HSL-WI6
Ragsdale Bodymaker
High Speed Logic Option
User's Manual

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WARNING

To ensure that 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 Electrical 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 the User Manual and any other manuals referred to by it prior to installation and/or operation of the equipment.

The manufacturer accepts no liability for any consequences resulting from inappropriate, negligent or incorrect installation, operation, or adjustment 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 it's performance or the contents of the User Manual without notice.

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SECTION 1
GENERAL DESCRIPTION

The HSL-WI6 is an option upgrade for the HSL-WISVCUP Servo positive cupfeed for the Ragsdale Bodymaker.

This section describes the features of the HSL-WI6. This includes the functional description, alarms detected, interlocks between the control package and the existing control system, etc.

1.1 FEATURES

- The HSL-WI6 is used in conjunction with HSL-WISVCUP Servo motor driven positive cupfeed cam control system for the Ragsdale Bodymaker.

- Performs additional high speed control functions of the Ragsdale Bodymaker including cupfeed solenoid control, air strip control, as well as die protection (short can detection).

- Accurate short can detection to a resolution of 1/4" can length. Short detection incorporates immediate stop of cupfeed cam and cupfeed solenoid upon short can/tear-off detection to prevent the feeding of an additional cup.

- Highly repeatable air strip control to reduce can stripping and blow out problems.

- Brake wear compensation (Auto BDC timing programming) algorithm to stop press at BDC regardless of brake response. Brake response determination allows displaying of the actual brake response (in degrees). Brake response alarm to indicate when brake stopping response (in degrees) has exceeded a preset limit.

- Trimmer speed reference (0-10volt analog output) provides reference to trimmer proportional to speed of bodymaker (user scalable).

- Alarm detection: short can detection, die sensor fail alarm, timing signal fail detection, brake response too long alarm, in addition to existing cupfeed following fault, cupfeed servo motor o'temp, cupfeed motor amplifier fault.

- Data Acquisition: Total number of good cans produced and total number of short can faults (for both current shift and last shift).

- Built-in 2 Line X 40 character sealed display with 24 key membrane keypad allows viewing of collected data (good can count, short can count, brake response) and set-up of user variables (passcode protected).

- Built-in PLS provides all machine timing, eliminating need for an additional PLS.

1.2 FUNCTIONAL DESCRIPTION

The HSL-WI6 is an option upgrade used in conjunction with the HSL-WISVCUP Bodymaker servo cupfeed control system. It performs the following high speed control functions of the bodymaker: accurate short can detection, reliable cupfeed and precise air strip control. In addition, it provides a brake wear compensation feature that automatically adjusts the BDC timing signal to stop the press at BDC regardless of brake stopping time.

Alarm detection is provided including: short can detection, die sensor failure detection, timing signal failure, brake response too long alarm, and all servo control related faults (cupfeed motor over temp, amplifier fault, following fault, etc.).

Data collection includes: Total good can count and short can faults count, (both for the current shift and previous (last) shift). The package interfaces directly to the machine mounted main crank resolver, short can sensor, cupfeed, and air strip solenoids as well as the host PLC via discrete DC I/O.

The control system is not a dedicated “black box”, but is instead implemented using the high performance SYSTEMS M4510 PLC/PLS Motion control module. This allows easy customization by either SEA or the end user.

The M4510 module is programmed using the DOS-based SYSdev programming package. This allows the module to be programmed in any combination of Ladder or High-level (subset of "C"), as well as perform on-line monitoring and trouble-shooting. The M4510 module incorporates a built-in PLS which interfaces directly with the machine mounted resolver and provides all machine timing, eliminating the need for an external PLS.

1.3 CUPFEED SOLENOID CONTROL

The HSL-WI6 package provides control directly for both the cupfeed "on" and "off" solenoids. For auto operation, the cupfeed is enabled by the host PLC via a discrete input to the HSL-WI6. The cupfeed is timed "on" and "off" with the cupfeed timing signal of the M4510 PLS section to provide accurate cup loading. The manual cupfeed input is provided to activate the cupfeed as long as the manual input is "on" when the machine is stopped (typically used to clear the rotary cupfeed while the machine is stopped) or to feed a single cup when the machine is running.

Control Of Cupfeed Solenoid Via Host PLC: Two discrete DC inputs to the HSL-WI6 from the host PLC are used to control the cupfeed solenoid: "Cupfeed Enable" and "Cupfeed Manual". The following description of operation defines the requirements of the host PLC logic to activate the cupfeed through the HSL-WI6:

Auto Cupfeed Mode: In single and continuous modes, the cupfeed is gated "on" with the leading edge of the cupfeed timing signal (CH04) and gated "off" with the trailing edge of the cupfeed timing signal (CH04). The cupfeed is opened after two strokes when the "Cupfeed Enable" input is turned "on" and the leading edge of CH04 occurs. This allows three strokes of air strip to clear the punch of coolant before the first can is made. The cupfeed is closed when the "Cupfeed On" input is turned "off" and the trailing edge of CH04 occurs.

Note: It takes two strokes once the cupfeed is opened for the first can to travel through the positive cupfeed and is punched. Also once the cupfeed is closed, it requires two strokes to punch the last two cups which are in process of traveling through the positive cupfeed.

Manual Mode: The cupfeed can be activated directly (manually) by activating the "Cupfeed Manual" input. With the machine stopped, activating the Cupfeed Manual" input "on" opens the cupfeed. When the "Cupfeed Manual" input is "off", the cupfeed is closed. With the machine running, activating the manual cupfeed feeds one cup with the corresponding three strokes of air strip prior to making the cup.

1.4 AIR STRIP CONTROL

The HSL-WI6 provides a repeatability of 0.5 milliseconds for the air strip thus reducing can stripping and blow out problems. Both an "Air Strip (Low)" and "Air Strip (High)" timing signal is provided to activate the air strip when the press is running and is enabled two stokes prior to the cupfeed open.

1.5 BRAKE WEAR COMPENSATION

The HSL-WI6 incorporates a brake wear compensation or automatic BDC timing feature. This stops the press at BDC regardless of the actual braking response of the clutch/brake. This is accomplished by automatically adjusting the BDC timing signal based on the previous stopping response. Any overrun is detected and a new BDC timing signal is computed such that the machine will stop at the desired location on the next stop. Two BDC signals are provided, one for low speed and one for high speed. Both incorporate the break wear compensation feature. The appropriate BDC timing signal (low or high) is adjusted based on the speed of the machine when the BDC stop was initiated.

The HSL-WI6 also calculates the actual brake response (in degrees). This is the number of degrees from where the clutch was de-activated (BDC timing location) to where the crankshaft actually stopped. This can then be displayed on the Keypad/Display to determine the condition of the brake.

A "Brake Response Too Long" alarm is generated when the actual brake response exceeds a user specified maximum allowed brake response. This can be used to indicate that service to the brake should be performed.

1.6 ALARM DETECTION

The HSL-WI6 detects the following additional alarms:

Short Can Detection: The "Short Can Check" timing signal (CH02), along with the machine mounted short can sensor, is used to verify the entire length of the can. The short can sensor must see can the entire time the "Short Can Check" timing signal (CH02) is "on". If the can is short (tear off) or any void is detected, the short can alarm is generated. The cupfeed cam is immediately stopped and the cupfeed is immediately closed as well. The resolution of the short can check is 0.5 milliseconds. At a machine speed of 250CPM, this translates to approximately 1/4" resolution in can length. This alarm must be interlocked to the existing control system to dis-engage the clutch immediately.

Die Sensor Failure: This alarm occurs when the short can sensor fails "on". The "Sensor Check" timing signal (CH03) is used to verify that the short can sensor does indeed turn "off" when a can is not present.

Timing Signal Fail: The timing signal fail occurs when any of the timing signals generated in the PLS section fail to change state periodically while the machine is running. This alarm activates the "Die Sensor Fail" output.

Brake Response Too Long: The "Brake Response Too Long" alarm is generated when the actual brake response exceeds a user specified maximum allowed brake response. This can be used to indicate that service to the brake should be performed.

The above alarms are available to the host PLC via discrete outputs. These should be used to stop the machine and indicate the problem when any one of the alarms occurs.

1.7 INTERLOCKS TO EXISTING CONTROL SYSTEM

In addition to the alarms listed in section 1.6, the following (+24VDC discrete signals) should be interlocked to the existing control system:

BDC Stop Enable: This signal is provided to facilitate ease of interface with the existing control system. This signal is "on" when the cupfeed is opened and cups are feeding into the machine. When the cupfeed is closed, this signal will stay "on" for two additional strokes while cups are processed through the cupfeed cam. This signal can than be used during normal BDC stops to hold in the clutch enable (BDC) signal of the existing control system when a BDC stop is initiated, the cupfeed is closed, and the two additional strokes are made. See suggested existing PLC ladder logic at the back of this manual.

BDC Timing: This is the BDC timing (CH00 or CH01, depending on the speed of the machine) generated in the PLS section of the M4510. If the brake wear compensation is to be used, this signal must be used by the existing control system as the BDC stop timing instead of the existing BDC timing.

PLC Clock Timing: This signal is provided as a general timing signal. This can be used for whatever purpose desired by the existing control system.

1.8 INTERLOCKS FROM EXISTING CONTROL SYSTEM

In addition to the Cupfeed Auto and Manual interlocks described in section 1.3, the following interlocks should be provided by the existing control system:

BDC Stop (BW Comp): This signal is only used if the brake wear compensation feature of the HSL-WI6 is enabled. This signal should be set when a normal BDC stop is initiated and should stay "on" for 1.5 seconds after the clutch has been disengaged. See suggested existing PLC ladder logic at the back of this manual.

End Of Shift: This signal is used transfer the "Current Shift" data (total good cans produced and total short cans) to the "Last Shift" data and then clear the "Current Shift". This can be activated automatically by an output of the user's line control system or manually using a user supplied PB.

1.9 DATA COLLECTION

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

1) Total number of good cans produced
2) Total number of short can faults

This data can be viewed locally on the Keypad/Display. This information is updated ("current" shift transferred to "Last" shift) based on the change of state of the "End of Shift" input.

SECTION 1
GENERAL DESCRIPTION

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SECTION 2
INSTALLATION

The HSL-WI6 package is an option package added to the HSL-WISVCUP package.

2.1 WHAT'S INCLUDED

Verify that the following items are included when unpacking the HSL-WI6:

1ea.	S4568 8-In/8-Out 10-30VDC I/O Board
1ea.	D4591 Display/Keypad
1ea.	Pre-wired field wiring arm for S4568 (terminated to fuse holders and DIN rail mountable connectors)
1ea.	D4591 to M4510 display cable
1ea.	HSL-WI6 User's Manual
1ea.	HSL-WI6 Program Disk

2.2 INSTALLING THE S4568 I/O BOARD

With power to the HSL-WISVCUP "off", perform the following steps to install the S4568 I/O board of the HSL-WI6 in the HSL-WISVCUP:

1) Remove the cover of the M4510 chassis (retained with three captive screws on the lower front of the cover and a captive screw on each side of the M4510 chassis).

2) Verify the slot address dip switches (SW1) of the S4568 are set to the following positions (slot1):

S4568	SW1 switch1 = "ON"
	SW1 switch2 = "OFF"

3) Install the S4568 in Slot1-1 (right slot next to existing S4568 of HSL-WISVCUP) of the M4510 chassis.

4) Install the cover back over the M4510, making sure all the board connectors protrude through the slots in the cover. Tighten the three captive screws on the lower front of the cover and the screws on each side of the M4510 chassis.

5) Connect 18-pin connector of provided field wiring arm to S4568 in Slot1-1.

6) Route field wiring arm through the panduit of HSL-WISVCUP and install FU6, FU7, and FU8 to left side of DIN rail next to existing fuses and CB1.

7) Install UMSTBHK2.5/10 connectors (with wire numbers 558 thru 573) on right side of DIN rail of HSL-WISVCUP next to end of existing TB.

2.3 INSTALLING THE D4591 DISPLAY/KEYPAD

The D4591 display should be mounted in the door of the HSL-WISVCUP enclosure.

Note: The display cable length is limited to 6 feet, thus it is impractical to mount the D4591 any significant distance from the HSL-WISVCUP enclosure.

Perform the following steps to mount the D4591 display:

1) Referring to the recommended cut-out in figure 1, cut a cut-out in the door of the HSL-WISVCUP enclosure.

2) With the gasket installed on the D4591 mounting studs, slide the D4591 into the cut-out from the front. Attach the D4591 to the door using the supplied hardware.

3) Connect the 26-pin display ribbon cable to the back of the D4591 display. The ribbon cable connector is polarized and will mate with the display connector only one way.

4) Remove the M4510 from the HSL-WISVCUP back-panel and connect the 26-pin display cable to the back of the M4510 module.

5) Install the M4510 back on the back-panel, routing the cable out the bottom of the module.

6) Once the D4591 is installed, a lugged earth ground wire should be installed on one of the mounting screws to insure that the D4591 is well grounded.

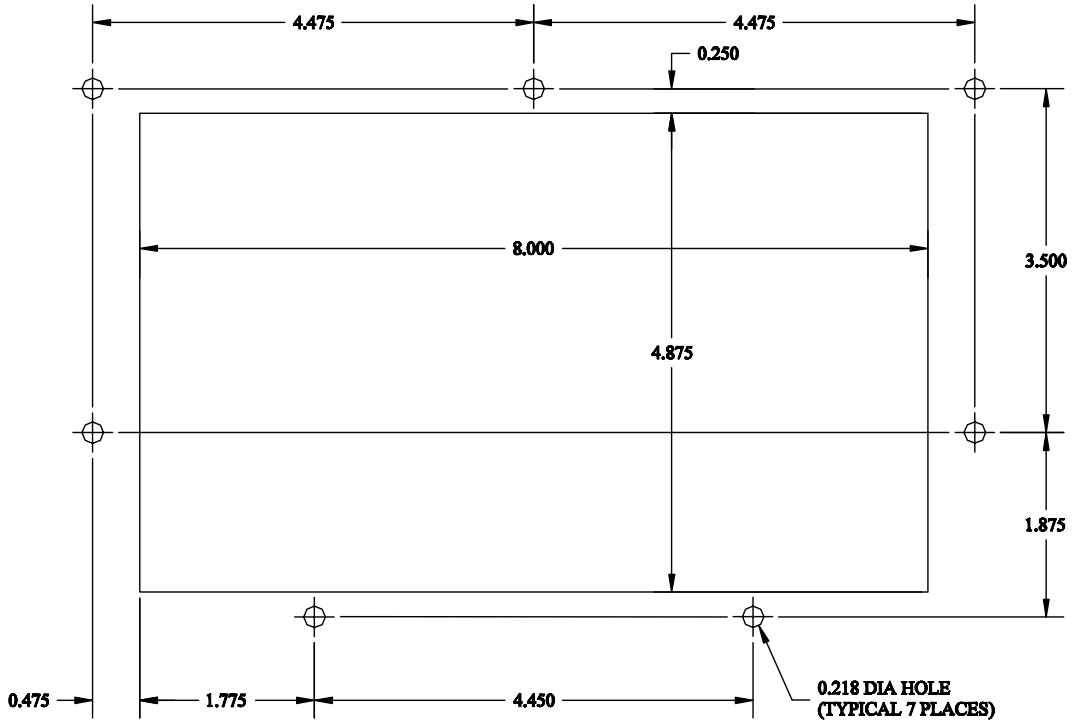

Figure 1 - D4591 Keypad/Display Recommended Panel Cut-out

2.4 WIRING THE HSL-WI6 INTERLOCK WIRING

Referring to the electrical control schematic at the back of this manual, wire the HSL-WI6 as follows:

1) Interlocks from existing control system to HSL-WI6 (Wires 558, 559, 560, and 564).

2) Interlocks to existing control system from HSL-WI6 (Wires 569, 570, 571, 572, and 573).

3) Cupfeed and Air Strip Solenoids (Fuses FU6-FU8).

4) Short Can sensor (Wires 540, 501, and 500).

In general, when wiring the HSL-WI6, keep all +24VDC and resolver wiring away from high voltage wiring.

2.5 HSL-WI6 SOFTWARE INSTALLATION

The “HSLWI6” program replaces the “HSLSCUP” program used in the M4510 main processor. In addition, the PLS timing signal file “TMGSCUP” is also loaded in the M4510 as the timing channels for the PLS section of the M4510. The “HSLSCUP.EXE” DOS setup program is still used to set-up the servo control of the HSL-WISVCUP as well as to set the parameters of the HSL-WI6.

The “HSLWI6” application program and “TMGSCUP” timing channel file are added to the same directory as used for the existing HSL-WISVCUP programs. Perform the following to add the HSL-WI6 programs to the HSL-WISVCUP directory:

1) Switch to the “HSLSCUP” directory of the PC used to support the HSL-WISVCUP (this was created when the HSL-WISVCUP set-up software was installed).

2) Install the disk labeled “HSL-WI6 PROGRAMS” into the drive, switch to the “HSLSCUP” directory and install the “HSL-WI6” programs by typing the following at the DOS prompt:

```
CD  \HSLSCUP<ENTER>
A:INSTALL<ENTER>
```

3) Modify the computer's menu software selection (created when the HSL-WISVCUP set-up software was installed) to support the HSL-WI6. The DOS commands executed for this selection should be:

```
CD  \HSLSCUP
HSLSCUP  HSLWI6  SRVCUPR
CD  \
```

   With this set of commands, the “HSLWI6” application program will be selected for the M4510 main processor instead of the default “HSLSCUP” application program.

4) To execute the servo cupfeed set-up program, simply select the corresponding “B/M SERVO CUPFEED” selection from the menu software's menu.

2.6 MODIFY EXISTING PLC PROGRAM

In addition to the modifications made to the existing program for the HSL-WISVCUP, modify the existing control system PLC program to interface with the HSL-WI6. Refer to the suggested existing PLC ladder logic at the back of this manual. This is generalized as an example of how the existing PLC ladder logic might be modified for the previous interlocks. Incorporate the following into the existing PLC ladder logic:

1) The HSL-WI6 now controls the cupfeed, air strip, and short can detection. Defeat the existing short can detection in the PLC and add the "Short Can Alarm" input from the HSL-WISVCUP and the "Die Sensor Fail" alarm.

   Note: These two alarms must immediately de-clutch the machine.

2) Add the "Cupfeed Enable (Auto)" and "Cupfeed Enable (Manual)" outputs into the PLC program. The "Cupfeed Enable (Auto)" is the summation of the cupfeed auto mode and all line control stand-by conditions (when "on" the cupfeed will be opened by the HSL-WI6 and feed cups in the normal production mode). The "Cupfeed Enable (Manual)" should be directly driven by the Cupfeed Manual push-button.

3) Add the "BDC Stop Enable" input from the HSL-WI6. This signal should be used to sequence the machine off during normal BDC stops. When a BDC stop is initiated, first turn "off" the "Cupfeed Enable (Auto)" output from the PLC and then wait until the "BDC Stop Enable" input has turned "off" before initiating the actual BDC de-clutch. This insures that the cupfeed is sequenced "off" and that the remaining cups in the cupfeed cam have been processed.

4) If the brake wear compensation is to be used, add the "BDC Stop (BW Comp)" output to the PLC. This signal should turn "on" when a normal BDC stop is initiated and should stay on for 1.5 seconds after the clutch has been dis-engaged. The "BDC Timing" input from the HSL-WI6 must now be used as the BDC timing signal in the existing PLC.

2.7 DOWNLOAD "HSLWI6" PROGRAM AND "TMGSCUP" TIMING CHANNELS TO M4510

Once the HSL-WI6 is installed, perform the following to download the HSLWI6 application program to the M4510 main processor as well as download the timing channel set-points:

1) Connect an RS-232 cable from the COM port of the computer used to support the HSL-WISVCUP to the "PROG" port on the M4510.

2) From the computer's menu program, select the "B/M SERVO CUPFEED" selection (this was set in section 2.5).

3) From the Main Menu, select "3: Select Bodymaker (B/M number) to Set-up" and enter the bodymaker that is being interfaced to.

4) From the Main Menu, select "1: Bodymaker/Trimmer Set-up M4510 PROG PORT).

5) Download the HSLWI6 application program to the M4510 by selecting "4: Download Program to M4510". The current program ident, revision, and checksum for both the program to be loaded (on disk) and for the program already loaded in the M4510 will be displayed. Press the <ENTER> key to start the download. Once he download is complete, press any key to return to Bodymaker Set-up main menu.

6) Download the PLS timing set-points to the M4510 by selecting "2: Set Machine Timing" from the HSL-WISVCUP Bodymaker/Trimmer Set-up main menu. From the PLS main development menu, select "4: Download Channels to PLS". Press the <ENTER> key to start the download. Press any key to return back to the PLS main development menu. Enter 12 to return back the Bodymaker Set-up main menu.

2.8 HSL-WI6 SET-UP

Once the HSL-WI6 is installed and the control system is powered back up, perform the following to set-up and tune the HSL-WI6. The set-up is performed using a PC running the "HSLSCUP" set-up program. See section 4 for a description of the "HSLSCUP" menus and variables and how to use the setup program. Some of the user variables can also be accessed using the Keypad/Display (see section 3 for a description of the Keypad commands and menu displays).

Note: With the HSL-WI6 option installed, the complete set-up of the entire package is achieved by performing all the steps of section 2.8 in this manual and section 2.9 in the HSL-WISVCUP User's Manual.

2.8.1 DEFAULT SET-UP VARIABLES

As shipped, the set-up variables for the M4510 main processor are set to the following defaults:

Brake Wear Compensation:
- Enabled: N
- Desired BDC Stop Position (Low Speed): 000
- Desired BDC Stop Position (High Speed): 000

Maximum Allowed Stopping Response (degrees): 300

Bodymaker Running Speeds:
- Low Speed (SPM): 250
- High Speed (SPM): 350

Trimmer Speed Reference:
- Maximum Speed: 375
- Idle Speed (W/I stopped): 250

The "TMGSCUP" timing channel file, as shipped, contains the following default timing set-points:

CHAN	ON	-	OFF	DESCRIPTION
CH00:	150	-	170	BDC (high) Timing
CH01:	180	-	200	BDC (low) Timing
CH02:	155	-	175	Short Can Check Timing
CH03:	110	-	130	Sensor Check Timing
CH04:	270	-	030	Cupfeed Timing
CH05:	150	-	200	Air Strip (low) Timing
CH06:	120	-	190	Air Strip (high) Timing
CH07:	180	-	000	PLC Clock Timing
CH10:	___	-	___	spare
CH11:	___	-	___	spare
CH12:	___	-	___	spare
CH13:	___	-	___	spare
CH14:	___	-	___	spare
CH15:	___	-	___	spare
CH16:	___	-	___	spare
CH17:	___	-	___	spare

The above default set-up variables are stored in the data file for Bodymaker 00.

2.8.2 SET BODYMAKER SET-UP PARAMETERS

The Bodymaker set-up parameters include:

- Enabling or disabling the brake wear compensation.
- Setting the desired low and high speed stopping points (if the brake wear compensation is enabled).
- Setting the maximum allowed stopping response.
- Setting the bodymaker running low and high speeds.

Brake Wear Compensation: If the brake wear compensation is to be used, enable it by setting the "Brake Wear Compensation Enable" to "Y". Set the "Desired BDC Stop Position (Low)" and "(High)" as well if the compensation is enabled. The "Desired BDC Stop positions" are the location you want the ram to be at when it comes to rest after a BDC stop. Both the "Low" and "High" desired stopping positions are generally set to 000 degrees. Enabling the brake wear compensation allows the BDC timing channels (CH00-High) and (CH01-Low) to be automatically adjusted as necessary such that the press will stop at the desired position regardless of the actual brake response.

If the brake wear compensation is not to be used, disable it by setting the "Brake Wear Compensation Enable" to "N". Disabling the brake wear compensation requires the BDC (High) timing (CH00) and the BDC (Low) timing (CH01) signals to be manually set such that the press stops at BDC.

Note: If the brake response then changes, the press will not stop at the desired position if the brake wear compensation is disabled.

Maximum Allowed Stopping Response: This parameter defines what the maximum allowed brake response before a "Brake Response Too Long" alarm is generated. If the actual brake response (number of degrees from when the brake is activated to the position where the press stops) when a BDC stop is performed is longer than this number, the alarm is generated. If the actual brake response is less, the alarm is not generated. Set this parameter to the value where the brake response is considered too long and service to the brake should be performed (typically 270 to 300 degrees).

Bodymaker Running Speeds: Set the Bodymaker running "Low Speed" and "High Speed" to the speeds that the bodymaker will actually run at when the respective speed is selected.

Note: This is not a speed reference that will make the bodymaker run at the speeds entered but is instead simply parameters used to switch between the BDC (Low) and BDC (High) timing, as well as the Air Strip (Low) and (High) timing.

See section 4.2 (set-up program reference) or section 3.4 (using the Keypad/Display) for details on setting the above parameters.

2.8.3 SET TRIMMER SPEED REFERENCES

The "Trimmer Maximum Speed" and "Trimmer Idle Speed" are used to control the speed of the trimmer (via the 0-10VDC trimmer speed reference output of the M4510).

Trimmer Maximum Speed: The "Trimmer Maximum Speed" parameter is used to scale the 0-10VDC analog output such that when the bodymaker is running at the speed entered in "Trimmer Maximum Speed", the analog output will be at 10 volts.

Trimmer Idle (Minimum) Speed: This parameter determines the speed the trimmer will run at when the bodymaker is stopped (de-clutched).

Note: When the bodymaker is running, the trimmer speed reference is proportional (as set by the "Trimmer Maximum Speed" scaling) to the speed of the bodymaker. This parameter is used to provide the speed reference when the bodymaker speed is zero.

See section 4.2 (set-up program reference) or section 3.4 (using the Keypad/Display) for details on setting the above parameters.

2.8.4 SET MACHINE ZERO

Inch the bodymaker to back dead center (BDC) and set the M4500 offset per section 3.2 (set-up program reference) or section 4.4 (using the Keypad/Display).

Note: This offset is also set by pressing the "Zero Main Crank" push-button inside the HSL-WISVCUP enclosure as outlined in section 2.9.4 of the HSL-WISVCUP User's Manual.

2.8.5 VERIFY LOCATION OF SHORT CAN TIMING (CH02)

Inching the machine and verify that the "Short Can" timing (CH02) first turns "ON" when the short can sensor is over the nose of the punch on the forward portion of the stroke. This would be where the sensor would first "see" the can as it emerges from the die set. Verify that the "Short Can" timing turns "off" right before the sensor would quit seeing the lip of the can as the ram continues it's forward motion. Adjust either the "ON" or "off" set-points of CH02 until the above is achieved. Depending on the location of the short can sensor, CH02 is typically set "on" at 155 degrees and then back "off" at 175 degrees.

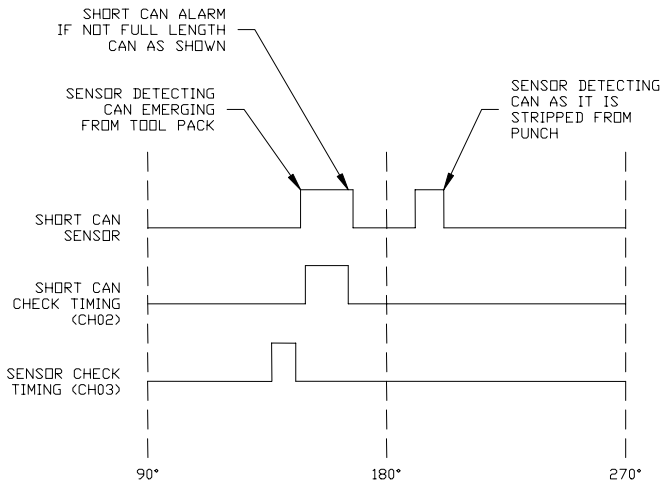

Figure 2 - Short Can Check Timing Sequence

Note: The short can sensor must "see" can the entire time the "Short Can" timing (CH02) is "on" in order to pass the short can check otherwise the "Short Can" alarm will be generated.

Verify that the "Sensor Check" timing (CH03) is also set correctly. This timing signal should go "on" for 20 degrees then back "off" just prior to the punch emerging from the die set (typically 110 to 130 degrees). This signal is used to verify that the short can sensor has not failed "on" and therefore the short can sensor must be "off" the entire time CH03 is "on" otherwise the "Die Sensor Fail" alarm is generated.

See section 4.2 (set-up program reference) or section 3.4 (using the Keypad/Display) for details on setting CH02 and CH03.

2.8.6 VERIFY SINGLE CUPFEED

With the machine running in continuous and the auto cupfeed "off", feed a single cup through the machine by depressing the "Cupfeed Manual" push-button. The cupfeed solenoid should open for one cup with the air strip activated for three strokes prior to the can being punched (can punched on fourth stroke). Verify the cupfeed timing (CH04), air strip timing (CH05 and CH06), and short can timing (CH02). Adjust as necessary to achieve smooth cupfeed open with no false short can shut downs.

2.8.7 VERIFY MACHINE OPERATION

Run the machine in normal production (both at low and high speeds where practical) and verify the following:

Verify Air Strip Timing: With the machine running and the cupfeed open, verify that the cans are stripped without any problems and that no blow outs are occurring (verify at both low and high speed). If a problem is occurring, adjust the respective "Air Strip" timing (CH05-Low Speed, CH06-High Speed) until the problem is corrected. See section 4.2 (set-up program reference) or section 3.4 (using the Keypad/Display) for details on adjusting CH05 and CH06.

Verify Short Can Timing: With the machine running and the cupfeed open, verify that no false short can faults are occurring (short can alarm occurs when full length can is made). If false short can alarms are occurring, narrow the short can timing one degree at a time until the false short can alarms quit occurring.

Verify that the short can detection is working correctly by generating a short can and verifying that the short can alarm is generated for this can. This can be done by stopping the press, removing one of the die rings then punching a cup in single stroke mode with the die ring removed. The short can alarm should be generated when the first cup is punched.

Verify BDC Stops: If the brake wear compensation is enabled, verify that the press stops at the desired location in both the high and the low speeds.

Note: When the HSL-WI6 is first installed, it will take a few successive stops for the algorithm to program the BDC timing channels to the correct position. Also the compensation is enabled after the press has been running at a fixed speed in continuous. The BDC timing channels will not be modified when single strokes are made or if press is started in continuous and then immediately stopped again. Wait about 5 seconds after the press is started before performing the BDC stop to verify the stop position.

If the brake wear compensation is disabled, manually adjust both the BDC (High) timing (CH00) and the BDC (Low) timing (CH01) such that the press stops at back dead center at both respective speeds. See section 4.2 (set-up program reference) or section 3.4 (using the Keypad/Display) for details on adjusting CH00 and CH01.

Verify BDC Stop Sequence: Perform a normal manual BDC stop while the cupfeed is open. Verify that the cupfeed closes, the machine makes two extra strokes processing the two remaining cups in the cupfeed cam and stops at BDC with no cups in the cup locator or cupfeed cam. This sequence should be true for standby stops and BDC alarm stops as well. If the machine stops before making the two strokes and leaves a cup in the cam or cup locator, verify that the "BDC Stop Enable" input to the existing PLC is implemented correctly in the PLC ladder logic.

The Machine Is Now Set-Up And Ready To Run!

SECTION 2
INSTALLATION

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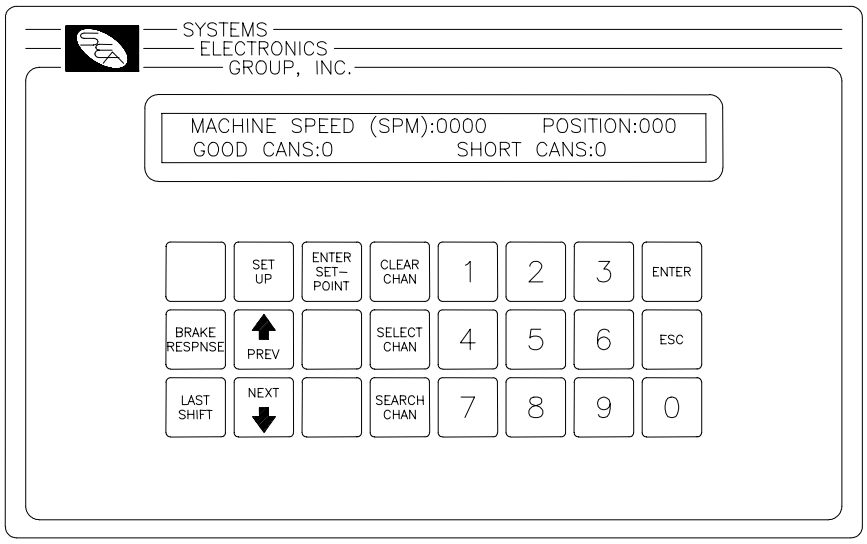
SECTION 3
USING THE KEYPAD/DISPLAY

The keypad of the HSL-WI6 contains 24 keys consisting of data display commands, set-up commands, and a numeric keypad. The display is 2 line by 40 character back-lit LCD display which displays the selected data and set-up menus. The Keypad/Display can be used to view data or adjust the timing and all set-up parameters.



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

1) Set the Bodymaker Set-Up Parameters
2) Set the Trimmer Set-Up Parameter
3) Set Machine Timing
4) Set Machine Zero
5) View the Actual Brake Response (in degrees)
6) View the Current Shift Data
7) View the Last Shift Data

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

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:

MACHINE SPEED (SPM):xxxx POSITION:xxx
GOOD CANS:xxxxxxx SHORT CANS:xxxxxx

- The “Machine Speed” is the current speed of the Bodymaker (SPM).
- The “Position” is the current angular position of the bodymaker crankshaft.
- The “Good Cans” field is the total number of good cans produced so far into the current shift.
- The “Short Cans” field is the total number of “Short Can Faults” the machine has had so far into the current shift.

This display effectively replaces a speed meter, a position display, and two can counters. This screen is always returned to when no commands are active.

3.2 “BRAKE RESPONSE” KEY

This key displays the brake response of both low and high speed stops. The response is the number of degrees it takes to stop the press from when the clutch is de-activated to the position that the machine comes to rest (for a BDC stop). This can be used to determine the general condition of the brake and whether servicing of the brake is required. To exit back to the default screen, simply press the “ESC” key.

3.3 "LAST SHIFT" KEY

The Last shift data menu displays
- "Total Good Can" count.
- "Total Short Can" fault count.

This data is the totals for the last (previous) shift. This data is transferred from the current shift 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. This data cannot be reset by the operator, only at the end of shift transition.

Note: The Current shift "Good Cans" and "Short Cans" is displayed as part of the default screen (see section 3.1).

The Last shift data is defined as follows:

Good Cans: This is the total number of good cans produced for the previous shift. This is essentially a can counter.

Short Cans: This is the total number of short can faults the machine had the previous shift.

3.4 "SET-UP" KEY

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

1: SET BODYMAKER PARAMETERS
2: SET TRIMMER PARAMETERS
3: SET MACHINE TIMING (SET-POINTS, ETC.)
4: ZERO MACHINE (SET RESOLVER OFFSET)

When selected, each of the above selections brings up a sub-menu with the corresponding set-up parameters. The following sections describe these sub-menus and the definitions of the corresponding variables. To select the respective set-up sub-menu, simply press the corresponding numeric key (1 thru 4).

Note: The primary set-up menu is passcode protected. When the set-up key is first depressed, an "ENTER PASSCODE:" is displayed. At this point, the 5-digit passcode must be entered followed by pressing the <ENTER> key. If the passcode entered is correct, the primary set-up menu is then displayed and any of the parameters accessed by this menu may be changed. If the passcode entered is incorrect, the message "INCORRECT PASSCODE" will be displayed. At this time the passcode may be entered again or the <ESC> key can be pressed to return back to the main menu.

When the passcode is entered, the digits entered are not displayed. Instead "*" characters are displayed as each digit is entered. This prevents un-authorized personnel from observing the passcode as it is entered. In addition, the "ENTER PASSCODE" prompt is only displayed for a maximum of 60 seconds. The correct passcode must be entered within this 60 second period otherwise the set-up mode is aborted and the main menu is re-displayed.

Refer to section 3.2 for details on setting the passcode.

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

"SET-UP" KEY
1: Set Bodymaker Parameter

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

Brake Wear Comp Enble? (0=No, 1=Yes): This prompt is used to enable or disable the brake wear compensation. If the compensation is to be disabled, enter "0" and press <ENTER>. If the compensation is to be enabled, enter "1" and press <ENTER>.

Desired BDC Stop POS (Low Speed): This is the desired stopping location (in degrees) for a BDC stop in low speed when the brake wear compensation is enabled. This is typical set to 000 degrees (Back Dead Center). This prompt is only displayed when the brake wear compensation is enabled.

Desired BDC Stop POS (High Speed): This is the desired stopping location (in degrees) for a BDC stop in high speed when the brake wear compensation is enabled. This is typical set to 000 degrees (Back Dead Center). This prompt is only displayed when the brake wear compensation is enabled.

Maximum Allowed Stopping Response: This defines what the maximum allowed brake response is before the "Brake Response Too Long" alarm is generated. If the actual brake response (number of degrees from when the brake is activated to the position where the press stops at rest) when a BDC stop is performed is longer than this number, the alarm is generated. If the actual brake response is less, the alarm is not generated. Set this parameter to the value where the brake response is considered too long and service to the brake should be performed (typically 270 to 300 degrees).

Running Bodymaker Low Speed (SPM): This is the speed (in strokes per minute) that the bodymaker will run when in low speed.

Running Bodymaker High Speed (SPM): This is the speed (in strokes per minute) that the bodymaker will run when in high speed.

"SET-UP" KEY
2: Set Trimmer Parameters

This menu is activated when the "2" key (SET TRIMMER PARAMETERS) is pressed while the primary set-up menu is active. The following trimmer set-up parameters may then be adjusted or viewed:

Trimmer Maximum Speed (CPM): The "Trimmer Maximum Speed" parameter is used to scale the 0-10VDC analog output such that when the bodymaker is running at the speed entered in "Trimmer Maximum Speed", the analog output will be at 10 volts. This is typically set to the running high speed of the Bodymaker or slightly higher.

Trimmer Minimum Speed (CPM): This parameter determines the speed the trimmer will run at when the bodymaker is stopped (de-clutched).

Note: When the bodymaker is running, the trimmer speed reference is proportional (as set by the "Trimmer Maximum Speed" scaling) to the speed of the bodymaker. This parameter is used to provide the speed reference when the bodymaker speed is zero.

"SET-UP" KEY
3: Set Machine Timing (Set-Points, etc.)

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

CHuu SETPOINT:xxx [] "channel name"
RPM:yyyy POS:zzz OFFSET:wwww SCALE:360

Each field is defined as follows:

Field	Definition
CHuu	Currently selected channel (CH00 thru CH17) where"uu" is the octal channel number.
SETPOINT:xxx	Channel "on" or "off" set-point where "xxx" is the set-point position
[]	State of channel set-point (blank = "off", solid block character = "on")
"channel name"	selected channel name: (CH00) BDC (HIGH) TIMING, (CH01) BDC (LOW) TIMING, etc.
RPM:yyyy	Current machine speed where "yyyy" is in CPM.
POS:zzz	Current resolver position where "zzz" is in degrees.
OFFSET:wwww	Resolver offset where "wwww" is the offset in degrees.
SCALE:360	Resolver SCALE FACTOR (360 degrees per revolution).

In addition to displaying the timing set-point menu, the following keys are also enabled:

- "ENTER SET-POINT"
- "CLEAR CHANNEL"
- "SELECT CHANNEL"
- "SEARCH CHANNEL"

"ENTER SET-POINT": This key is used to enter a new set-point (both "on" and "off" set-points) in the selected channel.

"CLEAR CHANNEL": This key is used to clear all set-points from the selected channel.

"SELECT CHANNEL": This key is used to select a new channel for programming.

"SEARCH CHANNEL": is used to view both the "on" and "off" set-points in the selected channel.

Searching Channel: To view the set-points in a channel simply press the "SEARCH CHANNEL" key. The next "off" to "on" or "on" to "off" position is shown in the "SETPOINT" field. If the transition was "off" to "on", the state character [] will be a solid block. If the transition was "on" to "off", the state character [] will be blank.

Entering or Adjusting Set-point: To set or adjust a timing channel, perform the following:

1) Select the channel to be adjusted by pressing the "SELECT CHANNEL" key, entering the channel number (00 to 17) and pressing enter. In addition, the "NEXT" and "PREV" keys can be used to advance to the next channel or retard to the previous channel.

2) Press "CLEAR CHANNEL" to clear the existing set-point out.

   Note: Entering a new set-point does not automatically clear the old set-point out. If the two set-points are not in the same place, the channel will simply have two set-points in it if the old one is not cleared out first. Therefore, **always clear the channel before entering a new set-point**. A set-point may, however, be "extended" by programming another set-point onto an existing set-point using either the existing "on" or "off" set-point as the starting position for the new set-point. This will result in one larger set-point.

3) Press “ENTER SET-POINT” to enter the new set-point. The display will then prompt “ON SETPOINT:”. Enter the position (in degrees) where the set-point should go “on” and press <ENTER>. The display will now prompt “OFF SETPOINT:”. Enter the position (in degrees) where the set-point should go “off” and press <ENTER>. The channel will now be programmed with a set-point that goes “on” at the “on” position entered and “off” at the “off” position entered.

4) Exit back to the primary set-up menu by pressing <ESC>. Exit back to the default screen by pressing <ESC> again.

“SET-UP” KEY
4: Zero Machine (Set Resolver Offset)

This selection is used to auto zero the resolver. To set the machine zero (resolver offset) perform the following:

1) Select “3: SET MACHINE TIMING” and observe the “POS:” field. Verify that as the machine is rotated forward (either inched or barred) that the position increases linearly from 0 through 359. If not, swap the S1 and S3 leads of the resolver at the M4510 resolver connector. Then verify that the position then indeed does increase with forward movement. Press “ESC” to exit back to the primary set-up menu.

2) Position the machine at machine zero (back dead center).

3) Auto zero the resolver by selecting “4: ZERO MACHINE” from the primary set-up menu. Enter “0” to zero the resolver. The timing set-up menu will be displayed, now showing the “POS:” at zero.

4) The M4510 will calculate the actual offset value required to make this the 000 position and will display this number in the offset field.

5) Exit back to the primary set-up menu by pressing <ESC>. Exit back to the default screen by pressing <ESC> again.

SECTION 3
USING THE KEYPAD/DISPLAY

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SECTION 4
HSLSCUP – DOS BASED
SET-UP PROGRAM REFERENCE

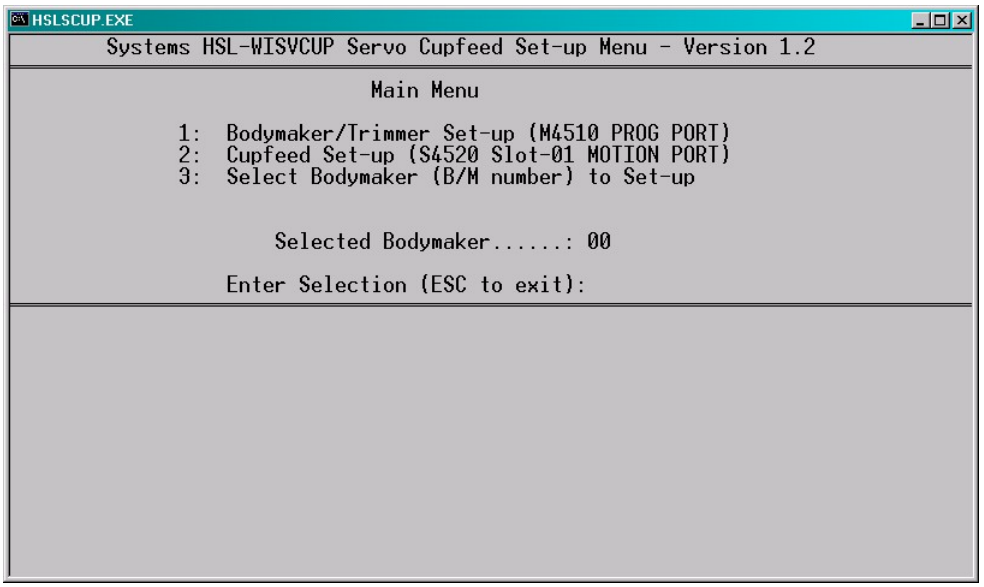
The DOS based "HSLSCUP" set-up program is a menu driven program that allows the user to easily view data or alter the set-up variables using a laptop or personal computer. In addition, the set-up program, can be used to set the machine timing (resolver offset, timing signal locations, etc.). The set-up variables are used to configure and tune the control system to match the configuration and performance of the specific bodymaker (see section 2.8 – HSL-WI6 Set-up).

Note: The "HSLSCUP" program is an on-line communications program used to interface with the M4510 module. The data displayed in the menus and set in the menus is communicated directly to the M4510 and S4520. Therefore, prior to selecting any of the menu selections, make sure an RS-232 cable is connected from the COM port to the respective port ("PROG" or "MOTION") port on the M4510.

The following sections are a complete description of the "HSLSCUP" selections and menus.

4.1 MAIN MENU

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



SECTION 4
HSLSCUP – DOS BASED
SET-UP PROGRAM REFERENCE

1: Bodymaker/Trimmer Set-up (M4510 PROG PORT)

This selection is used to interface with the main processor of the M4510. This includes:

- Set-up of the basic bodymaker and trimmer parameters (HSL-WI6 option).
- Downloading the application program to the M4510.
- Downloading/uploading the set-up data and saving these parameters on disk.

When selected, the "Bodymaker/Trimmer Set-Up Main Menu" is invoked (see section 4.2 – Bodymaker/Trimmer Set-Up Main Menu).

2: Cupfeed Set-up (S4520 Slot-01 MOTION PORT)

This selection is used to interface with the Cupfeed S4520 motion control processor in slot-01 of the M4510 chassis. This includes:

- Set-up of the cupfeed motion control parameters.
- Timing of the servo cupfeed motor.
- Tuning the servo cupfeed PID loop gains.
- Downloading the "SRVCUPR" application program to the S4520.
- Downloading/uploading the servo cupfeed parameters and saving these parameters on disk.

When selected, the "Cupfeed Set-up Main Menu" is invoked (see section 5.3 – Cupfeed Set-Up Main Menu of the HSL-WISVCUP User's manual).

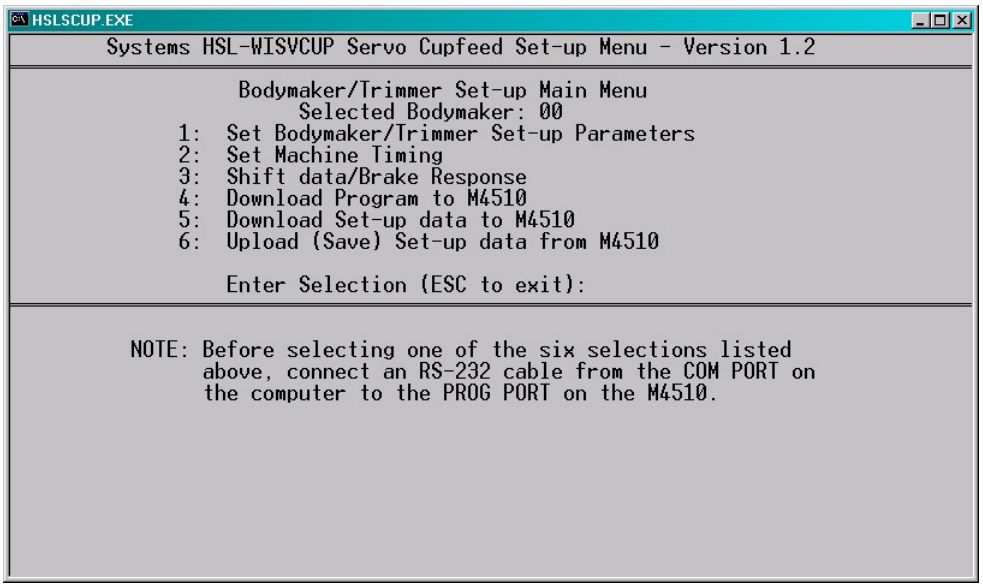
3: Select Bodymaker (B/M number) to Set-up

This selection is used to select the bodymaker that will be interfaced to. In most cases, the set-up parameters from one bodymaker to another bodymaker will vary depending on the actual performance of that bodymaker. This selection allows the setup program to interface with all the bodymakers in the plant, saving the set-up data for each bodymaker in separate files.

Note: Be sure to select the respective Bodymaker number prior to modifying any of the parameters (this should be the first step performed when the program is invoked). The data file for Bodymaker number 00 contains the recommended defaults for the HSL-WISVCUP package.

4.2 BODYMAKER/TRIMMER SET-UP MAIN MENU

The Bodymaker/Trimmer Set-up main menu of the set-up program incorporates the following menu selections:

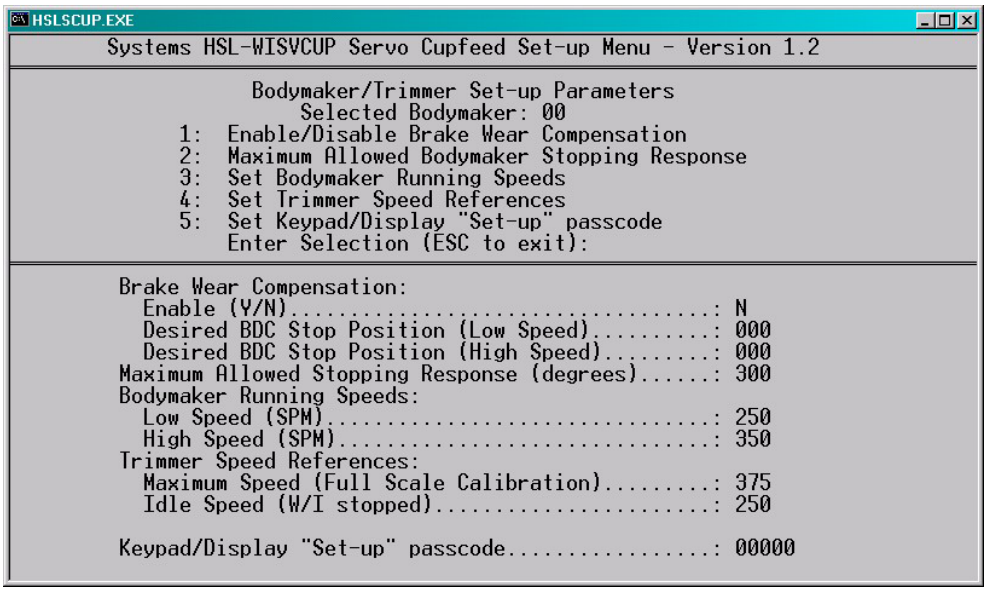


Note: Prior to selecting this selection, make sure the RS-232 cable is connected from the COM port on the computer to the PROG PORT on the M4510.

SECTION 4
HSLSCUP – DOS BASED
SET-UP PROGRAM REFERENCE

BODYMAKER/TRIMMER SET-UP MENU
1: Set Bodymaker/Trimmer Set-up Parameters

The "Bodymaker/Trimmer Set-up Parameters" menu contains the following selections:



The following selections set the corresponding parameters:

1: Enable/Disable Brake Wear Compensation:
Brake Wear Compensation Enable? (0=No, 1=Yes): This prompt is used to enable or disable the brake wear compensation. If the compensation is to be disabled, enter "0". If the compensation is to be enabled, enter "1".

Desired BDC Stop Position (Low Speed): This is the desired stopping location (in degrees) for a BDC stop in low speed when the brake wear compensation is enabled. This is typical set to 000 degrees (Back Dead Center).

Desired BDC Stop Position (High Speed): This is the desired stopping location (in degrees) for a BDC stop in high speed when the brake wear compensation is enabled. This is typical set to 000 degrees (Back Dead Center).

2: Maximum Allowed B/M Stopping Response:
Maximum Allowed Stopping Response (degrees): This defines the maximum allowed brake response before the "Brake Response Too Long" alarm is generated. If the actual brake response (number of degrees from when the brake is activated to the position where the press stops when a BDC stop is performed) is longer than this number, the alarm is generated. If the actual brake response is less, the alarm is not generated. Set this parameter to the value where the brake response is considered too long and service to the brake should be performed (typically 270 to 300 degrees).

3: Set Bodymaker Running Speeds:
Running Bodymaker Low Speed (SPM): This is the speed (in strokes per minute), the bodymaker will run in low speed.

Running Bodymaker High Speed (SPM): This is the speed (in strokes per minute), that the bodymaker will run in high speed.

4: Set Trimmer Speed References:
Trimmer Maximum Speed (CPM): The "Trimmer Maximum Speed" parameter is used to scale the 0-10VDC analog output such that when the bodymaker is running at the speed entered in "Trimmer Maximum Speed", the analog output will be at 10 volts. This is typically set to the running high speed of the Bodymaker or slightly higher.

Trimmer Idle Speed (CPM): This parameter determines the speed the trimmer will run at when the bodymaker is stopped (de-clutched).

Note: When the bodymaker is running, the trimmer speed reference is proportional (as set by the "Trimmer Maximum Speed" scaling) to the speed of the bodymaker. This parameter is used to provide the speed reference when the bodymaker speed is zero.

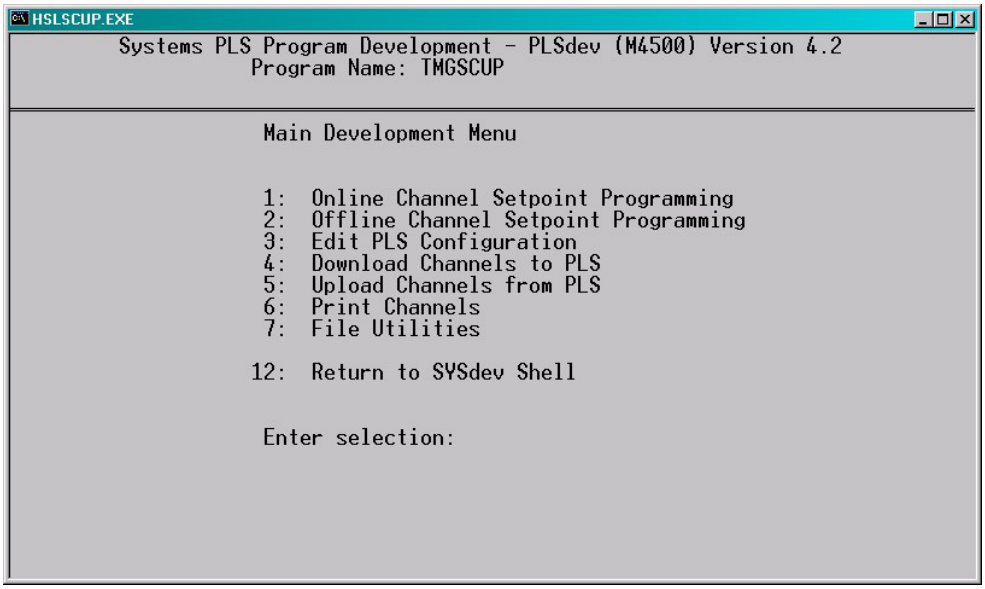
5: Set Keypad/Display "Set-up" Passcode: This parameter is the 5 digit passcode that must be entered after the "Set-up" key on the Keypad/Display is pressed. This allows the user to set the passcode to any number between 0 and 64999. The correct 5 digit passcode must be entered in order to gain access to the set-up menu. This prevents un-authorized personnel from altering any of the set-up parameters.

Note: If passcode protection is not to be used, set the passcode to "0". Simply press the <ENTER> key to proceed to the set-up menu when prompted for the passcode. If passcode protection is used, set the passcode to a number between 1 and 64999. Then when the "Set-up" key is pressed a valid passcode will have to be entered in order to gain access to the set-up menu.

See section 3.4 for details on changing the passcode from the Keypad/Display.

BODYMAKER/TRIMMER SET-UP MENU
2: Set Machine Timing

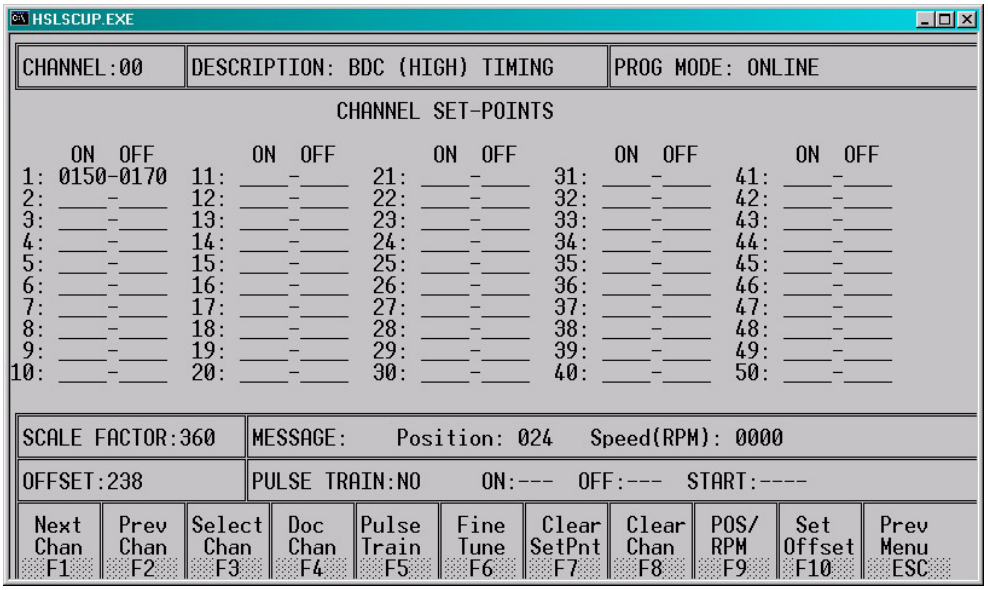
The Set Machine Timing selection is used to invoke the PLS programming command menus (these are the same menus used in SYSdev to program the PLS section of the M4510).



When selected, the PLS programming main development menu will be invoked using the default TMGSCUP channel set-point file. From this menu the user can:

- Zero the machine (set the resolver offset).
- Adjust the timing signal set-points.

Note: Prior to selecting the Machine Timing selection, make sure the RS-232 cable is connected from the COM port on the computer to the PROG PORT on the M4510.



The following describes how to perform these functions. Section 5 provides a complete description of each timing signal.

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

1) Connect the RS-232 cable from the COM port on the computer to the "PROG" port on the M4510.

2) Select the "2: Set Machine Timing" selection from the HSL-WISVCUP set-up program main menu.

3) Select "1: Online Channel Setpoint Programming" from the Main Development menu.

4) Select "F9: POS/RPM" and observe the "POS:" field. Verify that as the machine is rotated forward (either inching or barred) that the position increases linearly from 0 through 359. If not, swap the S1 and S3 leads of the resolver at the M4510 resolver connector. Then verify that the position then indeed does increase with forward movement. Press "ESC" to exit the "POS/RPM" update.

5) Position the machine at back dead center.

6) Auto zero the resolver by selecting "F10: Set Offset" and enter "0" in the offset field.

7) The M4510 will calculate the actual offset value required to make this the 000 position and will display this number in the offset field. The position will now read 0.

8) Exit back to the PLS Main Development menu by pressing <ESC>. Exit back to the "HSLSCUP" set-up main menu by pressing <ESC> again.

Adjusting the Timing Channel Set-points: To set or alter any of the timing signal set-points, perform the following:

1) Connect the RS-232 cable from the COM port on the computer to the "PROG" port on the M4510.

2) Select the "2: Set Machine Timing" selection from the HSL-WISVCUP set-up program main menu.

3) Select "1: Online Channel Setpoint Programming" from the Main Development menu.

4) Set all channels per section 5. Set-points are entered for a particular channel simply by entering in the set-point in the form XXX-YYY of the given channel.

   Note Up to 50 set-points may be entered for any channel. However for the bodymaker only one set-point is used per channel and this should be entered in the number 1 set-point.

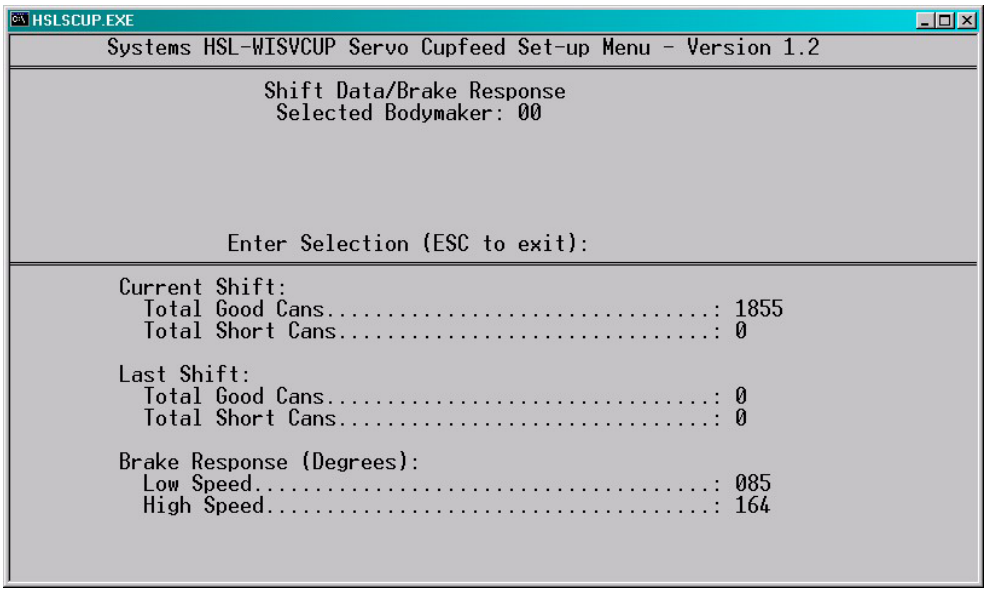
   The XXX is the location the set-point will turn "on" while YYY is the location where the set-point will turn "off". Use the PgUp, PgDn, F1:Next Chan, or F2: Prev Chan keys to select the desired channel for programming.

5) Once all channels are programmed, press <ESC> to exit back to the PLS Main Development Menu. Press <ESC> again to exit back to the "HSLSCUP" set-up main menu. The new channels will be saved both in the M4510 and in the "TMGSCUP" file on the hard drive.

BODYMAKER/TRIMMER SET-UP MENU
3: Shift Data/Brake Response

This selection is used to view the Current Shift data, Last Shift data, and the Low and High Speed Brake Responses. When selected, the "Shift Data/Brake Response" menu is invoked.

The following data is displayed in the "Shift Data/Brake Response" menu:



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 M4510.

Current Shift - Total Good Cans: This is the total number of good cans produced so far into the current shift. This is essentially a can counter.

Current Shift - Total Short Can Faults: This is the total number of short can faults that have occurred so far into the current shift.

Last Shift - Total Good Cans: This is the total number of good cans produced in the last (previous) shift. This is essentially a can counter.

Last Shift - Total Short Can Faults: This is the total number of short can faults that occurred in the last (previous) shift.

Note: The current shift 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. This data cannot be reset either from this menu or by the operator, only at the end of shift transition.

Lo Speed Brake Response (degrees): This is the number of degrees from the when the clutch was de-activated (at the BDC (Lo) timing) to where the bodymaker crankshaft came to rest when a BDC stop was performed at Low speed. This can be used to determine the general condition of the brake and whether servicing of the brake is required.

Hi Speed Brake Response (degrees): This is the number of degrees from the when the clutch was de-activated (at the BDC (hi) timing) to where the bodymaker crankshaft came to rest when a BDC stop was performed at high speed. This can be used to determine the general condition of the brake and whether servicing of the brake is required.

Note: The brake response of the brake for both high and low speeds is updated after each BDC stop.

BODYMAKER/TRIMMER SET-UP MENU
4: Download Program to M4510

This selection is used to download the application program to the M4510 module. This should only be performed when replacing the module (see section 2.10.1 – M4510 Module Installation of the HSL-WISVCUP User's Manual) or when the program has been changed.

Note: Program download cannot be performed while the bodymaker is running. All outputs on the M4510 are turned "off" and no program execution is performed. The bodymaker should therefore be stopped prior to program download.

This selection can also be used to verify the program ident, revision, and checksum without downloading the program. Perform steps 1 through 3 below but instead of initiating the download in step 3, simply press the <ESC> key to abort the download.

To download the program, perform the following:

1) Connect the RS-232 cable from the COM port on the computer to the "PROG" port on the M4510.

2) Select the "1: Bodymaker/Trimmer Set-up (M4510 PROG PORT)" selection from the HSL-WISVCUP Main Menu.

3) Select "4: Download Program to M4510". The current program ident, revision, and checksum for both the program on disk and already loaded in the module will be displayed. A prompt will be displayed asking to continue or abort. To continue, press any key except the <ESC> key. To abort, press the <ESC> key. If a prompt stating that the "HSLWI6" file could not be open is displayed, then the "HSLWI6" application program is not installed in the current directory.

4) Once program download is initiated, M4510 program execution will cease, the current address being downloaded will be displayed, and the "RUN" LED on the M4510 will flash continuously.

5) Once the download is complete, the "RUN" LED on the M4510 will illuminate solid and program execution in the M4510 will resume.

BODYMAKER/TRIMMER SET-UP MENU
5: Download Set-up data to M4510

This selection is used to download the previously uploaded (saved) set-up variables to the M4510. This should only be performed when replacing the M4510 module.

Note: The set-up data consists of the bodymaker and trimmer set-up parameters (see section 4.2). Timing channel set-points are not stored as part of the set-up data.

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

1) Connect the RS-232 cable from the COM port on the computer to the "PROG" port on the M4510.

2) Select "5: Download Set-up data to M4510". A prompt will be displayed asking to continue or abort. To abort press the <ESC> key, to continue press any other key.

3) Once data download is initiated, the current address being downloaded will be displayed.

   Note: Program execution is not ceased and can be performed while the machine is running.

4) Once data download is complete, press any key to return to the "HSLSCUP" main menu.

BODYMAKER/TRIMMER SET-UP MENU
6: Upload (Save) Set-up data from M4510

This selection is used to upload (save) the set-up data from the M4510 to the hard drive (current directory selected). This should be performed anytime any of the set-up variables have been changed.

Note: The set-up variables are changed in the M4510, not on the file in the computer. By uploading (saving) the set-up data to disk, they can be downloaded to the M4510 if the module must be replaced. The set-up data consists of the bodymaker and trimmer set-up parameters (see section 4.2). Timing channel set-points are not stored as part of the set-up data.

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

1) Connect the RS-232 cable from the COM port on the computer to the "PROG" port on the M4510.

2) Select "6: Upload (Save) Set-up data from M4510". A prompt will be displayed asking to continue or abort. To abort press the <ESC> key, to continue press any other key.

3) Once data upload is initiated, the current address being uploaded will be displayed.

   Note: Program execution is not ceased and can be performed while the machine is running.

4) Once data upload is complete, press any key to return to the "HSLSCUP" main menu.

SECTION 5
GENERAL TIMING
SIGNAL LOCATIONS

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

CH00: BDC (High) Timing: This signal is used to de-activate the clutch for a BDC stop at high speed.

Note: The leading edge is used to de-activate the clutch, thus the width of the signal is not critical (generally set 20 degrees wide). When the brake wear compensation is enabled, this signal is adjusted automatically by the M4510. If the brake wear compensation is disabled, this signal must be set manually. In this case is should be set such that the press stops at back dead center for a BDC stop at high speed.

CH01: BDC (Low) Timing: Same as the BDC (High) timing (CH00) except used when the machine is running in low speed.

CH02: Short Can Timing: This signal is used to verify the length of the can and verify that the can is good. The short can sensor must "see" can the entire time this signal is "on" to prevent a short can alarm. This signal is generally set in the range of "on" at 150 to 160 and "off" at 170 to 175".

CH03: Sensor Check Timing: This signal is used to verify that the short can sensor does not fail "on". The short can sensor must be "off" the entire time this signal is "on" in order to prevent a "die sensor fail" alarm. This signal is generally programmed to be "on" just prior to the punch emerging from the die set on the forward stroke (typical "on" at 110 and "off" at 130).

CH04: Cupfeed Timing: This signal is used to activate the cupfeed "on" when enabled and back "off" when disabled. The leading edge of this signal is used to activate the solenoid "on" while the trailing edge is used to activate it "off". The "on" set-point is generally set such that when the cupfeed is opened, the cup will drop onto the high part of the rotary cam. The "off" set-point is generally set such that the cupfeed will close such that the cup is caught with-out causing damage to the cup that is retained. This signal is generally set "on" at 270 and "off" at 030.

CH05: Air Strip (Low) Timing: This signal is used to activate the air strip solenoid when the machine is running in low speed. The air strip is "on" for the entire window that CH05 is "on" while the machine is running with the cupfeed open. This signal is generally set "on" about 150 degrees and then set "off" at about 200.

CH06: Air Strip (High) Timing: Same as the Air Strip (Low) timing (CH05) except used when the machine is running in high speed. This is generally set "on" about 120 degrees and then "off" at about 190.

CH07: PLC Clock Timing: General purpose timing signal available for use by existing PLC for whatever purposes necessary. Not used by the HSL-WISVCUP package.

SECTION 6
RECOMMENDED SPARE PARTS

The following are recommended spares for the HSL-WI6. These parts are available through Systems Engineering Assoc., Inc.

Quantity	Part Number	Manuf	Description
1ea.	D4591	SEG	Display/Keypad
1ea.	S4568	SEG	8 input/8 output 10-30VDC I/O Board

SECTION 6
RECOMMENDED SPARE PARTS

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APPENDIX A
PLC PROGRAM
MODIFICATIONS EXAMPLE

The following ladder logic is a genreralized example showing how the PLC logic of the existing control system PLC should be modified to interface with the HSL-WISVCUP package.

Note: The following is merely suggested logic and may not accurately represent the logic of the existing control system.

It is the ultimate responsibility of the end user to ensure that the HSL-WISVCUP is interlocked with the existing system properly.

The variables shown in the ladder logic are defined as follows:

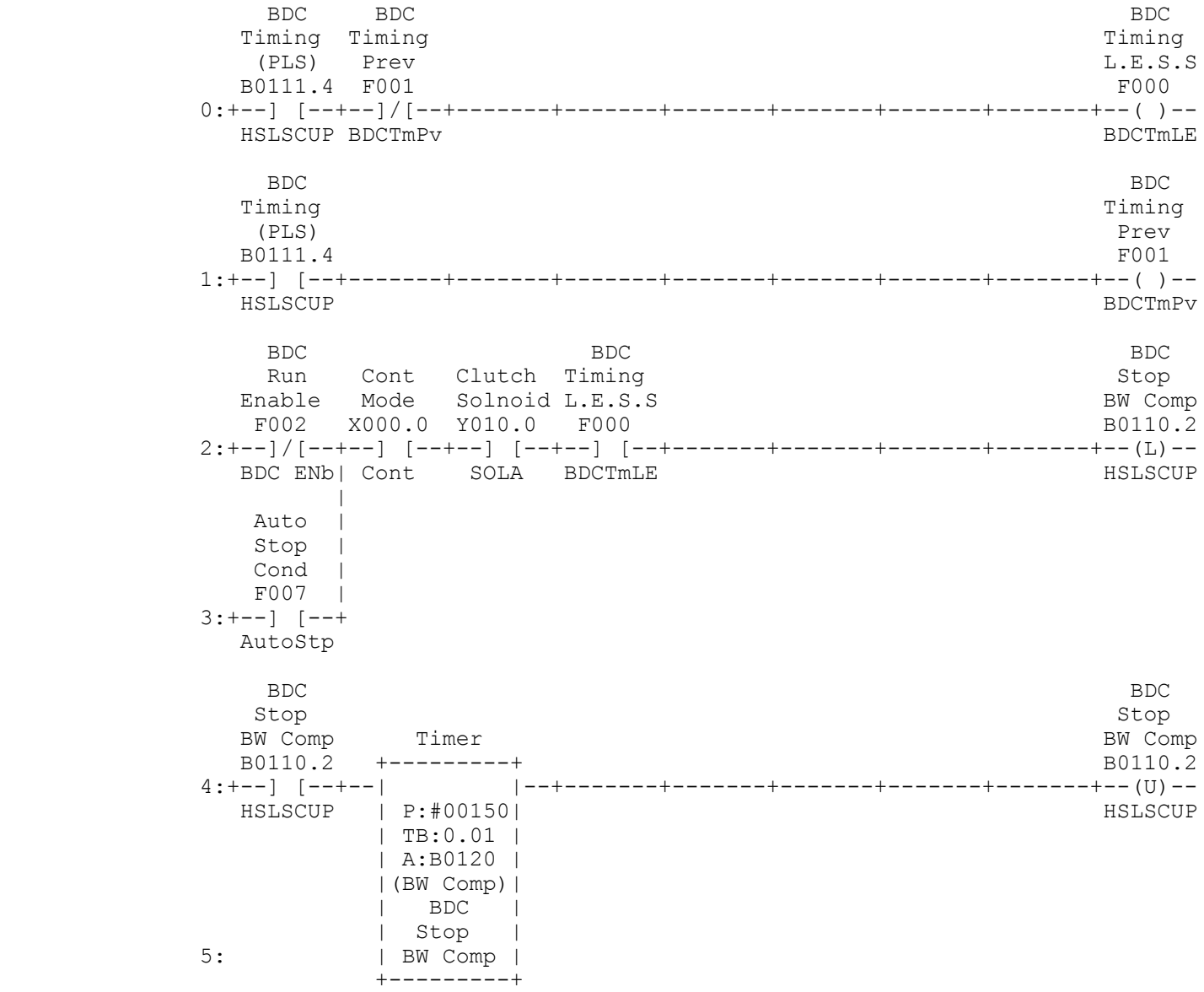
```
F000   -   F011: Internal coils of existing PLC
X0.0   -   X0.5: Existing Inputs to existing PLC.
Y10.0  -  Y10.1: Existing Outputs from existing PLC.
B100.2 - B111.4: New Inputs and Outputs between existing PLC and
                 HSL-WISVCUP package.
```

APPENDIX A
PLC PROGRAM
MODIFICATIONS EXAMPLE

block: 1 - Ladder

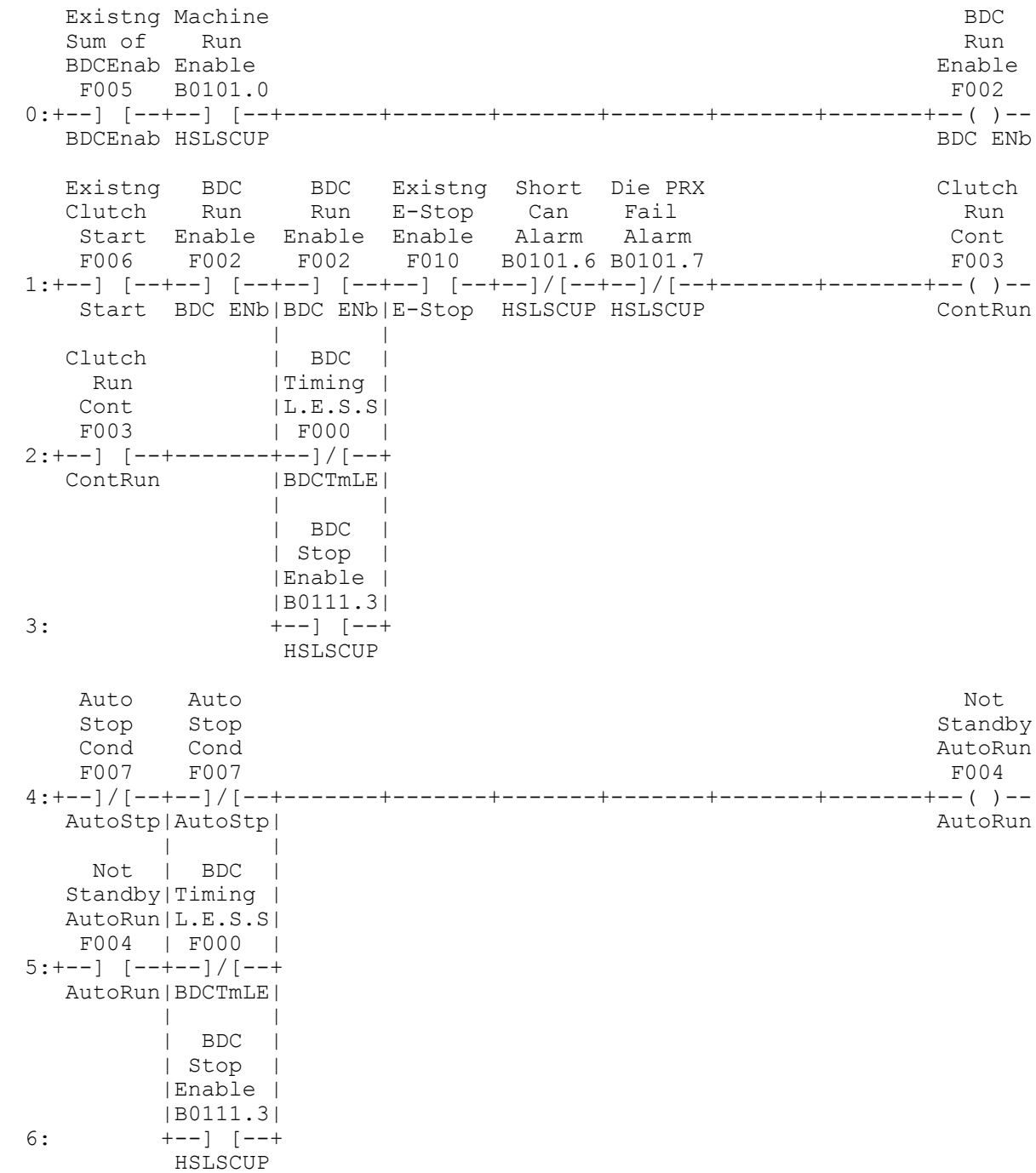
This block shows the generation of the leading edge single shot for the BDC timing signal from the HSL-WISVCUP. In addition this block contains the logic that would be used to activate the brake wear compensation enable at BDC stop output for the HSL-WISVCUP.

Note: This block of ladder logic is only required if the brake wear compensation feature of the HSL-WISVCUP is going to be used.



block: 2 - Ladder

This block of ladder logic shows the changes that would be made to the Continuous clutch control BDC stop as well as the auto stop (standby) bdc stop logic. In these rungs, the "BDC Stop Enable" signal from the HSL-WISVCUP is interlocked with the BDC timing signal to hold the clutch "ON" for two additional strokes when normal BDC stops and auto stop BDC stops are made.



APPENDIX A
PLC PROGRAM
MODIFICATIONS EXAMPLE

```
block:  3 - Ladder

    Clutch    Not
      Run   Standby                                                  Clutch
     Cont   AutoRun                                                  Solnoid
     F003    F004                                                   Y010.0
 0:+--] [--+--] [--+-------+-------+-------+-------+-------+-------+--( )--
    ContRun AutoRun|                                                | SOLA
                   |                                                |
     Inch          |                                                |
    Clutch         |                                                |Clutch
    Control        |                                                |Solnoid
     F008          |                                                |Y010.1
 1:+--] [--+-------+                                                +--( )--
     Inch  |                                                          SOLB
           |
      Bar  |
    Clutch |
    Control|
     F009  |
 2:+--] [--+
      Bar
```

APPENDIX A
PLC PROGRAM
MODIFICATIONS EXAMPLE

```
block:  4 - Ladder

This block shows the additional mode interlocks from the existing
control system to the HSL-WISVCUP that are required.

            Run/
     Cont   Not Bar                                                  Run
     Mode    Mode                                                   Mode
    X000.0  X000.5                                                 B0100.2
 0:+--] [--+--] [--+-------+-------+-------+-------+-------+-------+--( )--
     Cont   |RunMode                                                HSLSCUP
            |
            |
     Inch   |
     Mode   |
    X000.1  |
 1:+--] [--+
     Inch

     Alarm
     Reset                                                          Alarm
      PB                                                            Reset
    X000.2                                                         B0100.3
 2:+--] [--+-------+-------+-------+-------+-------+-------+-------+--( )--
     Reset                                                         HSLSCUP

    Cupfeed Existng   BDC     Not                                  Cupfeed
     Auto   Cupfeed   Run    Standby                               Enable
     Mode   Enable  Enable  AutoRun                               (Auto)
    X000.3   F011    F002    F004                                 B0110.0
 3:+--] [--+--] [--+--] [--+--] [--+-------+-------+-------+-------+--( )--
    CfdAuto CpfdEnb BDC ENb AutoRun                               HSLSCUP

    Cupfeed                                                        Cupfeed
    Manual                                                         Enable
      PB                                                           Manual
    X000.4                                                         B0110.1
 4:+--] [--+-------+-------+-------+-------+-------+-------+-------+--( )--
    Cfd Man                                                       HSLSCUP
```