTALLATION

2.10 M4500/P4500/D4591 INSTALLATION

The following sections provide information on mounting and wiring the M4500, P4500 and D4591 as well as a description of the power-up sequence.

2.10.1 MOUNTING THE D4591 KEYPAD/DISPLAY

The D4591 Keypad/Display is to be mounted to the outside of a cabinet door or operator console. Use the recommended cut-out in the figure below.



SECTION 2 INSTALLATION

1. Remove the ribbon cable from the display.
2. With the gasket installed on the mounting studs, slide the D4591 into the cut-out from the front and attach with supplied hardware.
3. Install the 26-pin polarized ribbon cable (the ribbon cable connector will mate with the display only one way).

Note: Communications is parallel at TTL levels therefore the display must be placed in close proximity to the M4500 (maximum cable length is 8 feet).

4. Once installed, a lugged earth ground wire should be installed on one of the mounting screws to insure that the display is positively grounded.

2.10.2 MOUNTING THE M4500 CHASSIS

The chassis should be mounted using 4ea. 8-32 screws and lock washers. If the M4500 is to be connected to the D4591 keypad/display, connect the ribbon cable for the display to the M4500 display interface connector (bottom of chassis) prior to mounting the M4500 chassis. The ribbon cable connector is polarized and will mate with the M4500 display interface connector in only one way. Once the M4500 chassis is installed, a lugged earth ground wire should be installed on one of the mounting screws to insure that the chassis is positively grounded.

2.10.3 MOUNTING THE P4500 POWER SUPPLY

The P4500 power supply is mounted to the left of the M4500 chassis in close proximity to the chassis. Use 2ea. 8-32 screws and lock washers to mount the P4500. Once mounted, connect the power supply cable connector in the +5/C/+12/C/-12 connector of the M4500. The connector is polarized and will only mate one way.

Wire 115VAC/230VAC 40-400HZ power to the P4500 power connector. The AC current rating is 0.5 amps at 115VAC and 0.3 amps at 230VAC.

2.10.4 INSTALLING THE I/O BOARDS

- 1) Remove the cover from the M4500 chassis (retained with three captive screws on the lower front of the cover and two captive screws on each side).
- 2) Install the S4569 in Slot0-0 (furthest left slot) of the M4500 and set the slot address dip switches (SW1) to the following positions:

Slot 0: SW1 switch1 = "OFF"
SW1 switch2 = "OFF"

- 3) Install the S4569 in Slot0-1 (slot next to S4569 in Slot 0) of the M4500 and set the slot address dip switches (SW1) to the following positions:

Slot 1: SW1 switch1 = "ON"
SW1 switch2 = "OFF"

- 4) Install the S4569 in Slot0-2 (slot next to S4569 in Slot 1) of the M4500 and set the slot address dip switches (SW1) to the following positions:

Slot 2: SW1 switch1 = "OFF"
SW1 switch2 = "ON"

- 5) Install the OPTIONAL S4516 serial communications board in Slot0-2 (slot next to S4569 in Slot 2) and set the slot address dip switches (SW2) to the following positions:

Slot 3: SW2 switch1 = "ON"
SW2 switch2 = "ON"

Set the RS-232/RS-422 select dip switches (SW1) on the S4516 to the following positions (RS-232 selected):

S4516: SW1 switch1 = "ON"
SW1 switch2 = "OFF"

- 6) Install the cover back over the M4500, 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 M4500 chassis.

SECTION 2 INSTALLATION

- 7) With power to the P4500 Off, install the P4500 power supply cable to the +5/C/+12/C/-12 connector on the M4500 (the connector on the cable is polarized and should mate with the connector on the M4500 only one way).
- 8) Install the respective field wiring arms on all the I/O boards of the M4500 (I/O slots 0 thru 2, resolver and IN0/IN1 connector). Make sure all field wiring connectors are fully mated in the M4500.

2.10.5 APPLICATION PROGRAM DOWNLOAD

The following is provided only as a reference. This step was performed at the factory prior to shipping. This step need only be performed in the event the M4500 is replaced.

Once the M4500 is installed, perform the following to download the application program and setup data to the M4500:

- 1) Power up the M4500 and the computer used to interface with the M4500
- 2) Connect an RS-232 cable from the computer COM port to the "PROG" port on the M4500.
- 3) Initiate the RTMLT16 Windows based setup program.
- 4) Download the application program to the M4500 (see section 4.2.3).
- 5) Download the previously saved setup data to the M4500 (see section 4.2.4).
- 6) The M4500 is now ready to run, loaded with the application program and setup data.

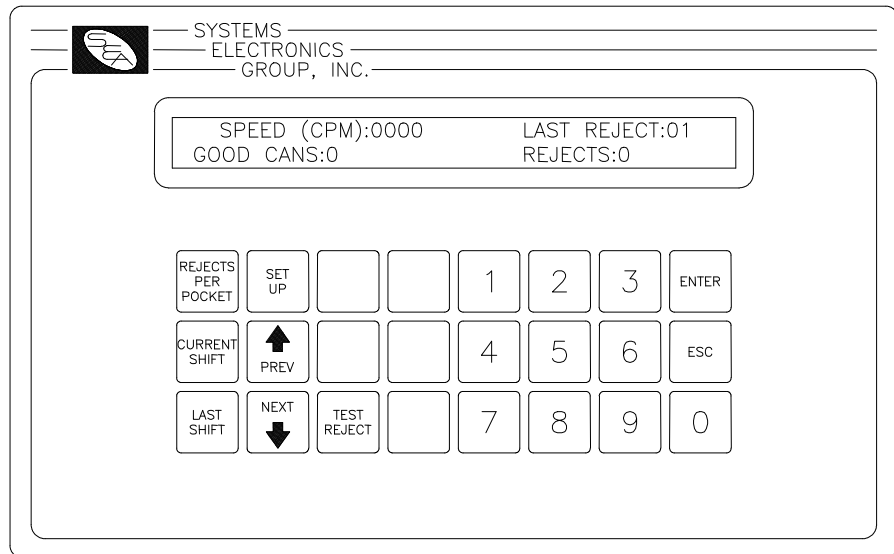
Note: Double check the machine zero position and re-zero the resolver if necessary, prior to running the machine.

SECTION 2 INSTALLATION

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SECTION 3 USING THE KEYPAD/DISPLAY

The Keypad/Display of the RTMLT16 contains 24 keys consisting of data display commands, setup commands, a numeric keypad and a 2 line by 40 character back-lit LCD display that displays the selected data and setup menus. The Keypad/Display is used to view data or to adjust setup parameters and zero the resolver.



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

- 1) Configure Machine
- 2) Set Reject Shift Registers
- 3) Set Machine Zero
- 4) View Critical Input Positions
- 5) View the Number of Rejects per Pocket
- 6) View the Current Shift Data
- 7) View the Last Shift Data
- 8) Test the Reject Solenoids

Note: For virtually all the menus, the "NEXT" and "PREV" keys can be used to advance to the next item of the menu or retard to the previous item on the menu.

SECTION 3 USING THE KEYPAD/DISPLAY

3.1 DEFAULT SCREEN

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

```
SPEED (CPM):xxxx  LAST REJECT:xx  
GOOD CANS:x,xxx,xxx  REJECTS:xx,xxx
```

Where the "Speed" is the current speed of the tester, the "Last Reject" is the pocket number of the last leaker reject, the "Good Cans" field is the total number of good cans tested so far into the current shift, and the "Rejects" field is the total number of cans rejected from 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 "REJECTS PER POCKET" KEY

The Number of Rejects per Pocket menu is provided to aid in the trouble-shooting of a light seal problem with a pocket or pockets.

The total number of leaker rejects for each pocket since the last reset or end of shift is displayed. These counts can be reset at any time to aid in the trouble-shooting process. The data is viewed by pressing this key. The display is a series of screens each with four pockets of data:

```
-- DIAGNOSTICS (REJECTS PER POCKET) --  
1:xxxx  2:xxxx  3:xxxx  4:xxxx
```

Where the numbers 1 through 4 are the first 4 pockets and the "xxxx" would be the actual counts for the respective pockets. The user can advance to the next screen or retard to the previous screen by pressing the "NEXT" or "PREV" key respectively.

The final screen prompts the user to reset the counts by pressing "0". If the counts are to be reset, press the "0" key, if not, press the "ESC" key. The default screen will then be displayed.

The "ESC" key can also be used at any time to abort the rejects per pocket data display and return back to the default screen.

SECTION 3 USING THE KEYPAD/DISPLAY

3.3 "CURRENT SHIFT" KEY

The "Current Shift" key 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" data 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 only reset at the transition of the "End of Shift" input.

Note: The Current shift "Good Cans" and "Rejects" is displayed as part of the default screen.

The Current Shift data is defined as follows:

Good Cans: This is the total number of good cans tested so far into the shift.

Rejects: This is the total number of cans rejected from the machine for the shift.

Leaker Cans: This is total number of "Leaker" cans rejected from the machine for the shift.

Array Faults: This is the total number of "Array Faults" that have occurred for the shift.

Aux1 Rejects: This is the total number of cans rejected due to an Aux1 (vision system, if used) reject input for the shift.

Aux2 Rejects: This is the total number of cans rejected due to an Aux2 (if used) reject input for the shift.

Rejects per Pocket (1:-16:): This is the total "Leaker" rejects for each pocket. A disproportionately high count for a particular pocket would indicate a light seal problem for the pocket.

SECTION 3 USING THE KEYPAD/DISPLAY

3.4 "LAST SHIFT" KEY

The "Last Shift" data is identical to the current shift data except it is the totals for the previous shift or label run. This allows data collection and diagnostics to take place automatically over a "Two Shift" period.

3.5 "SETUP" KEY

This selection is used to invoke the primary setup menu. This consists of the following four selections:

- 1: CONFIGURE MACHINE
- 2: SET REJECT SHIFT REGISTERS
- 3: ZERO MACHINE (SET RESOLVER OFFSET)
- 4: VIEW CRITICAL INPUT POSITIONS

Press the corresponding numeric key (1 to 4) to select the respective setup section.

The "NEXT" and "PREV" keys are used to advance to the Next or Previous variable respectively. Enter the new value on the numeric keypad and press <ENTER> to change a value. The value will be entered and then advanced to the next variable automatically. The primary setup menu is returned to once the last variable is entered. Pressing <ESC> at anytime will exit back to the primary setup menu.

Note: The primary setup menu is passcode protected. A 5-digit passcode must be entered to gain access to the primary setup menu. If an incorrect passcode is entered, the message "INCORRECT PASSCODE" will be displayed. Passcode entry can be attempted again or press the <ESC> key to return to the main display.

When a passcode is entered, the digits entered are not displayed. Instead "*" characters are displayed as each digit is entered. This prevents unauthorized personnel from observing the passcode as it is entered. In addition, the "ENTER PASSCODE" prompt is only active for a maximum of 60 seconds and then returned to the main display.

SECTION 3 USING THE KEYPAD/DISPLAY

The "Setup Enable" input is used to bypass the "ENTER PASSCODE" prompt and gain access to the primary setup menu. If the input is Off, then the normal passcode prompt is displayed. A keyed switch can be wired to the "Setup Enable" input to enable this function when the input is ON.

The 5-digit passcode can only be set using the RTMLT16 setup program. If the passcode is set to 0 then passcode entry completely disabled and immediate access to the setup parameters is granted.

3.5.1 CONFIGURE MACHINE

This menu is activated when the "1" key (CONFIGURE MACHINE) is pressed while the primary setup menu is active. The following parameters may then be adjusted or viewed:

Machine Number of Pockets (8 to 16): This parameter is used to set the number of pockets of the machine (8, 10, 12 and 16). Set this value to the number of pockets for the machine.

Resolver Input Enable (0=No, 1=Yes): This is used to enable the use of the resolver feedback for all timing functions. Enabling this feature allows additional setup menus and displays to be active as well as disable the inputs for the "Clock" and "Reset" timing. Set this value to a "1" when a resolver is used for machine timing.

3.5.2 SET REJECT SHIFT REGISTERS

This menu is activated when the "2" key (SET REJECT SHIFT REGISTERS) is pressed while the primary setup menu is active. The following parameters may then be adjusted or viewed:

Pocket Number 1 Offset (0 to Number of Pockets-1): This is adjusted such that a reject from pocket #1 is counted as a reject from pocket #1. Covering the "Array Reset" pickup (center window of array head) of array head number 1 with electrical tape will create a consistent. Run cans through the machine and observe the pocket number of the Last Reject. Adjust the "Pocket #1 Offset" until rejects for pocket number 1 continuously increment.

SECTION 3 USING THE KEYPAD/DISPLAY

Array Fault Offset (0 to Number of Pockets-1): This number is used to correctly display the number of the “Faulted Array Head” when a “Leak Detection Array Fault” occurs. Using electrical tape, cover the “Reject” IR output of array an array head. This will cause an “Array Head Fault” to be generated on the particular pocket. Adjust this offset until the faulted array head is correctly displayed when the fault is generated.

Reject Receiver Shifts (0-29): The length of this reject shift register can be set to any value from 0 to 29 and is used to establish the number of pocket delays from the input of the reject receiver to the actuation of the reject solenoid.

Array Fault Receiver Shifts (0-29): The length of this reject shift register can be set to any value from 0 to 29 and is used to establish the number of pocket delays from the input of the array head fault receiver to the actuation of the reject solenoid.

Aux1 Reject Input Shifts (0-29): The length of this reject shift register can be set to any value from 0 to 29 and is used to establish the number of pocket delays from the input of the Aux1 (vision) Reject to the actuation of the reject solenoid.

Aux2 Reject Input Shifts (0-29): The length of this reject shift register can be set to any value from 0 to 29 and is used to establish the number of pocket delays from the input of the Aux2 Reject to the actuation of the reject solenoid.

SECTION 3 USING THE KEYPAD/DISPLAY

3.5.3 ZERO MACHINE (SET RESOLVER OFFSET)

When a resolver is used for machine timing, the M4500 internally generates the Clock timing (one pulse per pocket) and the Reset timing (one pulse per revolution of the main carrier wheel). This selection is used to auto zero the resolver. To set the machine zero (resolver offset) perform the following:

- 1) Time the resolver by rotating the machine forward until a reject from pocket 1 will activate the Odd reject solenoid. This is the resolver zero position.
- 2) Auto zero the resolver by selecting "3: ZERO MACHINE (SET RESOLVER OFFSET)" from the primary setup menu. Enter "0" to zero the resolver. The critical inputs positions will be displayed, now showing the "POS 360:" and the "ABSOLUTE POS:" at zero.
- 3) Exit back to the primary setup menu by pressing <ESC>. Pressing <ESC> again will return to the main display.

3.5.4 VIEW CRITICAL INPUT POSITIONS

The "View Critical Input Positions" display is used to view the position, in degrees (360 degrees pocket-to-pocket reference), that the Reject Receiver, Array Fault Receiver, Aux1 (vision) Reject, and Aux2 Reject signals are coming in at. Primarily this is to verify that none of these signals coincident with the "Clock" timing. If a signal is very close or coincident with the "Clock" timing, the system could potentially miss clock the reject signals, causing the wrong can to be intermittently rejected. This display also shows the absolute position of the resolver (at a scale factor of 3840 divisions per revolution).

The "4: View Critical Input Positions" menu is accessed from the primary setup menu when the "SETUP" key has been depressed.

SECTION 3 USING THE KEYPAD/DISPLAY

3.6 "TEST REJECT" KEY

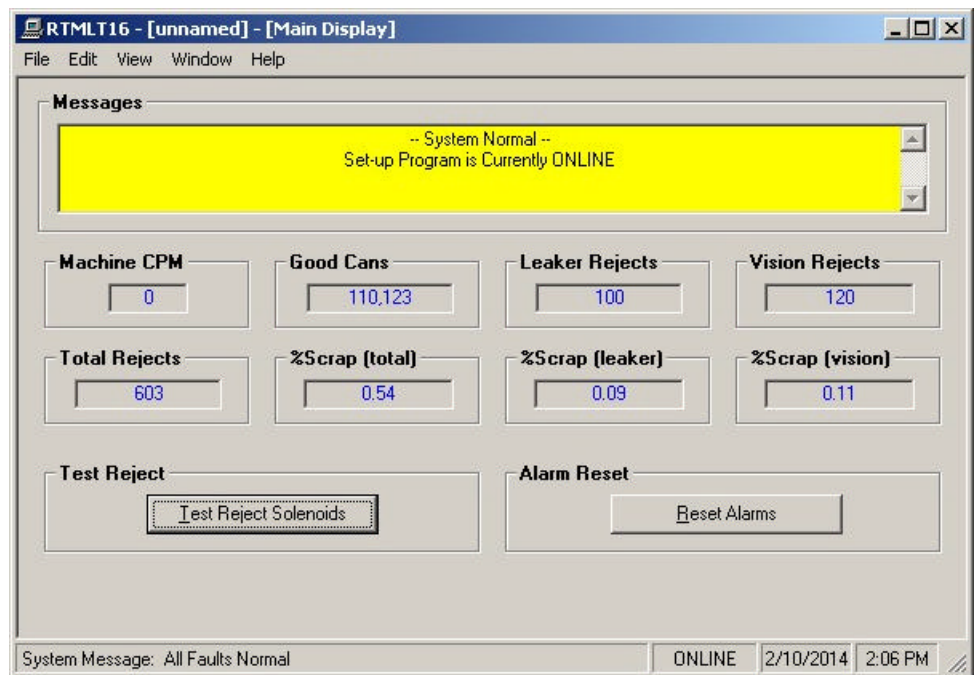
This key is used to test the reject solenoid while the machine is running (with cans) and when the machine is stopped. Testing the reject solenoids while the machine is running verifies the reject operation. When de-pressed, a single reject will be inserted into the leaker reject shift register. The reject solenoid is activated in the same way as when a leaker reject can is detected.

With the machine stopped, de-pressing the "Test Reject" key will activate both reject solenoids as long as button is depressed. This is used to verify the actuation of the reject mechanism.

SECTION 4 RTMLT16 WINDOWS BASED SETUP PROGRAM REFERENCE

The Windows based setup program is menu driven, allowing the user to easily view data, alter setup variables or set machine timing, using a computer running the Windows (95/98/ME/2000/XP/NT) operating system. The setup variables are used to configure and tune the M4500 to match the configuration and performance of the specific tester (see Setup Reference, section 2.9).

Note: The setup program is an on-line communications program used to interface with the M4500 and communicates directly while in the “Online” edit mode. Prior to going online, make sure an RS-232 cable is connected from the COM port on the computer to the "PROG" port on the M4500. The variables displayed while in the “Online” edit mode are read directly from the processor. Data can be saved to a “Setup Data” file (*.sdt) whenever changes are made to the parameters or if the data is uploaded.



SECTION 4

RTMLT16 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 “Setup 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.

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 setup program mode of operation. The mode of operation can be changed by simply double clicking the online/offline mode panel.

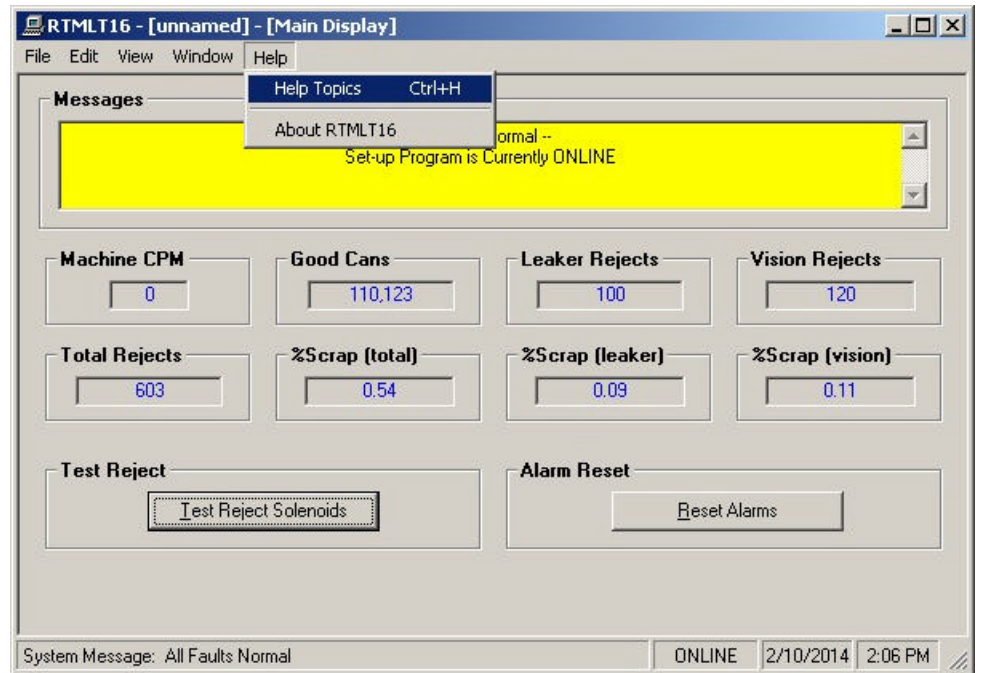
Hot Keys: Hot keys are activated by holding down the “ALT” key and simultaneously pressing the underlined letter of the desired function. Almost every function can be activated by either pressing a series of hot keys or using the “TAB” key to move between fields.

Online/Offline Modes: The setup 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.

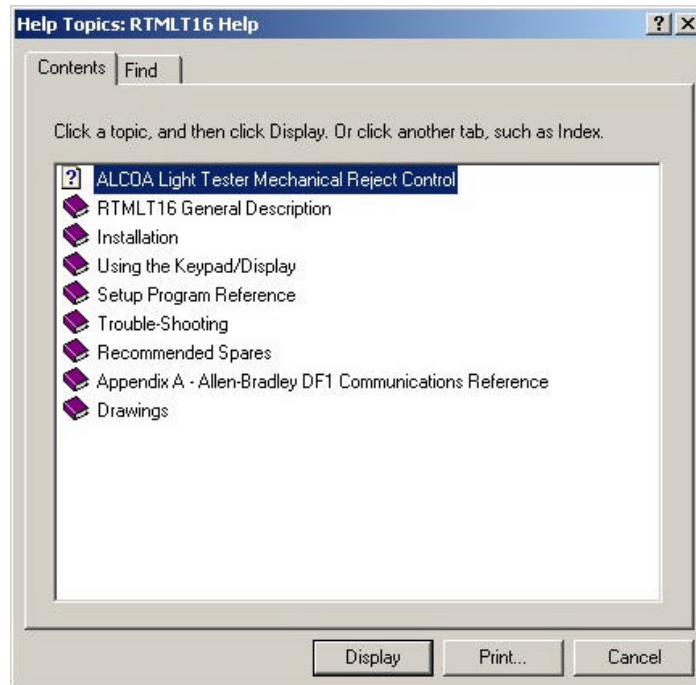
Note: Offline changes can only be made by enabling “Offline Editing”, accessed under the “Edit” menu.

SECTION 4 RTMLT16 WINDOWS BASED SETUP PROGRAM REFERENCE

Getting Help: The entire contents of this manual is contained within the help file. Pressing Ctrl+H will display the help file window.



Pressing the F1 key will display the contents of the help file.

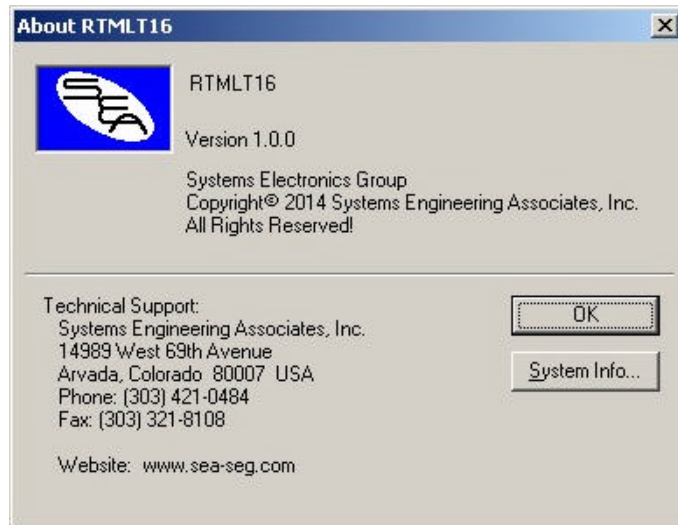


SECTION 4

RTMLT16 WINDOWS BASED SETUP PROGRAM REFERENCE

Hot spots allow jumps to other topics to display additional information as desired.

Selecting About 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.

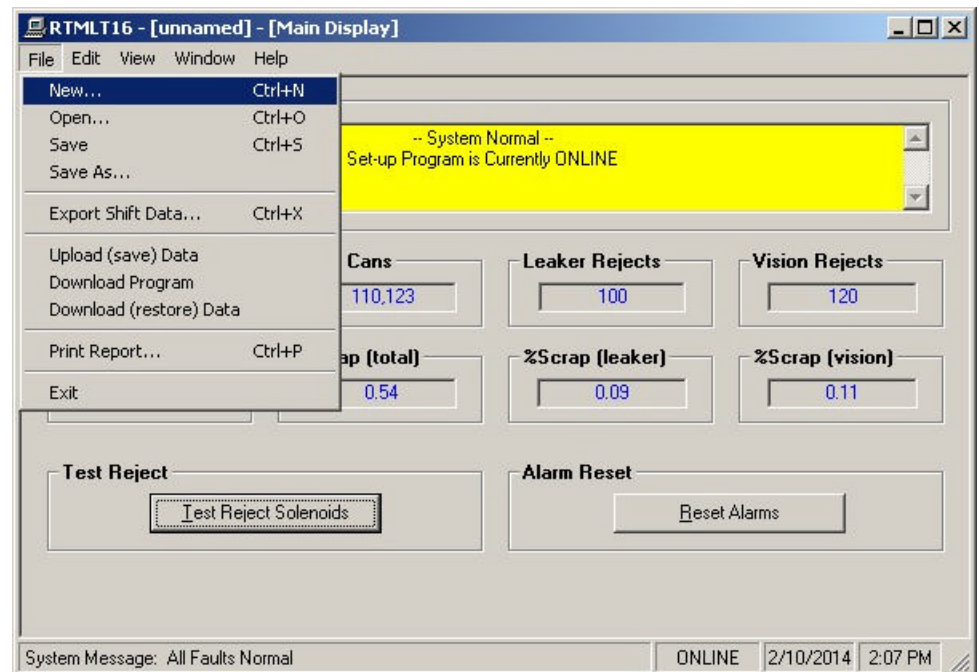


SECTION 4 RTMLT16 WINDOWS BASED SETUP PROGRAM REFERENCE

4.2 THE FILE MENU

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

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



SECTION 4

RTMLT16 WINDOWS BASED SETUP PROGRAM REFERENCE

4.2.1 THE SETUP DATA FILE

The setup “Data File” (.sdt) is a binary access file, designed for fast file I/O operation. When the setup program is first invoked, the default setup parameters are loaded into memory. If changes are made to any of the setup 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 “Setup” program can open a setup “Data File”, however, the data tables will not be properly aligned. The user will be alerted to the problem if the setup data file was created by a different setup program or a different revision of the software.

The setup “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 setup program is unaware of the settings and parameters that exist within the M4500. Therefore, to normalize the setup 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 tester, 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 setup 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.

SECTION 4 RTMLT16 WINDOWS BASED SETUP PROGRAM REFERENCE

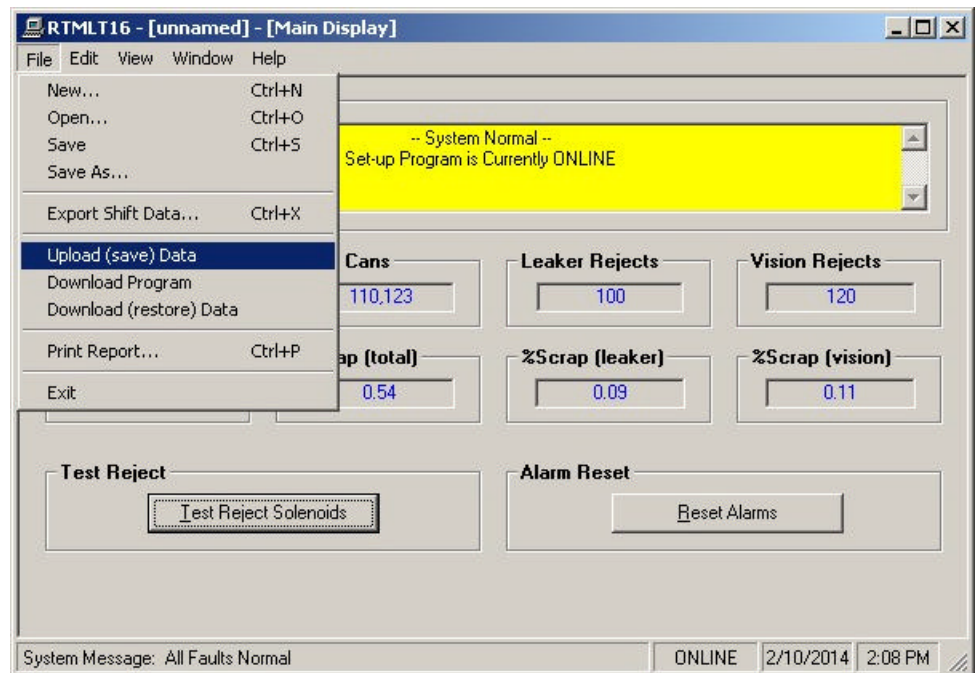
Save: To “Save” data file to disk, select “Save” from the “File” menu or press “Ctrl + S”. This displays a dialog box allowing the user to select a folder and enter a name for the file. The user will be notified if the file already exists and the extension “.sdt” will automatically be added to the file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

4.2.2 UPLOAD (SAVE) DATA

The “Setup” program allows the user to upload setup parameters and shift data from the M4500 into a setup “Data File”. This function is accessed from the “File” menu.

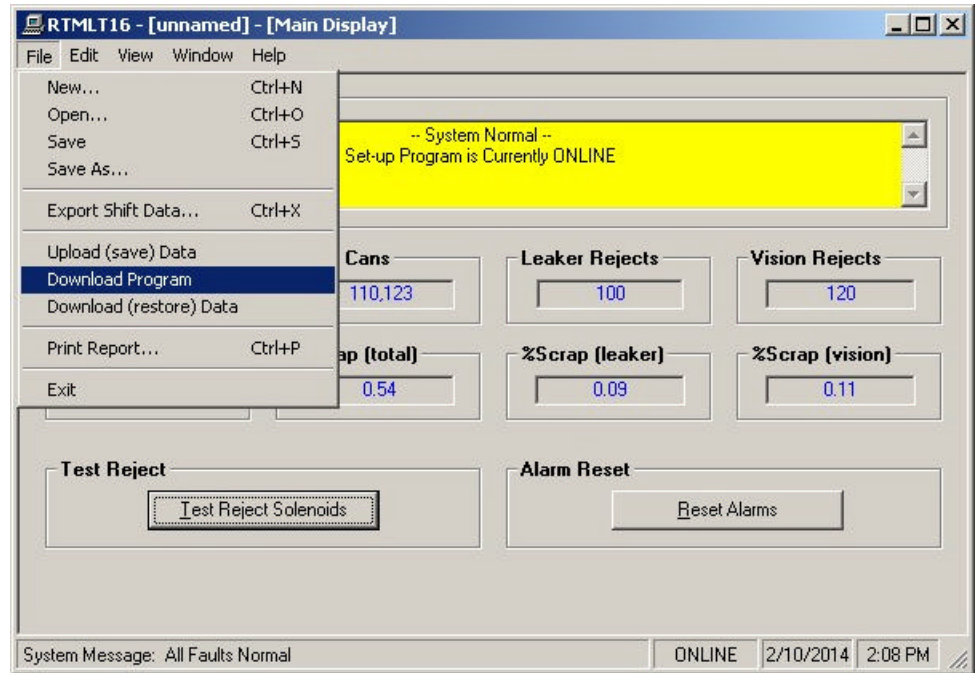


SECTION 4

RTMLT16 WINDOWS BASED SETUP PROGRAM REFERENCE

4.2.3 DOWNLOAD PROGRAM

The “Setup” program allows the user to “Download” any SYSdev program file to the M4500.



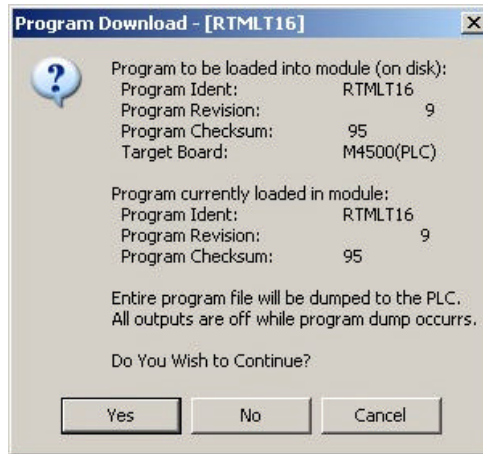
Note: To “Download” a SYSdev program to the processor, the program must be “Online”. If “Online” mode cannot be achieved, program download will not be executed. If the program is currently “Offline”, the user will be prompted to first go “Online”.

Once selected, and the setup 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 SYSdev file can be downloaded using the setup 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.



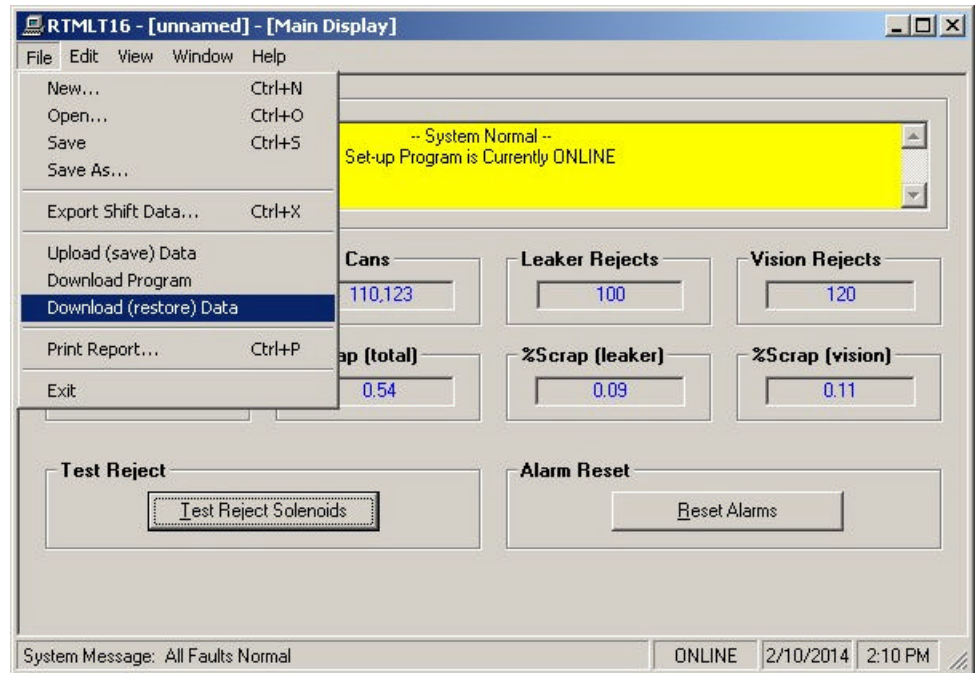
After the user confirms their choice, program download is initiated and the current program download address is displayed. When program download is complete, the user is prompted to acknowledge. Control is passed back to the main program and the setup program remains in an “Online” edit mode.

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4.2.4 DOWNLOAD (RESTORE) DATA

The setup program allows the user to download “Setup” parameters and shift data to the M4500 from the setup “Data File”. This function is accessed from the “File” menu.



Note: Only the values contained within the current data file are used. If the validity of the current data file is questionable, review the data in an “Offline” mode prior to download.

4.2.5 PRINT REPORT

The “Setup” program allows the user to generate a “Report” printout of all the setup parameters and shift data. This function is accessed from the “File” menu.

At the top of each page, the report displays the name of the setup 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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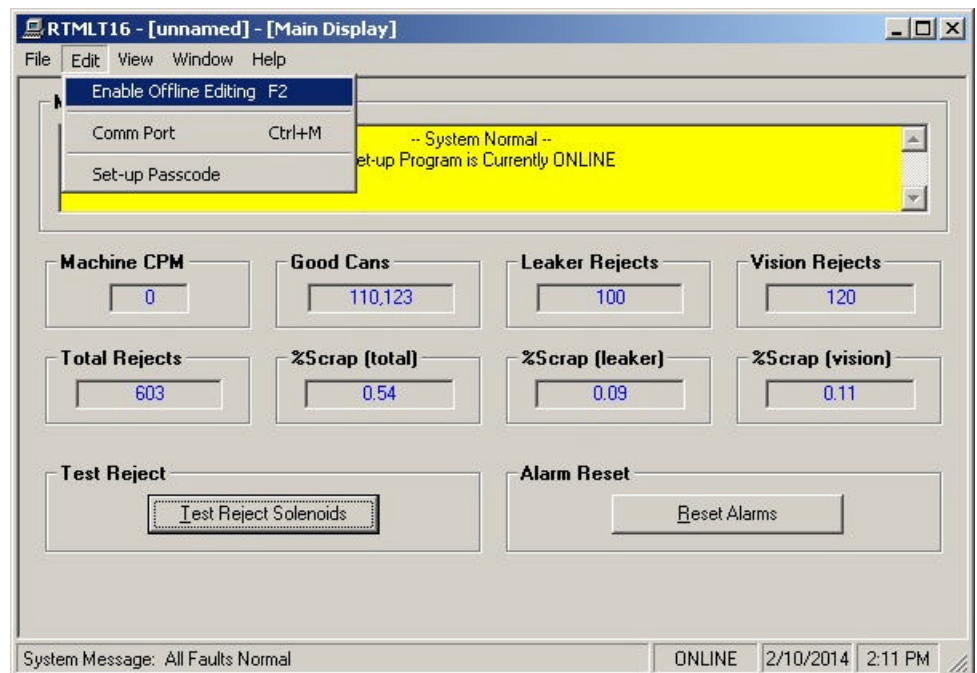
To printout a report of the settings contained in the setup “Data File”, perform the following:

- 1) 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.

4.3 THE EDIT MENU

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

- Enable/Disable Offline Editing.
- Setup the Comm Port.
- Setup Passcode



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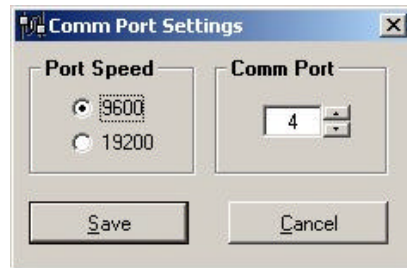
4.3.1 ENABLE OFFLINE EDITING

This function allows the user to perform “Offline” editing on the currently loaded setup data. This allows the user the ability to make any necessary changes to the setup parameters while not online with the processor.

If offline editing is not enabled, the user is only able to view the setup 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 M4500. The programming port of the M4500 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 Windows “Settings” folder.

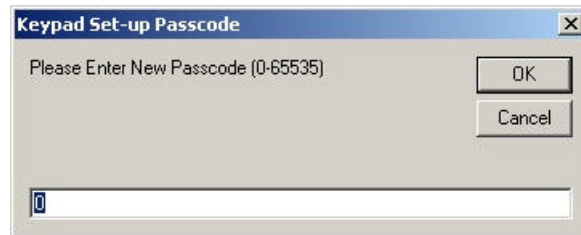
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4.3.3 EDIT SETUP PASSCODE

The edit “Setup Passcode” is an “Online” function only. This allows the user the ability to directly change the value of the Keypad/Display “Setup 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 Setup key on the Keypad/Display and simply press the <ENTER> key to gain access to the setup parameters without having to enter a zero.

If the value of the “Setup 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 setup parameters.

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.

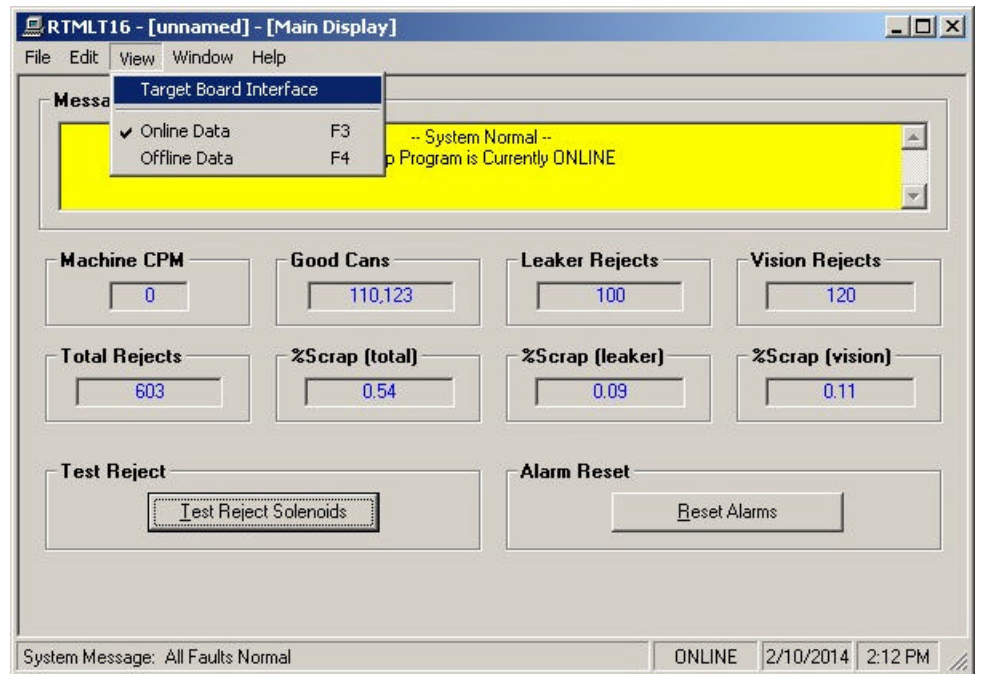
SECTION 4

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4.4 THE VIEW MENU

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

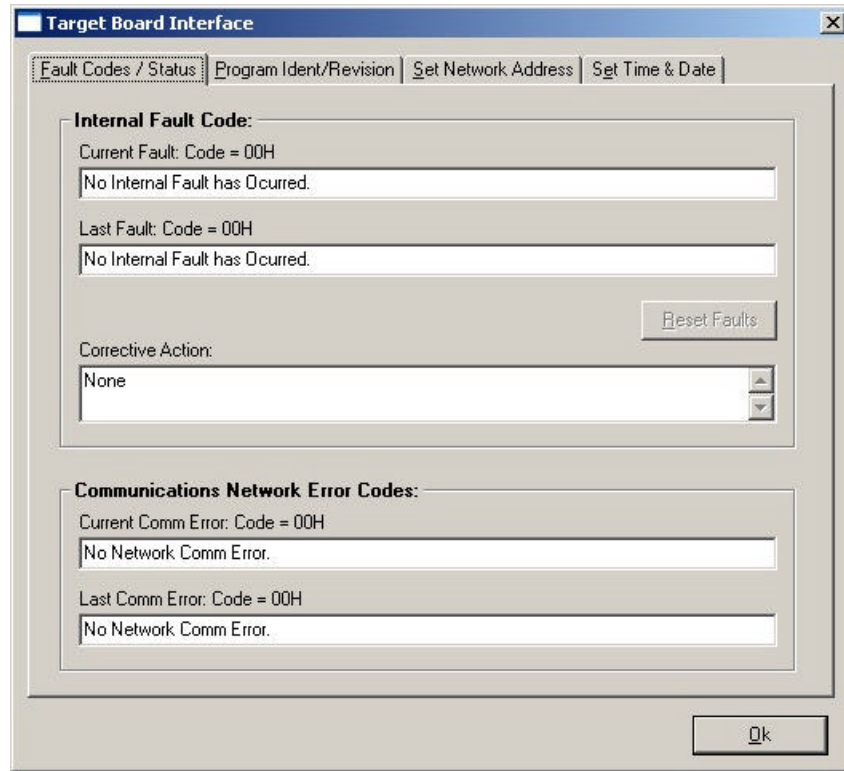
- View the “Target Board Interface”
- View “Online” Data
- View “Offline” Data



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4.4.1 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 from the “View” menu, by selecting “Target Board Interface”.



Once invoked, the setup program will prompt the user to select a program to compare with the one existing in the processor. Whether a program is selected or the user cancels, the setup program will attempt to communicate with the M4500. If unsuccessful a warning message will be displayed, prompting the user to either “Retry” or “Cancel” the operation. If 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 be displayed.

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4.4.2 VIEW ONLINE DATA

This function allows the user to place the setup program in an “Online” mode 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 setup program will attempt to open the Comm port and communicate with the M4500. If the setup program is unsuccessful, a warning message will be displayed prompting the user to either “Retry” or “Cancel” the operation. If the operation is canceled and communication with the processor cannot be established the system will be placed in an “Offline” edit mode.

Note: Anytime while the setup 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.

4.4.3 VIEW OFFLINE DATA

This function allows the user to place the setup program in an “Offline” mode. This is accessed by 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 setup data file.

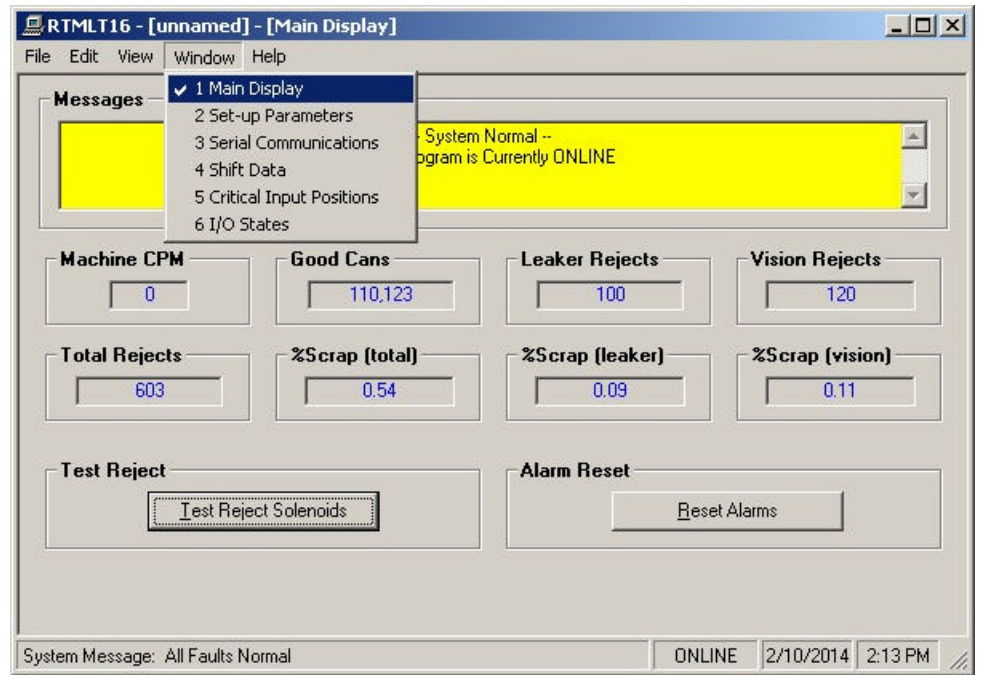
Note: The program can be toggled between “Online” and “Offline” by simply double clicking on the “Online” or “Offline” panel displayed in the status bar at the bottom of the window.

Once invoked, the setup program will close the Comm port and cease communication with the M4500.

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4.5 THE WINDOW MENU

The “Window” menu allows the user to select one of six different Display/Setup windows to modify setup parameters, view shift data 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 and the name is changed in the title bar of the main window.

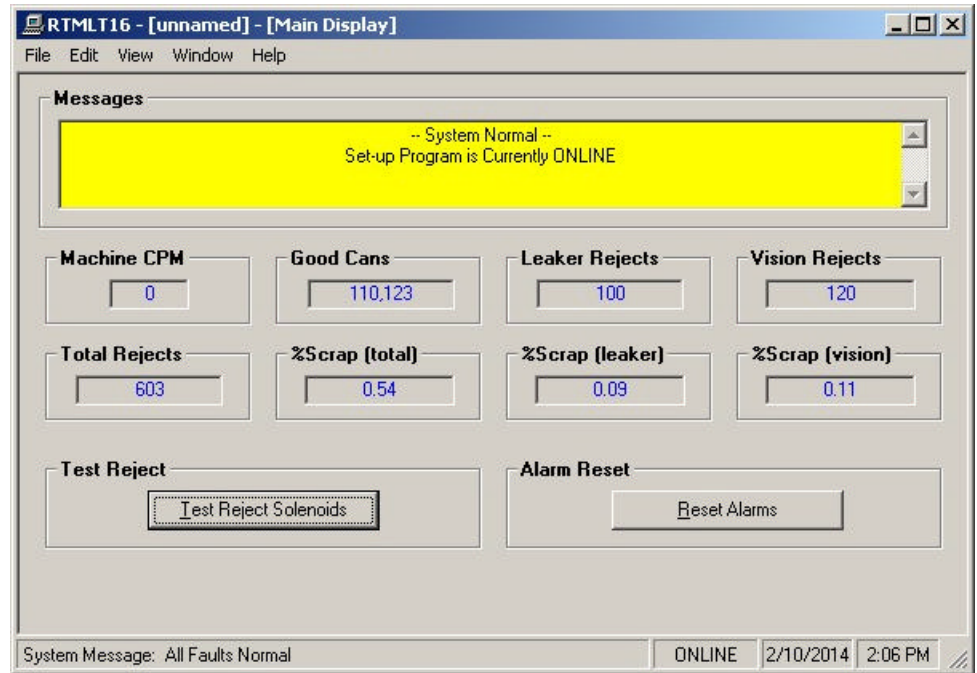
Note: “Read” only variables are displayed in blue with a gray background. Any variables that can be altered by the user are displayed in black with a white background. In most cases, a parameter that can be changed by the user will have associated with it increment and decrement controls. The user can either click on the desired parameter to adjust and enter in a new value, or use the increment or decrement controls 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 M4500, as well as, the current “Online” or “Offline” status of the setup 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”.

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

Leaker Rejects: This is the total number of “Leaker” cans rejected from the machine by the “Reject Receiver” input (IN0) so far into the current shift.

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Vision Rejects: This is the total number of cans rejected from the machine by the “Aux1” or “Vision” reject input (B100.2) so far into the current shift (if used).

Total Rejects: This is the summation of the total number of cans rejected from the machine due to the “Reject” receiver”, “Array Fault” receiver, “Aux1” (vision) or “Aux2 reject inputs.

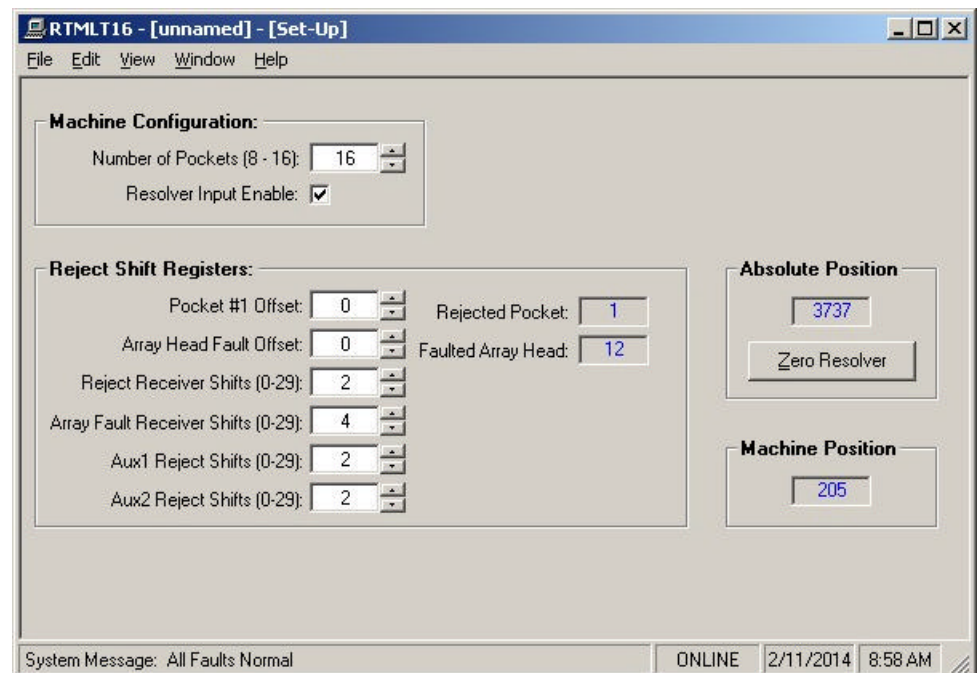
%Scrap (total): This is the percentage of all cans tested that were rejected from the machine.

%Scrap (leaker): This is the percentage of all cans tested that were rejected due to a “Reject Receiver” reject signal.

%Scrap (vision): This is the percentage of all cans tested that were rejected due to a “Aux1” or vision reject signal.

4.5.2 THE SETUP PARAMETERS WINDOW

The “Setup Parameters” window is used to view and adjust any of the setup parameters. This is selected from the “Window” menu.



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Machine Configuration:

- 1) **Machine Number of Pockets (8 - 16):** This parameter is used to set the number of pockets of the machine (8, 10, 12 and 16). Set this value to the number of pockets for the machine.
- 2) **Resolver Input Enable:** This parameter is used to enable the use of the resolver feedback for all timing functions. Enabling this feature allows other displays to be active as well as disable the “Clock” and “Reset” timing inputs. Select the check box when a resolver is used for machine timing.

Reject Shift Registers:

- 1) **Pocket #1 Offset:** This is adjusted such that a reject from pocket #1 is counted as a reject from pocket #1. Covering the “Array Reset” pickup (center window of array head) of array head number 1 with electrical tape will create a consistent reject from the array head. Run cans through the machine and observe the pocket number of the “Rejected Pocket” display field. Adjust the “Pocket #1 Offset” until rejects for the associated array head continuously increment.
- 2) **Array Head Fault Offset:** This number is used to correctly display the number of the “Faulted Array Head” when a “Leak Detection Array Fault” occurs. Using electrical tape, cover the “Reject” IR output of array an array head. This will cause an “Array Head Fault” to be generated on the particular pocket. Adjust this offset until the faulted array head is correctly displayed when the fault is generated.
- 3) **Reject Receiver Shifts (0-29):** The length of this reject shift register can be set to any value from 0 to 29 and is used to establish the number of pocket delays from the input of the reject receiver (IN0) to the actuation of the reject solenoid.
- 4) **Array Fault Receiver Shifts (0-29):** The length of this reject shift register can be set to any value from 0 to 29 and is used to establish the number of pocket delays from the input of the array head fault receiver (N1) to the actuation of the reject solenoid.

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- 5) **Aux1 Reject Shifts (0-29):** The length of this reject shift register can be set to any value from 0 to 29 and is used to establish the number of pocket delays from the input of the Aux1 (vision – B100.2) Reject to the actuation of the reject solenoid.

- 6) **Aux2 Reject Shifts (0-29):** The length of this reject shift register can be set to any value from 0 to 29 and is used to establish the number of pocket delays from the input of the Aux2 Reject to the actuation of the reject solenoid.

Absolute Position:

This display shows the absolute position of the resolver in counts with a scale factor of 3840 divisions per revolution. This display is only active when the Resolver Feedback Enable option has been selected.

Zero Resolver:

When a resolver is used for machine timing, the M4500 internally generates the Clock timing (one pulse per pocket) and the Reset timing (one pulse per revolution of the main carrier wheel). This selection is used to auto zero the resolver.

Note: This selection is only active when the Resolver Feedback Enable option has been selected.

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

- 1) Time the resolver by rotating the machine forward until a reject from pocket 1 will activate the Odd reject solenoid. This is the resolver zero position.

- 2) Auto zero the resolver by clicking on the “Zero Resolver” button. A dialog box will appear asking to confirm the operation. Select “Yes” to zero the resolver. The Absolute Position and Machine Position will show the position at zero.

Machine Position:

This display shows the relative position of the machine (360 degree pocket-to-pocket reference). This is a calculated value based on the number of pockets and the absolute position of the machine. This display is only active when the Resolver Feedback Enable option has been selected.

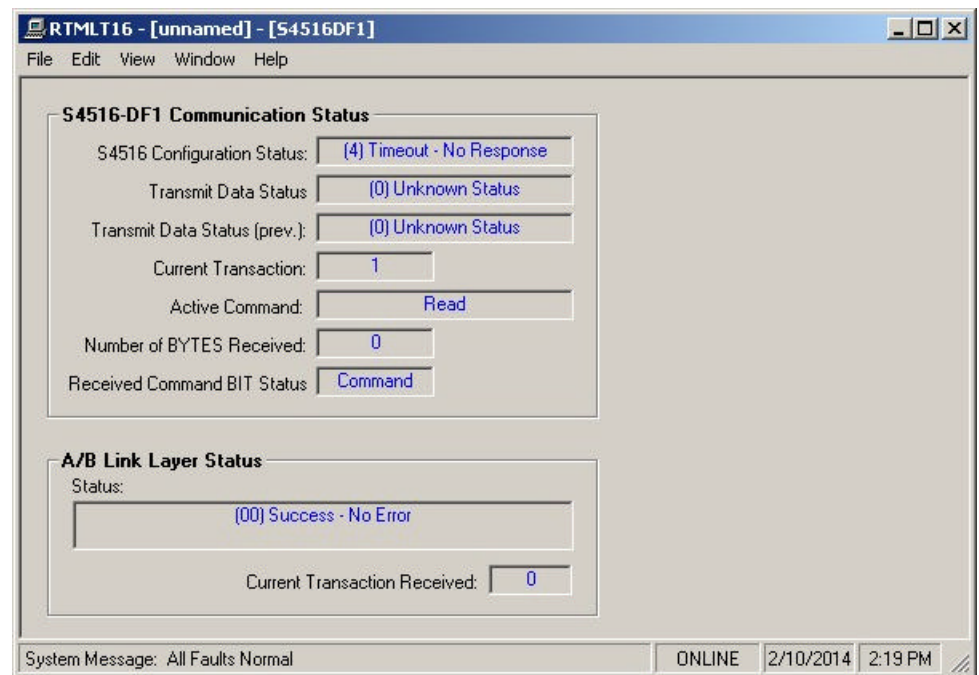
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4.5.3 THE SERIAL COMMUNICATIONS WINDOW

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

- View the S4516 configuration status.
- View the S4516-DF1 serial communication status.
- View the Allen-Bradley Link Layer serial communication status.



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- 1) **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 executed in the “Initialization” file of the user program, as well as in the main program to re-initialize the S4516 whenever it detects a loss of communications with the host PLC.

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 form 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).

- 2) **Transmit Data Status:** This represents the state of the data packet transmission and 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.

- 3) **Current Transaction:** This is the “Transaction” number delivered to the Allen-Bradley PLC.
- 4) **Active Command:** This displays either “Read” or “Write”. This is used to view the command type of the current transaction.
- 5) **Number of BYTES Received:** This displays the current number of bytes received from either a “Command” or “Reply” message packet.
- 6) **Received Command BIT Status:** This displays the state of the command received. If this displays a “Reply”, then the command was sent from the M4500. If this displays “Command”, then a command action was received by the M4500.

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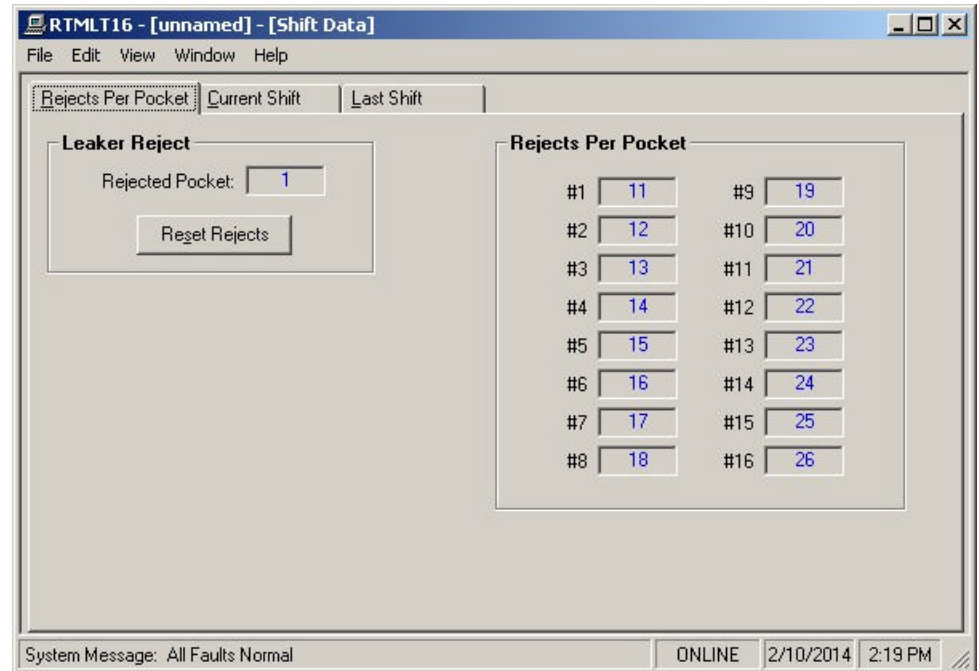
RTMLT16 WINDOWS BASED SETUP PROGRAM REFERENCE

- 7) **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.
- 8) **A/B Link Layer – Current Transaction Received:** This is the “Transaction” number received from the Allen-Bradley PLC.

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4.5.4 THE SHIFT DATA WINDOW

The “Shift Data” window is used to view the shift data collected by the M4500. This window is selected from the “Window” menu.



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

Rejects Per Pocket:

The number of rejects per pocket menu is provided to aid in the trouble-shooting of a light seal problem with a pocket or pockets. The total number of rejects for each pocket since the last reset or end of shift is displayed.

Note: Prior to selecting this selection, make sure the RS-232 cable is connected from the COM port on the computer to the "PROG" port of the M4500.

- 1) **Rejected Pocket:** This is the number of the last pocket that generated a leaker reject. This is only available in the online mode.

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- 2) **Rejects Per Pocket #:** This is the total number of leaker rejects for each pocket. This data is displayed and updated continuously in the respective field for each pocket. A disproportionately high count for a particular pocket indicates a light seal problem for that pocket.
- 3) **Reset Rejects:** This provides the operator the opportunity to reset the counts for troubleshooting purposes. Resetting these counts does not affect the total number of rejects per for the shift. This function is only available in the online mode.

Current Shift:

This selection 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" data 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.

Current Shift		
Total Good Cans:	110,123	
Total Rejects:	603	
Leaker Rejects:	100	
Array Faults:	203	
Aux1 (Vision) Rejects:	120	
Aux2 Rejects:	180	

Rejects Per Pocket			
#1	101	#9	109
#2	102	#10	110
#3	103	#11	111
#4	104	#12	112
#5	105	#13	113
#6	106	#14	114
#7	107	#15	115
#8	108	#16	116

Note: Prior to selecting this selection, make sure the RS-232 cable is connected from the COM port on the computer to the PROG PORT on the M4500. The following data is displayed in the "Current Shift (Totals so far)" menu:

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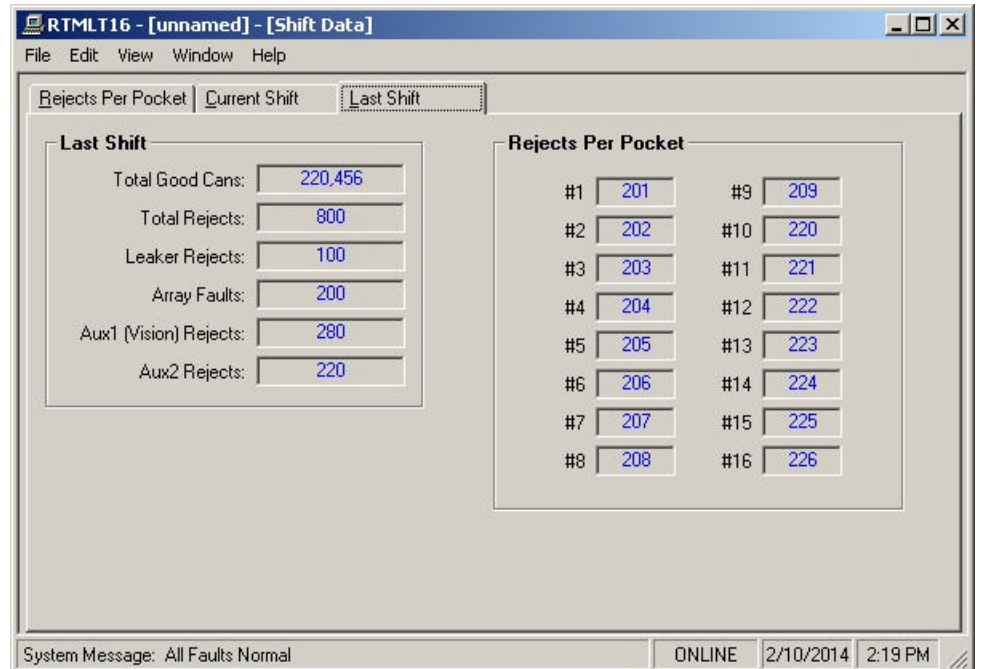
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- 1) **End of Shift - Transfer Data:** This button is used to invoke an end of shift data transfer. This will cause the current shift data to be transferred to the last shift and then all counts reset to zero.
- 2) **Total Good Cans Tested:** This is the total number of good cans tested so far into the shift. This is essentially a can counter.
- 3) **Total Rejects:** This is the total number of cans rejected by the machine so far into the shift.
- 4) **Leaker Rejects:** This is total number of “Leaker” cans rejected from the machine for the shift.
- 5) **Array Faults:** This is the total number of “Array Faults” that have occurred for the shift.
- 6) **Aux1 (Vision) Rejects:** This is the total number of cans rejected due to an Aux1 (vision system) reject input for the shift.
- 7) **Aux2 Rejects:** This is the total number of cans rejected due to an Aux2 (if used) reject input for the shift.
- 8) **Rejects Per Pocket:** This is the total leaker rejects for each pocket. A disproportionately high count for a particular pocket indicates a light seal problem for that pocket.

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Last Shift:

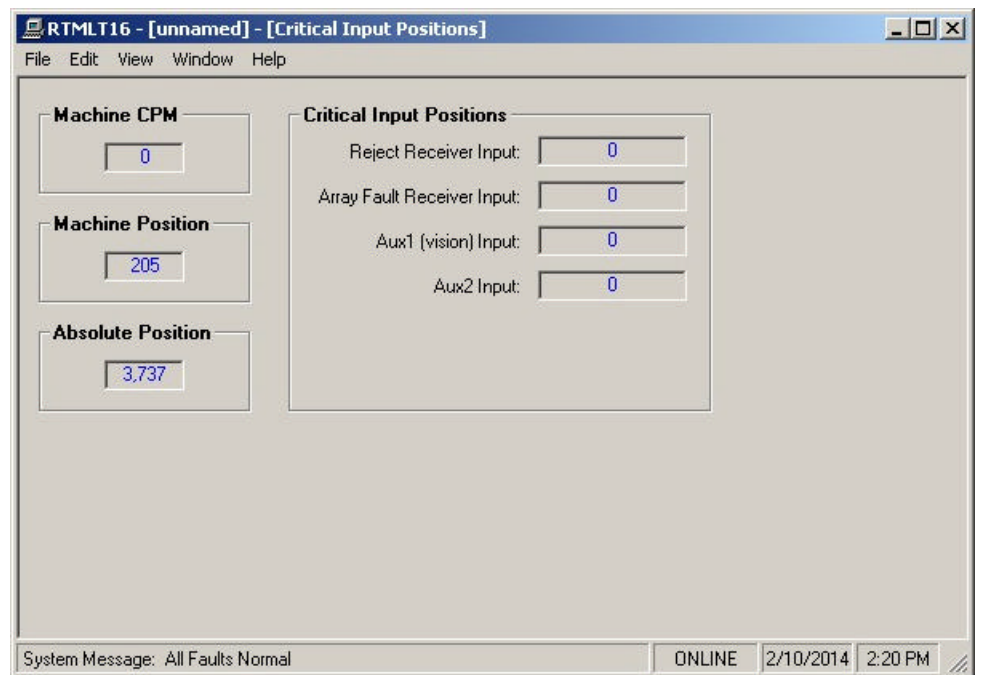
The "Last Shift" data is identical to the current shift data except it is the totals for the previous 8 or 12 hour shift or previous label run, however the shift collection is setup. This allows data collection and diagnostics to take place automatically over a two shift period. Refer to the previous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



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4.5.5 THE CRITICAL INPUT POSITIONS WINDOW

The critical input positions window is used to view the position, in degrees (pocket-to-pocket), that the Reject Receiver, Array Fault Receiver, Aux1 (vision), and Aux2 reject signals are coming in at while the machine is running. Primarily this is to verify that none of these signals are coming in within +/-60 degrees of the “Clock” timing. If any of them do, the system could potentially miss clock the reject causing the wrong can to be intermittently rejected.

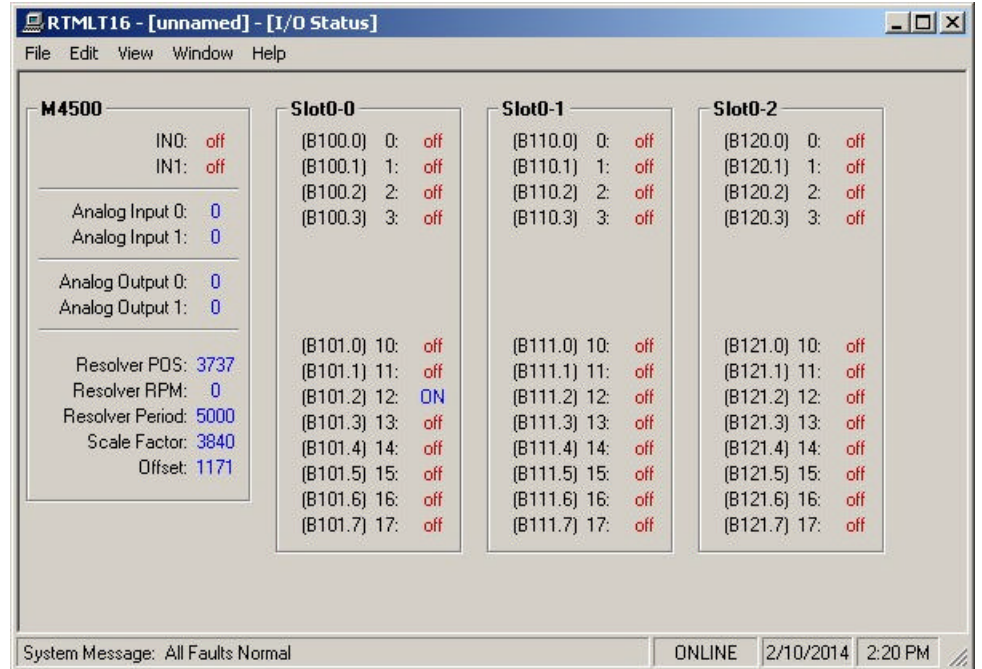


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4.5.6 THE I/O STATES WINDOW

The “I/O States” window is provided to display states of the inputs, outputs and that of the M4500. This includes the interrupt inputs (IN0 and IN1), the analog I/O, the resolver and I/O boards. These values are displayed as read by the M4500 processor



SECTION 5 TROUBLE-SHOOTING

The following is provided as a quick reference to aid in the troubleshooting of the RTM-LT16. Definitions and causes of the various alarm messages displayed by the RTMLT16 module is provided as well as a general step-by-step trouble-shooting process.

5.1 ALARM MESSAGE DEFINITIONS

In addition to the default and setup messages described in previous sections, alarm and status messages are displayed and defined as follows:

"Leak Detector Array Fault": At the leading edge transition of the Clock timing input, a check is done to verify the transition of state of the Array Fault receiver. If a transition of state was not detected, a "Leak Detection Array Head Fault" is generated, the "Array Head Fault" output is turned ON and reject information is shifted into a reject shift register to activate the appropriate reject solenoid and reject the associated can.

"Reset Timing Flag Failure": At the leading edge transition of the Clock timing input, a check is made to verify the occurrence of the Reset timing input and to increment the current pocket count. If the current pocket count exceeds the number of pockets of the machine then a Reset Timing Fault is generated.

"Clock Timing Flag Failure": After the machine starts and the Machine Run input is ON, the system will periodically check for the occurrence of the Clock timing input approximately every 1.5 seconds. If this input fails to change state then a Clock Timing Fault is generated.

SECTION 5 TROUBLE-SHOOTING

5.2 CAN REJECT TROUBLE-SHOOTING

If the system is intermittently rejecting the wrong can perform the following to trouble-shoot the system:

Note: The function of the reject solenoids can be performed at full production speeds using the “Test Reject” key on the Keypad/Display. Depressing this will cause one can to be rejected just as a normal reject would occur. This key can also be pressed with the machine stopped to verify the operation of the reject solenoids and will be ON as long as the key is pressed.

- 1) With the machine stopped, verify the operation of both reject solenoids. Remove an airline or disconnect the output to one of the solenoids then press the “Test Reject” key to verify operation. Repeat for the second solenoid
- 2) Verify air pressure to reject solenoids.
- 3) Verify wiring and function of Reject receiver. With an array head exposed to ambient light, the output should be ON. As the array head passes the Reject receiver, input IN0 should also turn ON. Verify that the input turns ON for all array heads. This same function should be true for the Array Fault receiver as well.
- 4) When a shaft mounted resolver is not installed, the Clock and Reset timing inputs are either derived from a two channel shaft encoder driven off the main carrier wheel or from sensors located inside the machine. The Clock timing occurs once per pocket. The Reset timing occurs once per revolution of the main carrier wheel, in between Clock timing pulses and determines the location of pocket 1.

Verify that as the machine is rotated in the forward direction, the input for the Clock timing (B100.0) comes ON once per pocket and the input for the Reset timing (B100.1) comes ON once per revolution of the main carrier wheel.

- 5) If a shaft mounted resolver is installed, check the resolver mounting and coupler for obvious damage (broken or loose coupler or mount).

SECTION 5 TROUBLE-SHOOTING

- 6) Position the machine at machine zero (see section 2.9.2). From the “View Critical Input Positions” selection of the primary setup menu, verify that the “Absolute POS:” reads 0000. If not re-zero the resolver.
- 7) Verify 360 degrees pocket-to-pocket. With the machine at 0 degrees, move the machine forward by hand one pocket. The “POS 360:” should count up thru 359 and again be at 0 degrees. Do this for all the pockets.

Note: The “POS 360:” may deviate +/-20 degrees from pocket to pocket. This is normal and is not a problem. If it does deviate significantly more than +/-20 degrees, perform the following:

- a) Using a DVM in AC mode, measure the voltage between R1 and R2 at the M4500 resolver connector. This should read 1.0 to 1.5 VRMS (AC voltage). If no voltage is read, replace the M4500 (see section 2.10.2). Be sure the DVM is in AC mode, this is not a DC voltage.
 - b) Again using the DVM in AC mode, verify the voltage between S1 and S3 at the resolver connector while slowly rotating the machine forward one revolution. The voltage should vary between 0 and 2.0 VRMS. If the voltage always stays at zero as the machine is moved forward, check the resolver wiring for a loose connection. If the wiring is OK, replace the resolver.
 - c) Check the voltage between S2 and S4 at the resolver connector just as was done for S1 and S3 above. It should read just as S1 and S3 should read.
 - d) If steps (a) thru (c) above check out OK, check the resolver coupler. Make sure the key in the resolver shaft is installed and the coupler is tight.
 - e) If (a) thru (d) did check out OK, but the pocket-to-pocket “Zero” location is still not right, replace the resolver.
- 8) With the machine running in normal production, verify the input positions of the critical inputs. These include the Reject Receiver, Array Fault Receiver, Aux1 (vision), and Aux2 reject signals. These signals should NOT be close or coincident with the “Clock” timing.

SECTION 5

TROUBLE-SHOOTING

- 9) If after performing the previous steps (1) thru (8), the system is still not functioning correctly, perform all the steps of the setup section 2.4.
- 10) If after performing step (9) and the system is still not functioning correctly, replace the M4500 then try again. See section 2.10.2 for details on replacing the module.

SECTION 5 TROUBLE-SHOOTING

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SECTION 6 RECOMMENDED SPARES

The following are recommended spares for the RTM-LT16. These parts are available through Systems Engineering Assoc. Inc.

<u>Quantity</u>	<u>Part Number</u>	<u>Description</u>
1 ea.	M4500	PLC/PLS Processor/Chassis (4-Slot) Module
1 ea.	P4500	+5VDC, +/-12VDC Power Supply - (M4500)
1 ea.	D4591	2 Line X 40 Character Display/24 Key Operator Interface
1 ea.	S4569	4-Diff In/4-BiDir/4-Out (Sink) 10-30VDC I/O Board
1 ea.	RSV34-MS1	Resolver with MS Connector

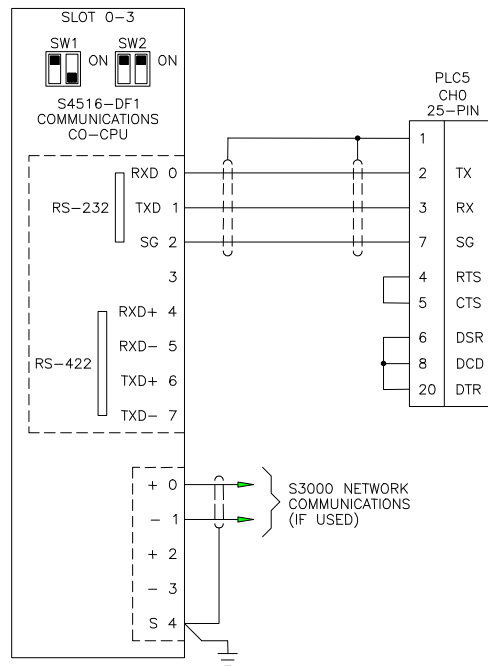
SECTION 6 RECOMMENDED SPARES

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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:

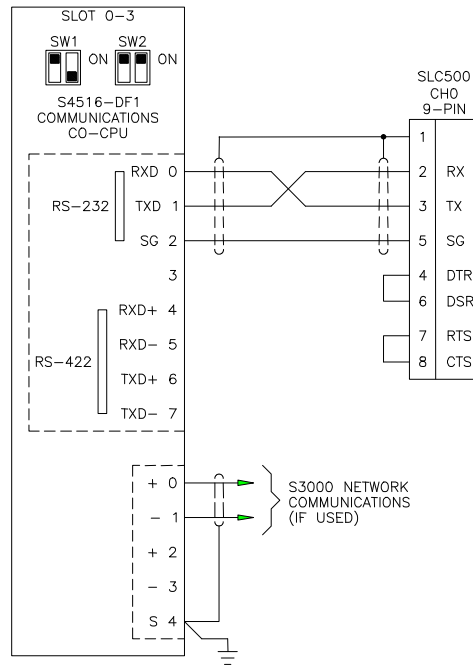
- POLE 1 = ON
- POLE 2 = OFF

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:

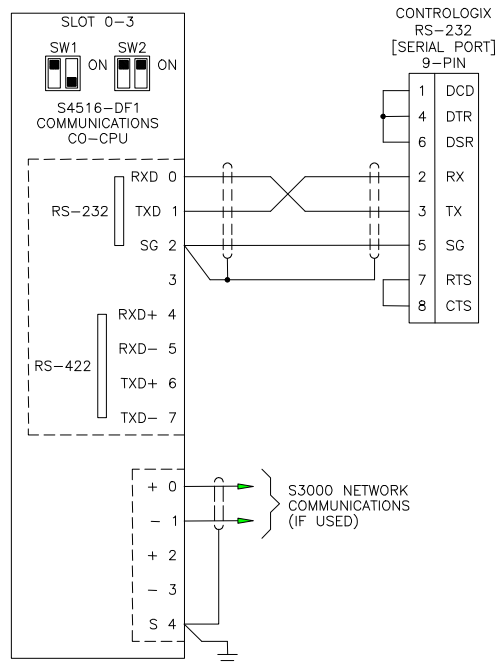
- POLE 1 = ON
- POLE 2 = ON

APPENDIX A DF1 COMMUNICATIONS

S4516-DF1 to SLC

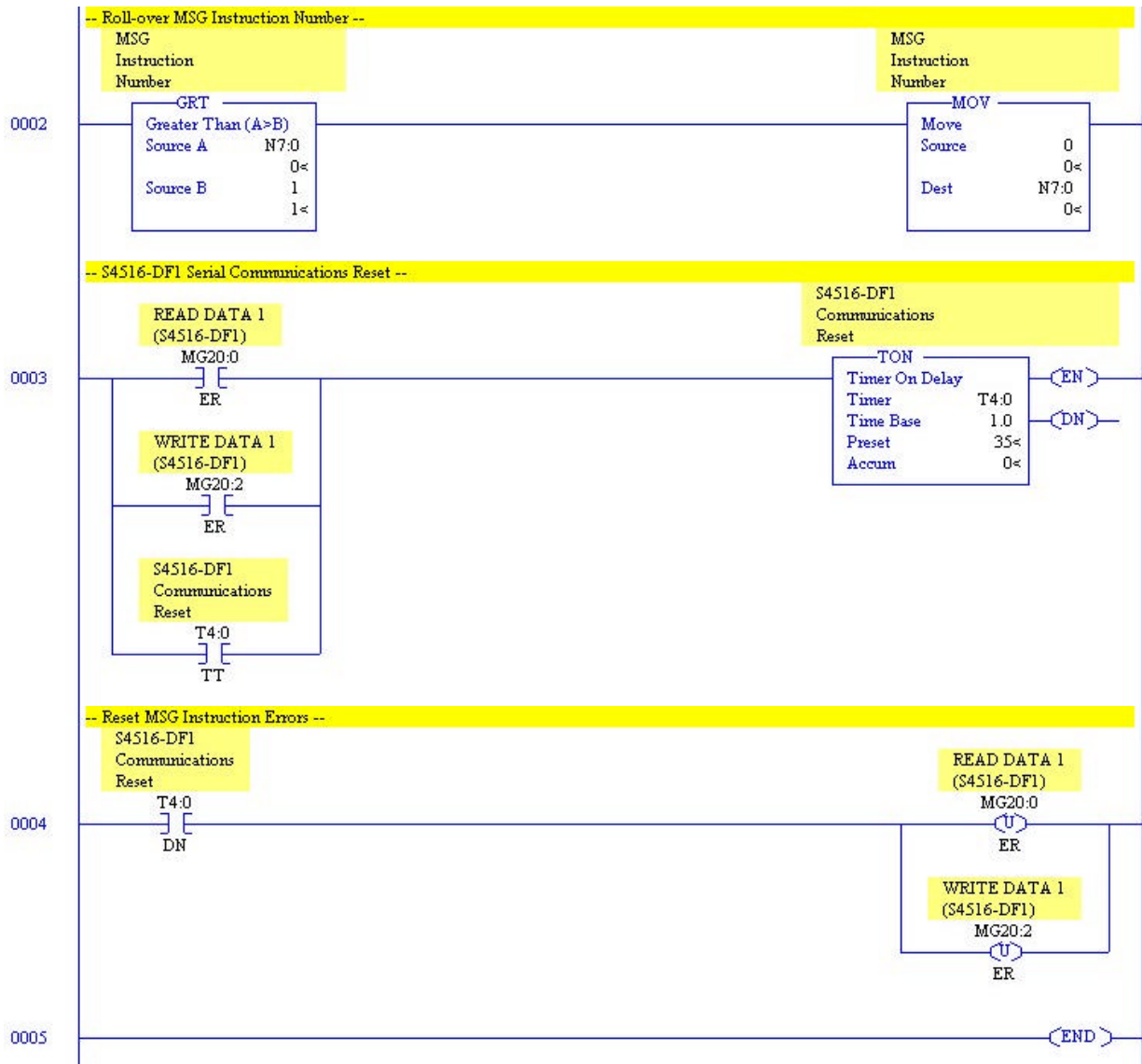


S4516-DF1 to ControLogix



APPENDIX A

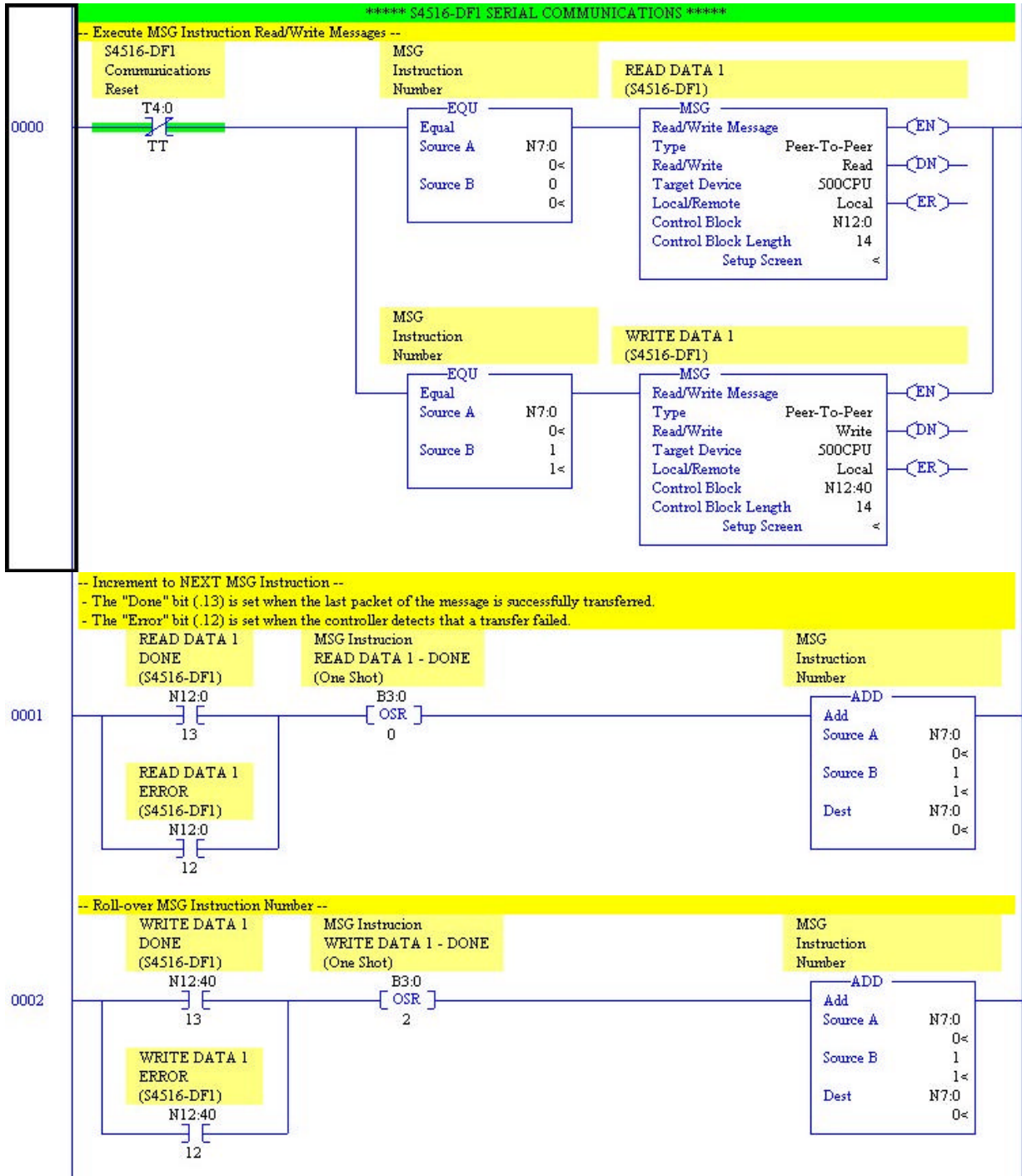
DF1 COMMUNICATIONS



APPENDIX A DF1 COMMUNICATIONS

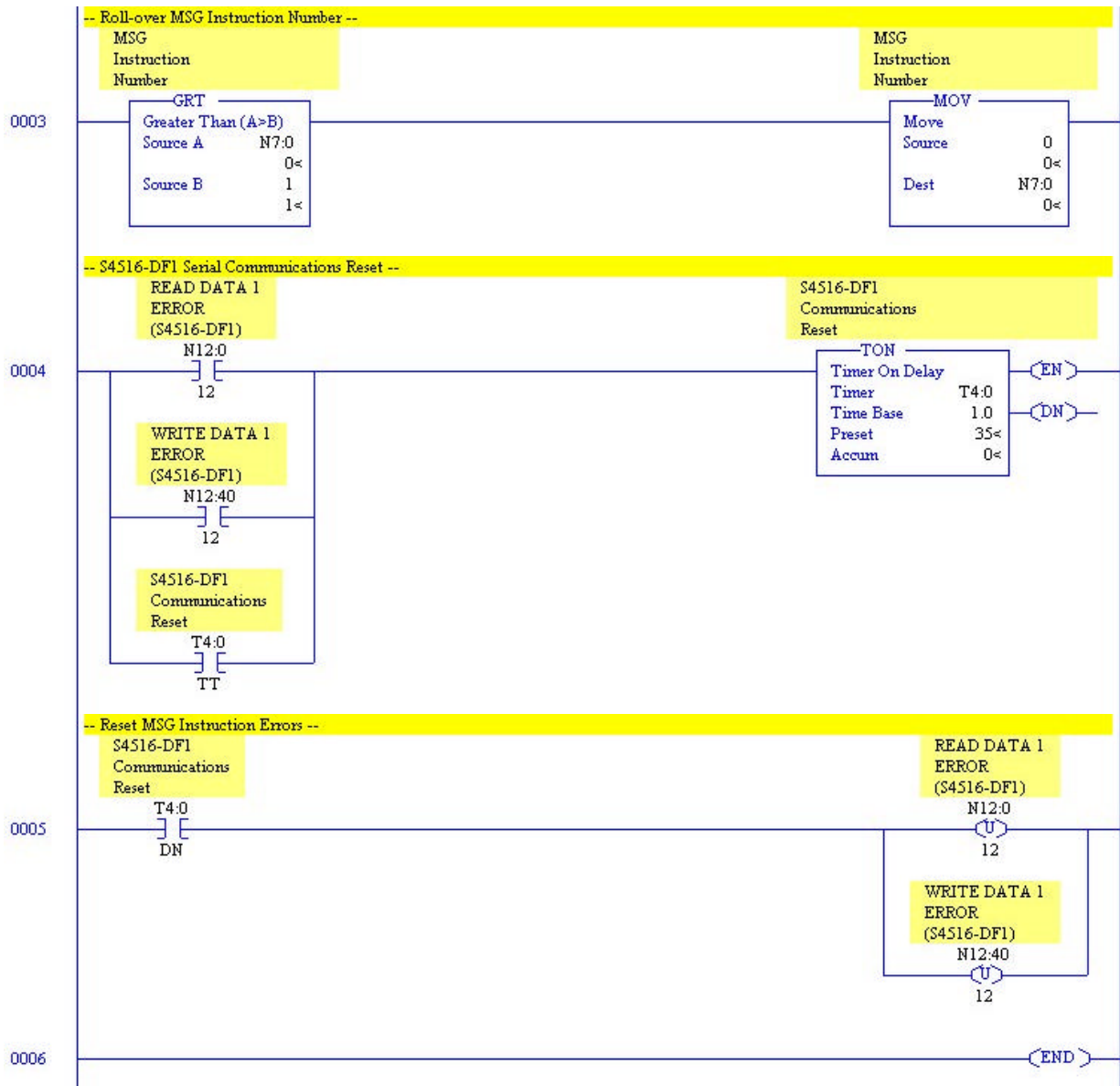
SLC500

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

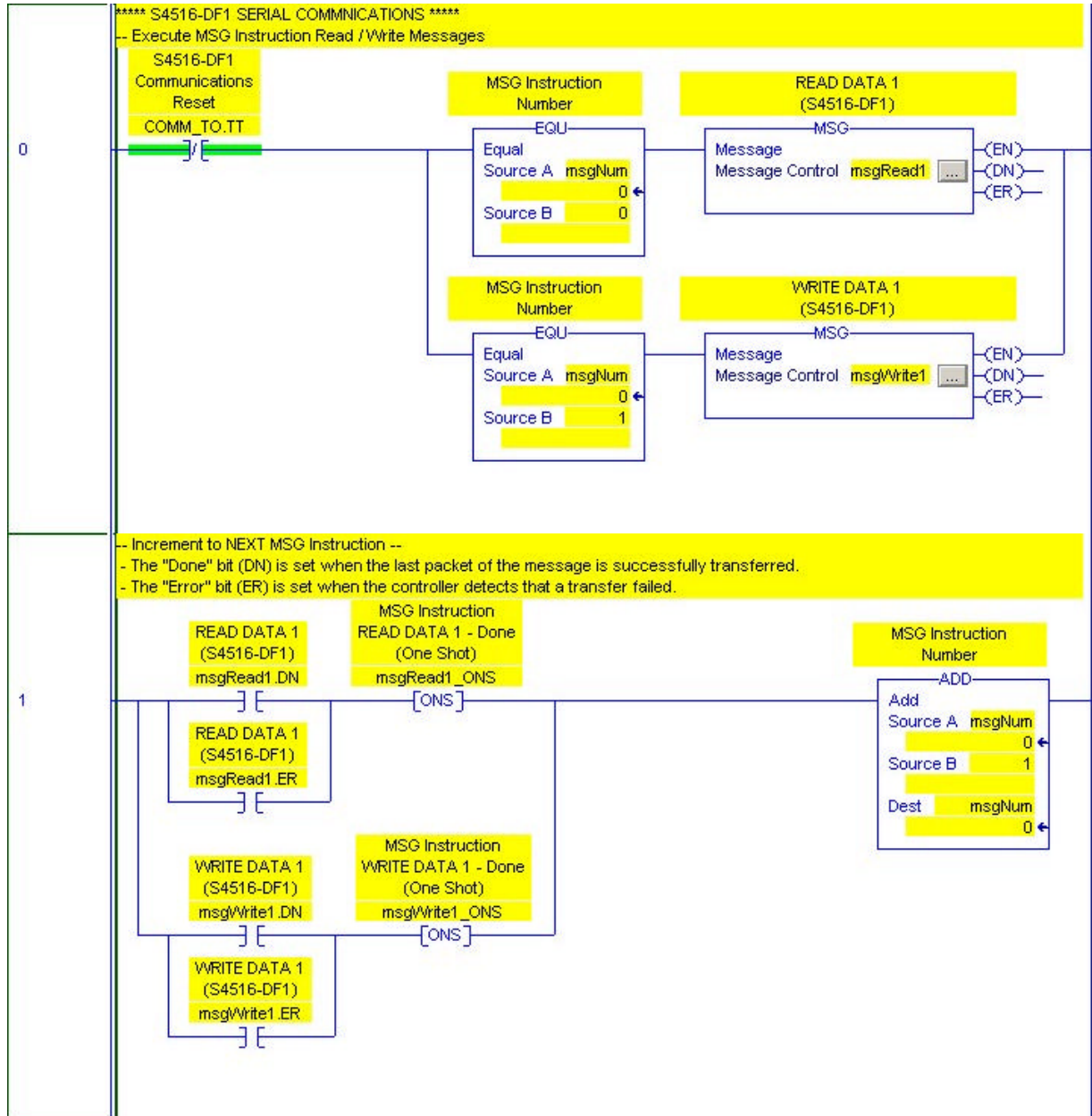
DF1 COMMUNICATIONS



APPENDIX A DF1 COMMUNICATIONS

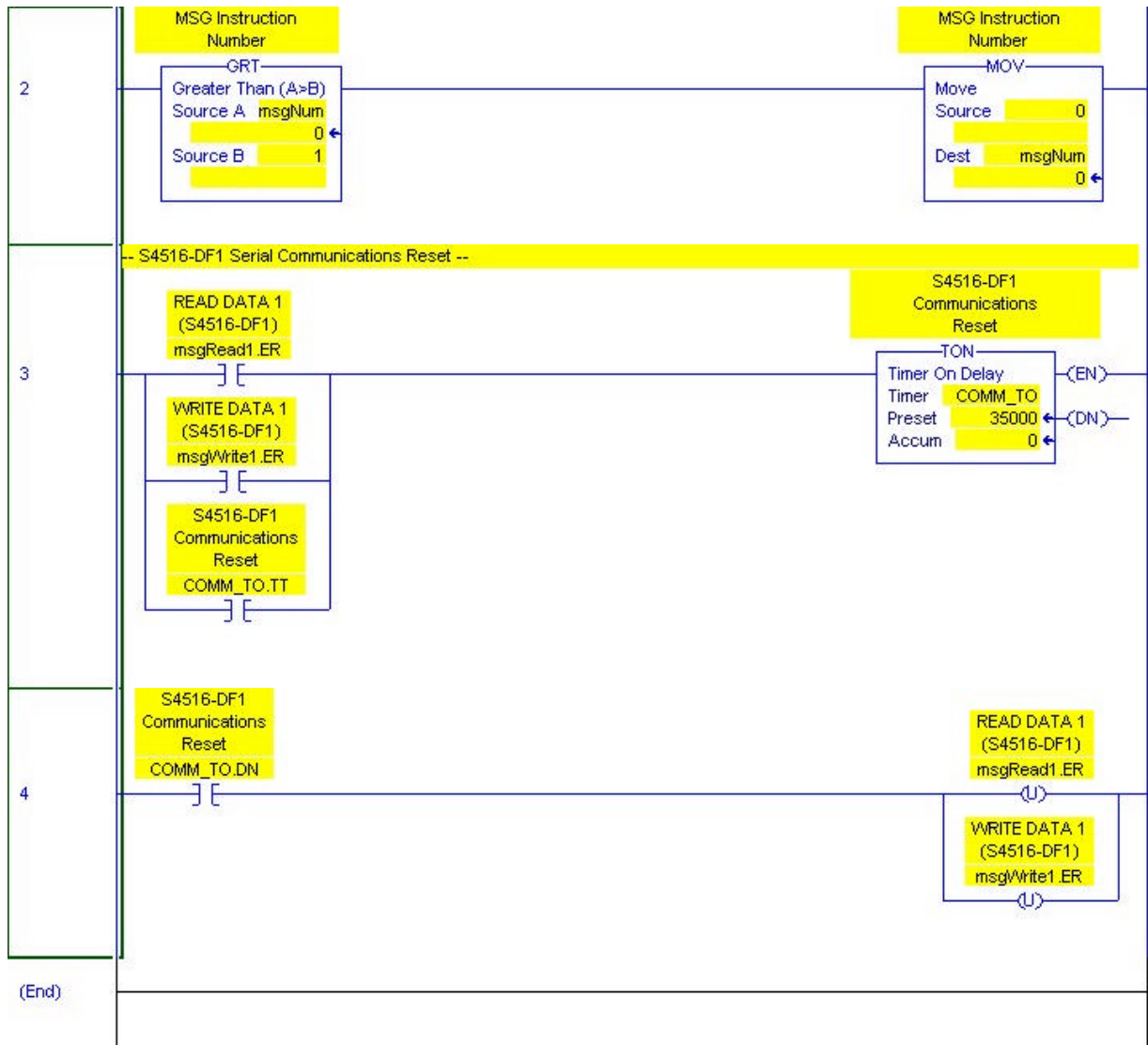
ControlLogix and CompactLogix

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

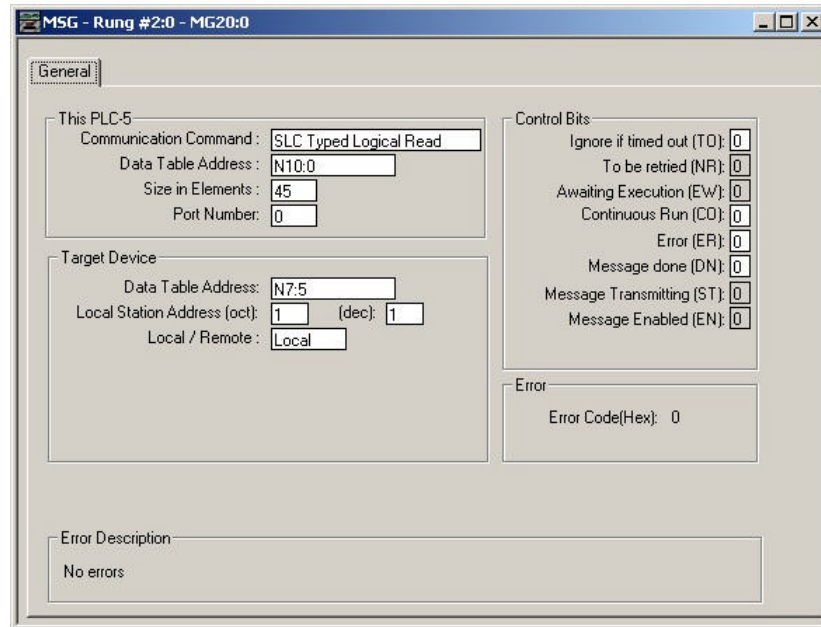
DF1 COMMUNICATIONS



USING THE MSG INSTRUCTION

READ INSTRUCTION – PLC5

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



Note: The Communication Command is “SLC Typed Logical Read”. The Data Table Address can be any integer file address. The 45 elements (total) read from the M4500 PLC are defined in the last section – Read/Write Data Definitions.

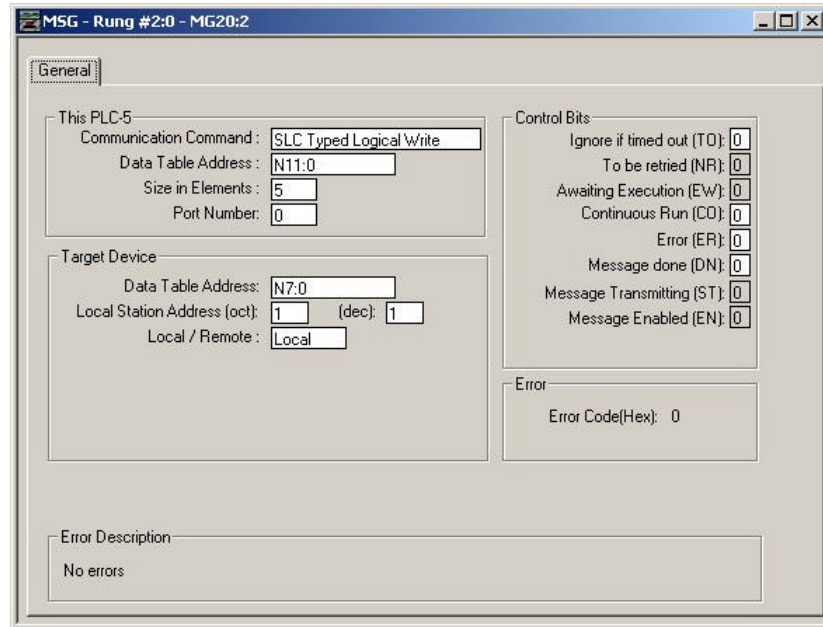
The Local Station Address is only necessary to define if communications with the S4516-DF1 is executed over a Data Highway network (via a DataLink Module).

APPENDIX A

DF1 COMMUNICATIONS

WRITE INSTRUCTION – PLC5

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



Note: The Communication Command is “SLC Typed Logical Write”. The Data Table Address can be any integer file address. The 5 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:

The screenshot shows a configuration window for a read message command. The window title is "MSG - Rung #2:0 - N12:0". The "General" tab is active. The "This Controller" section contains: Communication Command: 500CPU Read; Data Table Address: N10:0; Size in Elements: 45; Channel: 0. The "Target Device" section contains: Message Timeout: 5; Data Table Address: N7:5; Local Node Addr (dec): 1 (octal): 1; Local / Remote: Local. The "Control Bits" section lists: 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. The "Error" section shows Error Code(Hex): 0. The "Error Description" section shows No errors.

Note: The Data Table Address can be any integer file address. The 45 elements (total) read from the M4500 PLC are defined in the last section – Read/Write Data Definitions.

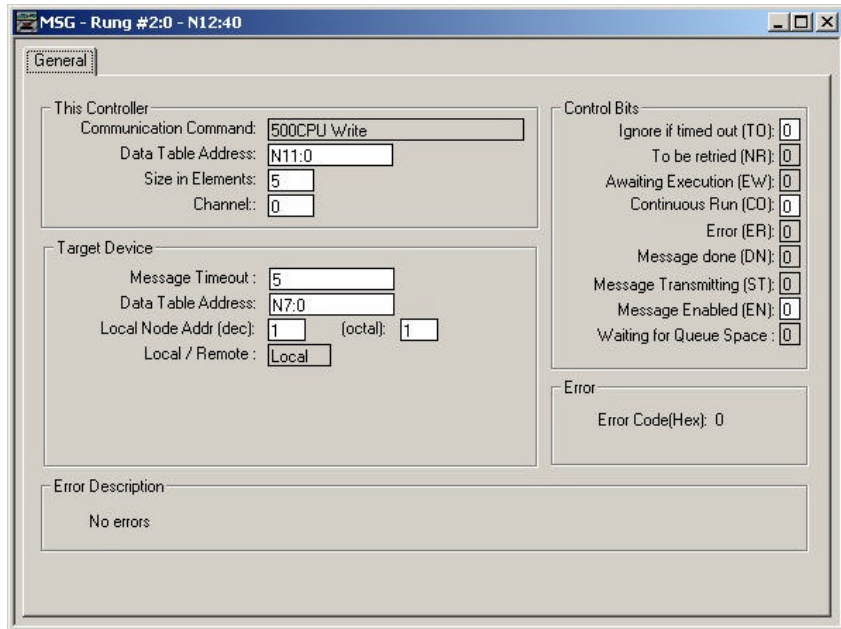
The Local Station Address is only necessary to define if communications with the S4516-DF1 is executed over a Data Highway network (via a DataLink Module).

APPENDIX A

DF1 COMMUNICATIONS

WRITE INSTRUCTION – SLC500

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

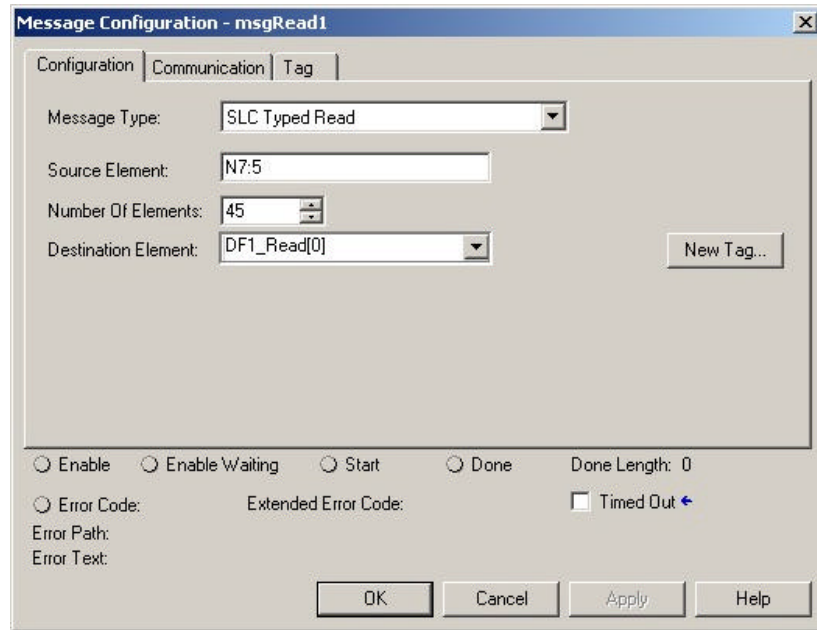


Note: The Data Table Address can be any integer file address. The 5 elements written to the M4500 PLC are defined in the last section – Read/Write Data Definitions.

APPENDIX A DF1 COMMUNICATIONS

READ INSTRUCTION CONFIGURATION – CONTROLOGIX

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



The screenshot shows a dialog box titled "Message Configuration - msgRead1" with three tabs: "Configuration", "Communication", and "Tag". The "Configuration" tab is active. It contains the following fields and controls:

- Message Type: SLC Typed Read (dropdown menu)
- Source Element: N7:5 (text input)
- Number Of Elements: 45 (spin box)
- Destination Element: DF1_Read[0] (dropdown menu)
- New Tag... (button)
- Enable (radio button)
- Enable Waiting (radio button)
- Start (radio button)
- Done (radio button)
- Done Length: 0 (text input)
- Error Code: (radio button)
- Extended Error Code: (text input)
- Timed Out (checkbox)
- Error Path: (text input)
- Error Text: (text input)
- OK (button)
- Cancel (button)
- Apply (button)
- Help (button)

Note: The “Message Type” is SLC Typed Read. The Destination Element can be any integer array. The 45 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 a dialog box titled "Message Configuration - msgWrite1" with three tabs: "Configuration", "Communication", and "Tag". The "Configuration" tab is selected. It contains the following fields and controls:

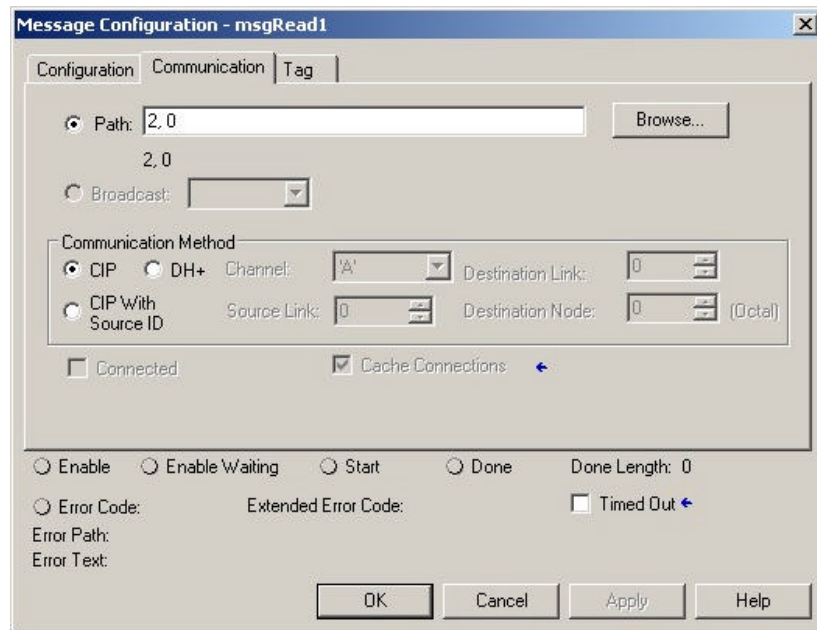
- Message Type:** A dropdown menu set to "SLC Typed Write".
- Source Element:** A dropdown menu set to "DF1_Write[0]" with a "New Tag..." button to its right.
- Number Of Elements:** A numeric spinner set to "5".
- Destination Element:** A text box containing "N7:0".
- Enable/Status:** Four radio buttons: "Enable", "Enable Waiting", "Start", and "Done". To the right of "Done" is the text "Done Length: 0".
- Error Handling:** Three fields: "Error Code:", "Extended Error Code:", and a checkbox labeled "Timed Out" with a blue arrow icon.
- Buttons:** "Error Path:" and "Error Text:" labels are present but have no input fields. At the bottom are four buttons: "OK", "Cancel", "Apply", and "Help".

Note: The “Message Type” is SLC Typed Write. The Source Element can be any integer array. The 5 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

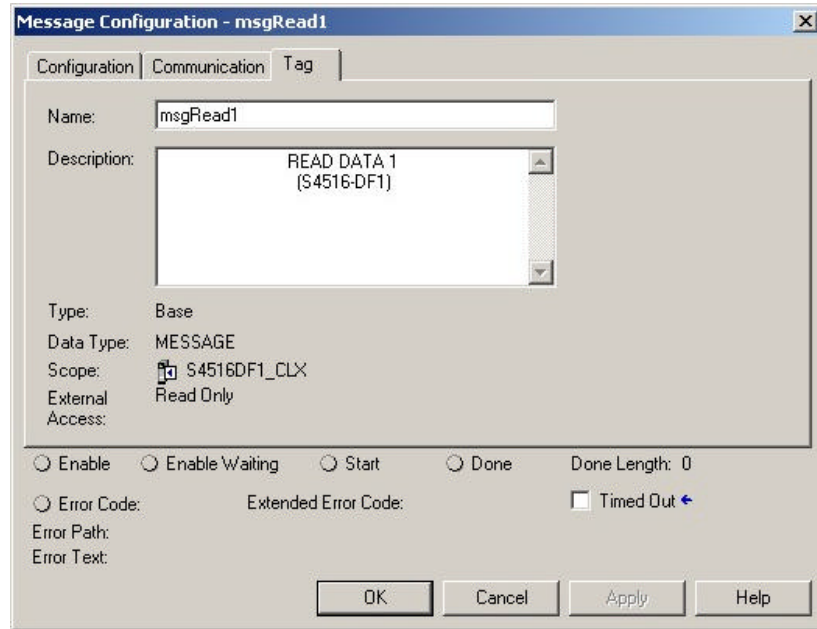
For serial DF1 communications, the *port* is “DF1 serial, channel 0” (Type = 2), *next_address* is for the station address (0-254). Since there is only the direct link from channel 0 to the User Port on the S4516-DF1 board, the *next_address* is set for station 0.

APPENDIX A

DF1 COMMUNICATIONS

TAG TAB - CONTROLOGIX

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

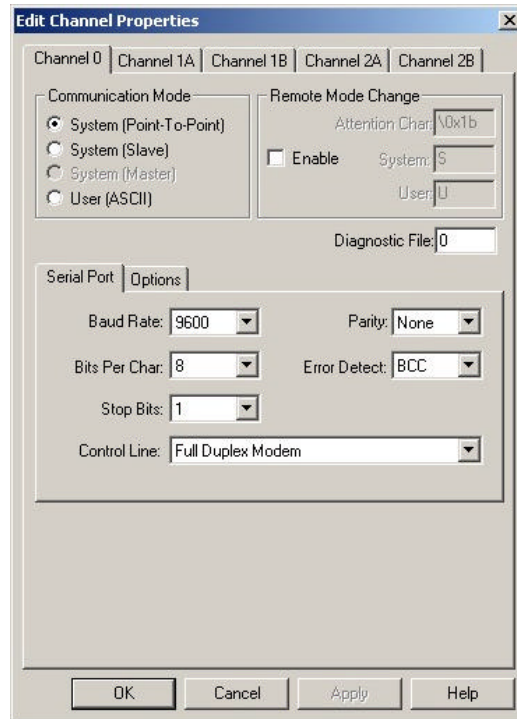


Note: The Tag “Data Type” must be MESSAGE and is defined at the “Controller” scope level.

CHANNEL 0 SETUP

PLC5

The Channel 0 Serial Port should be setup as follows:



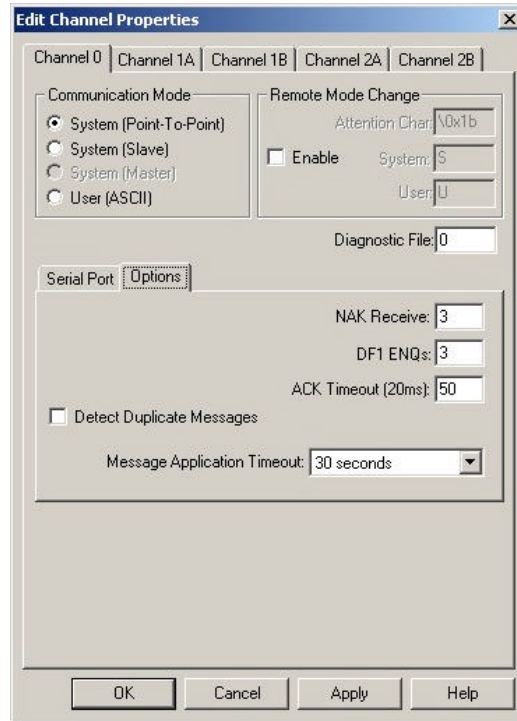
Note: The Communication Mode is setup for System (Point-to-Point).

APPENDIX A

DF1 COMMUNICATIONS

PLC5

The Channel 0 Options are setup as follows:

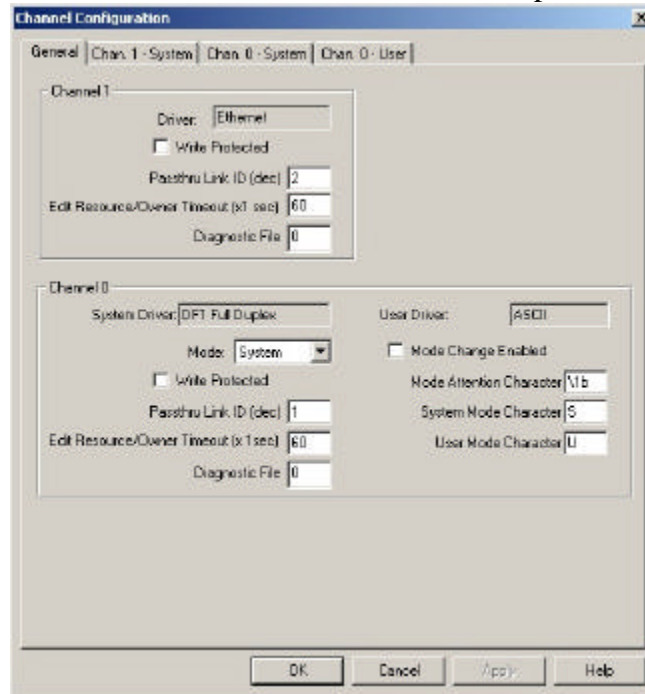


Note: The “Detect Duplicate Messages” should be unchecked.

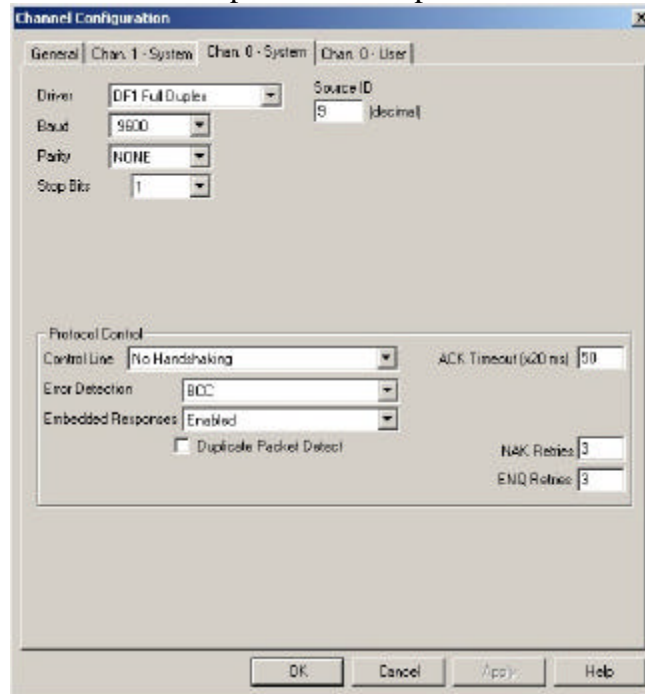
APPENDIX A DF1 COMMUNICATIONS

SLC500

The Channel 0 Serial Port should be setup as follows:



The Channel 0 Options are setup as follows:

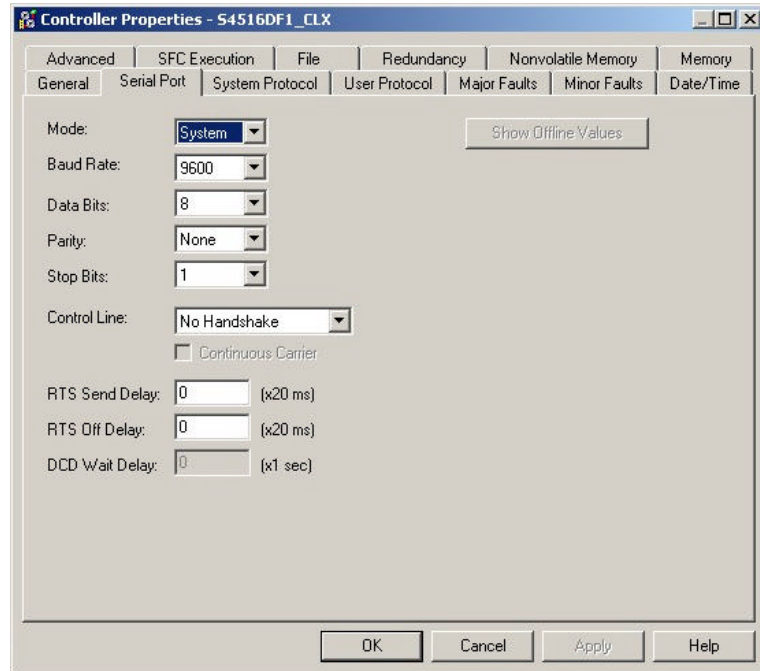


Note: The “Duplicate Packet Detect” should be unchecked.

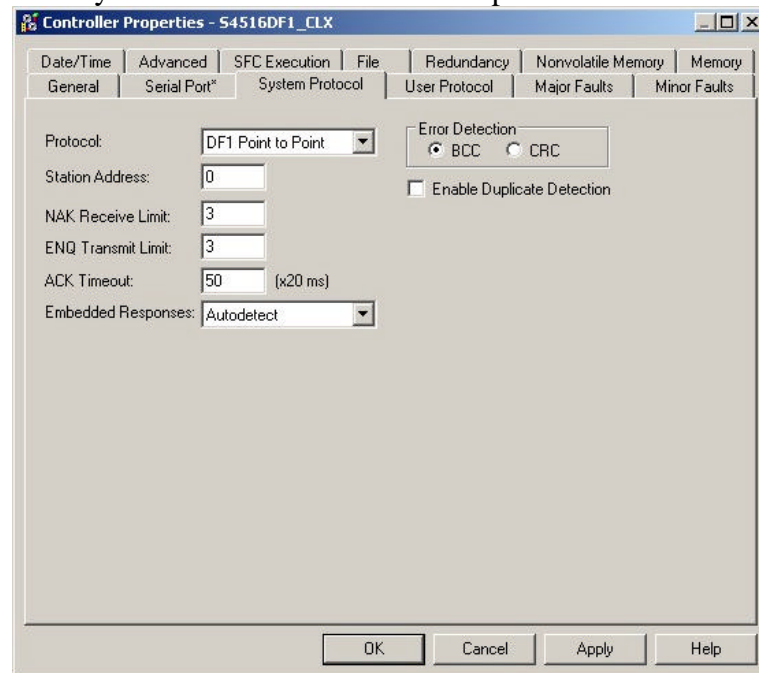
APPENDIX A DF1 COMMUNICATIONS

CONTROLOGIX

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



The “System Protocol” should be setup as follows:



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

APPENDIX A DF1 COMMUNICATIONS

READ/WRITE DATA DEFINITIONS

Data Read From The M4500 (45 Elements) Is Defined As Follows:

Description	M4500 Add	Mapped Add	PLC Add	Function
General:				
M4500 Status Word 1 (to PLC)		W3910	N7:5	R/O
Spare (Bit 00)		B3910.0	N7:5/0	
Spare (Bit 01)		B3910.1	N7:5/1	
Spare (Bit 02)		B3910.2	N7:5/2	
thru		thru	thru	
Spare (Bit 14)		B3911.6	N7:5/14	
Spare (Bit 15)		B3911.7	N7:5/15	
M4500 Status Word 2 (to PLC)		W3912	N7:6	R/O
Spare (Bit 00)		B3912.0	N7:6/0	
Spare (Bit 01)		B3912.1	N7:6/1	
Spare (Bit 02)		B3912.2	N7:6/2	
Spare (Bit 03)		B3912.3	N7:6/3	
Spare (Bit 04)		B3912.4	N7:6/4	
thru		Thru	Thru	
Spare (Bit 14)		B3913.6	N7:6/14	
Spare (Bit 15)		B3913.7	N7:6/15	
M4500 Status Word 3 (to PLC)		W3914	N7:7	R/O
Machine Speed (CPM)	W556	W3916	N7:8	R/O
Current Shift Data:				
Good Cans (Lo)	W1100	W3918	N7:9	R/O
Good Cans (Hi)	W1102	W3920	N7:10	R/O
Total Rejects (Lo)	W1104	W3922	N7:11	R/O
Total Rejects (Hi)	W1106	W3924	N7:12	R/O
Leaker Rejects	W1108	W3926	N7:13	R/O
Array Faults	W1110	W3928	N7:14	R/O
Aux1 (vision) Rejects	W1112	W3930	N7:15	R/O
Aux2 Rejects	W1114	W3932	N7:16	R/O
Rejects Per Pocket #1	W1116	W3934	N7:17	R/O
Thru	Thru	Thru	Thru	
Rejects Per Pocket #16	W1146	W3964	N7:32	R/O

