Operation - D-1500

Overview

The D-1500 is a dual-spindle REELEX coiling machine designed for either rewind-line or Online configurations.

Unlike the D-750, which must be stopped after each coil is made, the D-1500 has a cut and transfer system that automatically switches the product to the empty mandrel after a coil is finished winding.

This allows the D-1500 to run continuously for seamless production and packaging when placed at the end of an extrusion line.

Applicability

Warning: This manual applies to D-1500s with keypad interfaces only. For G2 machines equipped with a touchscreen HMI, please see **REELEX G2 Controls Operation**, or use the on-screen help function.

Push-button Description

EMERGENCY STOP: The Emergency Stop button will dump all power from the D-1500 and rest of the line. Follow instructions in initial line start up. Footage length is lost. For emergency only.

STOP: Stops D-1500 machine in a controlled deceleration. The D-1500 machine may be restarted at any time. STOP may also be pressed during transfer.

START: The line (Payoff/Accumulator) must be running. Press the START button to wind cable.

ENDFORM ON: Positions endform onto the empty mandrel. A foot pedal can be positioned near worktable for convenience.

TRANSFER: Transfers cable to the opposite mandrel if mandrel is ready. Footage counter is automatically reset.

L.RESET: Resets the footage counter regardless of FEET/METERS switch position.

RESET: Resets the D-1500 Machine after power up or Emergency Stop. The D-1500 will run through its reset routine. All Emergency Stop circuits must be closed (pulled out) to operate.

If machine is equipped with safety guarding:

OPEN CLOSE Left Door: Opens and closes left safety door after Reset is finished to initially string up line. Opens and closes left safety door after STOP button is pressed. Flashes 19 in readout when left door needs to be closed to start machine the way it stopped.

OPEN CLOSE Right Door: Opens and closes right safety door after Reset is finished to initially string up line. Opens and closes right safety door after STOP button is pressed. Flashes 20 in readout when right door needs to be closed to start machine the way it stopped.

Initial Line Start Up

1. Turn on main power and remove any coils from the D-1500 then press the RESET button
2. String up Accumulators.
3. Lower buffer by turning the Raise/Lower lever mounted on the left side of the machine, string up and raise. Wrap the cable around left mandrel, clockwise. Note that after RESET on D-1500, the machine will always start on left spindle.
4. If machine is equipped with safety guarding, please follow the following steps:
    a. If the left safety gate is open, a 19 is displayed. If the right safety gate is open, a 20 is displayed. Close doors. A zero is displayed if ready (Generation 1 only).
    b. Push PAYOFF START on the D-1500 controller (if equipped). The stop circuit in the payoff controller must be closed, all guards should be closed and locked, the dancer/accumulator must be off the crash switches, and the reel must be fully raised in order to start the payoff. Once the payoff is started the payoff run light will come on.
    c. Use wire clamps on top of D-1500 to hold cable.
    d. Open left safety door on D-1500, lower buffer/dancer on top of D-1500.
    e. String up buffer.
    f. Wrap cable around left mandrel. Note that after RESET on D-1500, the machine always starts on left and left spindle rotates in clockwise direction. Close left safety door. Raise buffer all the way to start D-1500.
5. Set air regulators as follows:

Equipment	Air Pressure
D-1500 Air Input	80 PSI
Accumulator/Dancer	20 PSI
Motorized Payoff	80 PSI
Anti Reverse	10 PSI
Pocket Door Regulator (If equipped with Guarding)	30 PSI
Footage Counter Wheel	5 PSI

6. Press the START button on the D-1500 machine to start winding on left spindle.
7. The D-1500 machine will automatically stop at PRESET 2 and cut over if the opposite mandrel is empty and ready. After transfer, the left endform will come down. Remove the coil. Press ENDFORM On (foot pedal) button, this prepares the left mandrel for transfer.
8. If the machine is ready, at the PRESET 2 footage, the D-1500 will automatically transfer to the right mandrel.

Changing Coil Parameters: Generation I

NOTE: The following operations can be performed while the D-1500 machine is stopped or running.

For G2 (Touchscreen) machines: refer to REELEX G2 Controls Operation for changing coil parameters.

Using the Keypad

To change any FUNCTION, press the down arrow until red light is on the FUNCTION you want to change. Enter a number and press the ENTER button on keypad to permanently store number. Loss of power will not cause the parameters to be lost.

A red light in the FUNCTION block indicates which number is in the readout display. Use the up or down arrows on the keypad to change the FUNCTION in the readout. If the LENGTH light is on, the footage counter is being displayed.

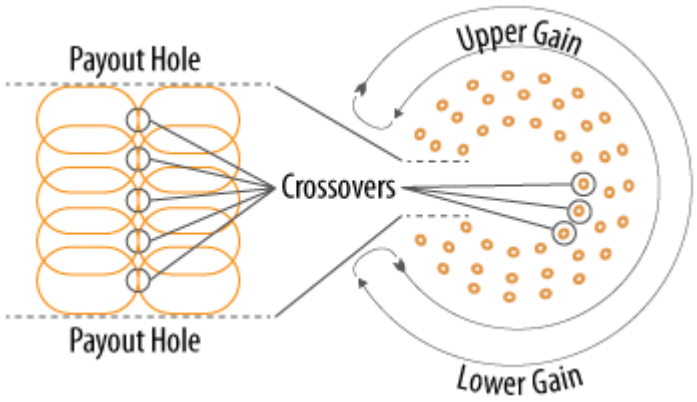
Additional parameters and adjustments can be accessed via S1 plus the A, B, and C buttons on the keypad followed by a number.

Coil Settings and Adjustments

Line Tension: Line tension is adjusted by air regulator on dancer and measured in Pounds Per Square Inch (PSI). Tension should be always as low as possible without causing a detrimental effect on coil rigidity or slack in the line. High line tension can cause the payout hole to close up while winding, cause damage to the cable or cause slipping layers, while too low tension can cause the coil to fall apart.

IMPORTANT: Recommended line tension for twisted-pair cables is **no more than 12 psi, and typically as low as 5-10 psi.**

Gains (Upper/Lower Ratios): The gain (ratio) adjustments control the distances between wraps in a layer. Generally, the lower the gain, the less negative space in the coil and therefore the coil will be denser and result in a smaller diameter. However, if the gain goes too low the coil will start to increase in diameter, as layers have nowhere to go but build atop one another.



In addition to fine-tuning the diameter of the coil, the gains also adjust tension placed on the product within the coil. Higher gains will help ease the tension within the coil if the product being wound is sensitive to pressures or deformation.

$$Gain\ Setting = (Upper\ Gain\ (Ratio) + Lower\ Gain\ (Ratio)) \div 2$$

In the packaging charts or packaging program, the chart will indicate the minimum diameter size at the minimum gain setting and the maximum gain gives the maximum diameter size.

EXAMPLE: Given a product with OD of 0.242 inches (6.14 mm)

If the chart or program gives Minimum Gain of 36 and Maximum Gain of 48, select a gain somewhere between those two numbers (closer to 36 will give a smaller diameter coil, whereas an average gain closer to 48 will create a larger coil).

A good setting for this product is 38. Thus, make Upper Gain (Ratio) = 40, and Lower Gain (Ratio) = 36. When averaged, these two numbers produce an Average Gain of 38.

40 + 36, divided by 2 equals = 38

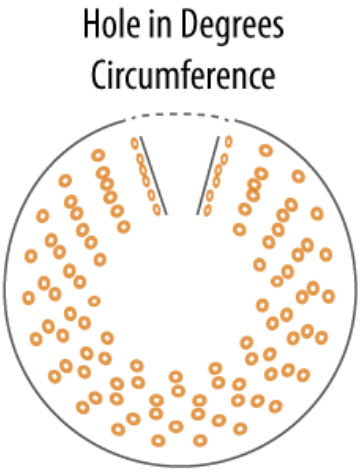
Upper and Lower Gain should not be the same. Typically, it is best they are different by 3 or 4 digits.

A Density Program is available for retrofit on most REELEX machines. This program adjusts the gain settings as the coil builds, thereby resulting in a denser and smaller coil. Please contact REELEX Packaging Solutions for more information.

Hole Size: The hole size setting on all REELEX machines can be adjusted in degrees. The larger the setting, the larger the payout hole, however the coil size will also increase. Any settings larger than 120 may produce a coil that may collapse or cause the product to slip. The hole size should be chosen so that a the machine or operator does not have a problem inserting the tube.

Older REELEX machines are capable of producing REELEX II coils by increasing the hole size setting above 80 degrees.

IMPORTANT: On newer machines featuring REELEX II-default software, the hole size setting is already offset by 50, so that the hole size in degrees is equal to the setting plus 50. Thus, to create a coil with an actual hole size of 110 degrees, the hole size setting would be 60, because 50+60 = 110.



Hole Shift: The hole shift setting is the hundred digit of the Hole Size setting and adjusts the slant of the hole. To determine the proper hole shift setting, use the following formulas:

$$English = 20 \times Cable\ OD\ in\ inches$$

$$Metric = 0.8 \times Cable\ OD\ in\ mm$$

EXAMPLE: Cable has an OD of 0.242 inches (6.14 mm)

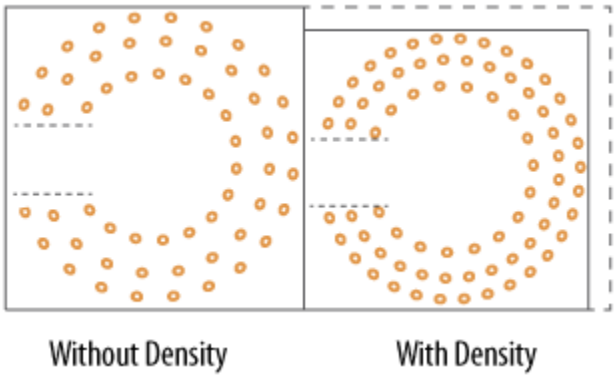
English: 20 x 0.242 = 4.84 round up to **5**

Metric: 0.8 x 6.14 = 4.91 round up to **5**

Density

NOTE: On non-G2 D-1500 machines, Density setting is **FUNCTION S1 + B + 1**

The D-1500 has a programmable density function built into the coiling software. This function varies the density of the REELEX coil as it winds. This software allows the manufacturer to change the size of the REELEX coils by increasing or decreasing wind density. Variable density has also been shown to have a positive effect on LAN cable electrical performance.



Software Operation

To use the density program values must be entered in the following variables:

1. Use the down arrow button on the keypad press until the LED next to “S1” is on.
2. To change density setting:
    - Press B, 1 and then enter. B1 is the density factor. Typical numbers are 0.0 to 4.0. Please note the decimal is not shown on the display. If you want to enter a density of 1.5 the display will read 15. The decimal between 1 and 5 is not displayed.
3. Press enter to save the number.
4. To turn density on or off:
    - Press B, 2 and then enter. B2 acts as a density on/off switch. A value of 0 means the density will not be used. A value of 1 means the density program is running. Alternatively, the density setting in B1 can be set to “0” and density will not be applied.

Presets

Preset 1 is the length on which the D-1500 will begin to slow down when in the offline Mode. In the Online Mode Preset 1 turns on an output relay. This relay could be an indicator for the operator that the D-1500 is near the end of the coil, and the empty mandrel should be ready for transfer.

Preset 2 is the length in which the D-1500 will transfer if the opposite mandrel is ready. If in the offline Mode when Preset 2 is reached, the D-1500 will stop and wait for the opposite mandrel to get ready. If in the Online Mode and the opposite mandrel is not ready at Preset 2, the D-1500 will continue to run and an over length error indicator will turn on.

Preset 3 **i**s the length in which the D-1500 in the Online Mode will stop if delegated. Preset 3 would be determined by how much cable can be wound onto the mandrel without oversizing the endforms.

Additional Functions

“A” Functions

	DESCRIPTION	VALUES
A1	Operation Mode - Online / Offline	**00** - Offline (rewind) from payoff (PRESET 1 ON) **01** - Online from extruder (PRESET 1 IGNORE)
A2	Spark Fault Behavior	**10** - Automatically transfers on spark error in offline mode. **11** - Automatically transfers on spark error in online mode.
A3	Acceleration and deceleration rate when the spindle pulls cable during transfer.	Numbers from 1 to 99 can be entered. 05 is factory default.
A4	Adjusts the Traverse (cam) position in degrees just prior to cut. (When Traverse (cam) positions toward machine frame.)	Numbers from 0 to 99 can be entered. For 8 and 10 inch mandrel, A4 = 00. For 6 inch mandrel, A4 = 90.
A5	Number of pulses from the sequential mark pickup to the cutter on the D-1500. This number is added with A8.	Each has a maximum value of 99 which would be 198 pulses (49.5 feet when using a 4 pulse wheel on the footage counter). See SECTION 9, sequential printing - cutting at zero.
A6	Defines the number of minutes that the stop bit will stay closed before opening for 1 second.	Numbers from 1 to 99 minutes can be programmed. Number 5 is the factory default. After the D-1500 is stopped or a full coil is left on the machine and it can not transfer the D-1500 will time out A6 minutes and open OPTO relay #17 on rack C for 1 second. Used to stop accumulators or payoff if operator leaves the machine. Wires 171 and 171A.
A7		
A8	Number of pulses from the sequential mark pickup to the cutter on the D-1500. This number is added with A5.	Each has a maximum value of 99 which would be 198 pulses (49.5 feet when using a 4 pulse wheel on the footage counter). See SECTION 9, sequential printing - cutting at zero.
A9	Reads a memory location that indicates how the machine had previously stopped.	**01 -** indicates STOP button with normal deceleration. **02 -** indicates CRASH STOP with fastest deceleration. **03 -** indicates left safety pad with fastest deceleration. **04 -** indicates right safety pad with fastest deceleration.

“B” Functions

	DESCRIPTION	VALUES
B1	Density Setting	**00 to 50** - “0.0” to “5.0”

“C” Functions

	DESCRIPTION	VALUES
C1	Left spindle shaft RPM readout	**Read Only**
C2	Right spindle shaft RPM	**Read Only**
C3	Traverse (cam) shaft RPM	**Read Only**

Packaging Procedure

NOTE: The D-1500 machine should run as fast as an operator can package a coil into a labeled box, palletize and fold a new box for the next coil.

1. After the transfer, the D-1500 machine automatically positions the cutter down and the two screws on the inner endform up. The finished coil is now able to be taken off the machine.
2. Wrap any loose cable around the outside of the coil (do not thread the outside “tail” back into the coil) and hold on to the outside end with thumb. Make sure not to lose track of the payout hole.
3. Reach around to the back of the coil and grab the inside of the coil from the back and pull the coil from the machine.
4. Set the coil down onto the cradle/table for boxing/packaging. While inserting the guide tube in the hole of the coil, step on the ENDFORM foot pedal or press button. This will begin winding the next coil.
5. Lift the coil into the box, place guide tube into the hole made in the coil. Secure tube in box, and feed the inner end of the product (wire) through the tube from the inside of the coil out.
6. If using REELEX II tubes, fold box around tube and secure tabs.
7. Stack box upright on pallet once complete.
8. Fold a new box and label it for the next coil.

NOTE: For detailed packaging instructions, see REELEX Packaging Guide

Modes of Operation

NOTE: A1=00, A2=10, A3=10, A4=00

Rewind Mode: (A1=00) When the length counter reaches PRESET1, the D-1500 will decelerate to a lower speed. At PRESET2, the machine will transfer to the opposite mandrel. If the operator has not returned the Endform by PRESET1, a PRESET1 warning is indicated. A light, siren or buzzer can alert the operator to press the ENDFORM button. If the endform is not returned before PRESET2, then the machinEmergency Stops until the operator returns the endform. A1=00.

EXAMPLE: A 1000-foot coil is to be wound.

PRESET1 = 970 and PRESET2 = 1000

Online Mode: (A1=01) When the length reaches PRESET1, a warning is indicated if the endform has not been returned. A light or bell can alert the operator to return the endform. At PRESET2 the machine will transfer if ready. If the endform has not been returned, over length error on the Left/Right mandrel is indicated. Again a separate bell or siren can alert the operator. The machine will transfer as soon as it is ready. At PRESET3, a PRESET3 warning is indicated. This can be used to shutdown the entire line or to alert the operator the last time. A1=01

EXAMPLE: A 1000-foot coil is to be wound.

PRESET1 = 700, PRESET2 = 1000 and PRESET3 = 2000 or when the endform is completely filled.

Changing Modes:

1. Turn off main power.
2. Remove jumper between #162 and #125.
3. Reset D-1500.
4. Press down arrow on keypad until S1 is ON.
5. Press A and then 1 a 1 will be in the thousands position of the readout and the hundreds blank.
6. Enter 00 for rewind mode or 01 for online mode.
7. Press the ENTER button to store.
8. Press the EMERGENCY STOP button and reconnect jumper between #162 and #125. (Locks program so an operator can not change the mode.)

Setup and Adjustments

Changing Footage Scaling Factor

1. Turn off Main Power.
2. Remove jumper between #125 and #162.
3. Turn on Main Power.
4. Hold the TRANSFER button and press the RESET button until the 16 LED's flash.
5. Push in 620 into the readout.
6. Press the ENTER button.
7. The UPPER GAIN LED will flash to indicate that the footage scalar is in the readout.
8. The (Up Arrow) shifts the number left and the (Down Arrow) right. The blank indicates the decimal point. Numbers are put in the units position. 0.0000 = 0 B 0000 is the smallest number 1.9999 = 1 B 9999 is the largest number B = blank If you do not want to change the number press the TRANSFER button Press the ENTER button to store new footage scalar.
9. After the ENTER or TRANSFER button has been pressed, the S2 LED will flash. It indicates that the meter scalar is in the readout. Use same procedure as (7) to enter and store your number.

NOTE: If you count in feet only, enter the same scalar in the meter scalar. This way the machine only counts in feet regardless of the position of feet/meter switch. The same can be done with meters scalar going into the feet scalar so the machine only counts in meters.

10. Press the ENTER button.
11. Turn off main power.
12. Re-install jumper between #125 and #162.
13. To calculate the scalar, wind several 1000 feet/305 meter coils at normal line speed. Do not use the first or last coils. Measure several finished coils accurately. For example: 305.5, 305.8, 306.0 and 305.6 are the true lengths with 305 meters in PRESET2. If you wish to achieve -0%/+0.25% error, the 305.5 meter coil must be changed to get 305 meters, also the 306 meter coil will become 305.5. The error is .5/305 x 100% = 0.1639%. Assume old scalar = 0.7630.

EXAMPLE: New Scalar = Number in PRESET2 (305.0) x Old Scalar (0.7630)

True Length (305.5)

New Scalar = 0.761751 or round off to 0.7618.

Sequential Printing and Cutting

Example

NOTE: This system has worked with VideoJet, Image and Domino printers.

Let us assume we are sequentially printing from one thousand to zero feet every two feet. For example, 1000, 998, 996, ... 0 then 1000 again. The inkjet printer is placed at the output of the Dancer and before the D-1500. How do we know when zero comes into the D-1500 WB machine and cut on it?

The inkjet printer must be programmed so an output occurs when the sequential printing resets. This Reset Mark is the point when the numbers change from 1000 to 0. At the Reset Mark, the D-1500 WB counts down A5 + A8 number of counter pulses and transfers. The A5 + A8 distance (number of pulses) is field programmable to match the distance between inkjet printer and cutter of D-1500.

A push-button to the inkjet is needed to reset the sequential numbers to zero for starting a new supply reel. The inkjet will output the Reset Mark to cause a transfer if the D-1500 is ready.

The ink must dry in 25 feet. Check with inkjet manufacturer to find out drying time and maximum line speed of inkjet printer.

NOTE: The print head must be placed between the D-1500 and Dancer.

Items Needed:

- Four-pulse magnet needed on counter for +/- six inch cut accuracy.
- AR2-WC is needed to prevent cable from going in reverse. All inkjet printers are unidirectional and the AR2-WC prevents a double print.
- W490 in Rack D Opto #4.
- Toggle switch at wires 166 and 125.

Contact REELEX For Proper Machine Software

Errors and Stops

Spark Errors

When a spark error is received, a spark error is indicated. When a sparker fault is received, the D-1500 WB counts down the number of length counter pulses to guarantee it being on a mandrel. This number is programmed into A2. An output is turned on to indicate which mandrel the spark error is on. (See next page for details.) Lights can be mounted at the operator's station. If a 1 is put in the tens position of A1, this will cause the machine to transfer after the spark fault is on the mandrel.

Below are details on how a spark fault is integrated with the operating modes.

A1=10 Automatically transfers on spark error in rewind mode. If the machine is ready to transfer and the length of PRESET2 has not been reached, the machine will take up cable until the spark is on a mandrel and then decelerates, at zero speed the counter is reset and transfer to empty mandrel. This insures length integrity and minimal scrap. A light can alert the operator of fault. If the machine is not ready to transfer, (ie. Endform is left out.) The machine stops and indicates the fault and also indicates PRESET1 warning.

A1=11 Automatically transfers on spark error in online mode. If the machine is ready to transfer and the length of PRESET2 has not been reached, the machine will take up cable until the spark is on a mandrel and then decelerates, at zero speed the counter is reset and transfer to empty mandrel. This insures length integrity and minimal scrap. A light can alert the operator of fault. If the machine is not ready to transfer, (ie. Endform is left out) the machine continues to wind and indicates a PRESET1 warning. As soon as the empty mandrel is ready, the machine will transfer. Again resetting the counter at zero speed.

A1=11 and in Sequential Mode. Transfer on spark fault in sequential count mode. If the machine is ready or not to transfer, on sparker fault it will continue to wind. When the fault is on a mandrel, the appropriate indicator is on and the machine waits to transfer at normal sequential reset mark. This way the cut happens at normal sequential reset mark.

Entering the Length of Cable Between Sparker and D-1500:

1. Turn off main power.
2. Remove jumper between #162 and #125.
3. Reset D-1500.
4. Press down arrow on keypad until S1 is ON.
5. Press A and then 2 a 2 will be in the thousands position of the readout and the hundreds blank.
6. Enter the number of length counter pulses between sparker and D-1500. The number must be between 01 and 99.
7. Press the ENTER button to store.
8. Press the EMERGENCY STOP button and reconnect jumper between #162 and #125. (Locks program so the operator can not change the amount.)

Machine Stops During Run

Five different STOP circuits can cause the machine to NOT start.

- STOP
- CRASH STOP
- LEFT SAFETY PAD
- RIGHT SAFETY PAD
- LOW AIR PRESSURE switch.

See rack D on drawing D-1500 valves and switches for details on stop circuits.

Function “A9” reads a memory location that indicates how the machine had previously stopped.

- 01 indicates STOP button with normal deceleration.
- 02 indicates CRASH STOP with fastest deceleration.
- 03 indicates left safety pad with fastest deceleration.
- 04 indicates right safety pad with fastest deceleration.

Also, approximately twice a second, the computer checks to see if the proper valves are on. The S2 LED flashes to indicate the computer is performing the test. If a fault occurs, it will shutdown the machine and display a code in the readout. Refer to troubleshooting program for help.

CODE	FAULT	PROGRAM
8 _ _ 1	S1 air valves (OUTPUT 16)	500
8 _ _ 2	S2 air valves (OUTPUT 17)	510
8 _ _ 3	(OUTPUT 18)	520
8 _ _ 4	(OUTPUT 19)	530
8 _ _ 5	Interrupt section-D.133 - call REELEX	
8 _ _ 6	Air pressure is too low	
8 _ _ 7	Right Table switch or Traverse Crash	
8 _ _ 8	Left Table Switch or Traverse Crash	

INDICATORS - ALL ARE 120 VAC 50/60 HZ	WIRE NUMBERS
RUN	170 & 102
STOP Payoff or Accumulator for 1 Second After “A6” Minutes	171&171A
SPARK ERROR	172 & 102
PRESET1	173 & 102
PRESET2	174 & 102
PRESET3	175 & 102
Left SPINDLE SPARKER ERROR (S1)	220 & 102
Right SPINDLE SPARKER ERROR (S2)	221 & 102
MULTIPLE SPARK ERRORS	222 & 102
TRANSFER READY	223 & 102

Problems on Reset

The machine has properly reset if the following indicators are on:

- LENGTH
- CPU ON
- UPPER GAIN
- S2 flashing
- 0 on Traverse (cam) Position error.

During reset, the computer checks several blocks of the electronics. If you have a failure, the computer writes a number to the display to indicate which block failed and it goes directly to the troubleshooting program.

NUMBER	OPORT TESTED	POSSIBLE BLOCK FAILURE
1	16 - S1 AIR VALVES	A, B, H, J or AC
2	17 - S2 AIR VALVES	A, B, H, J or AC
3	18 - OPORT 6	A, B, H, J or AC
4	14 - S1 D/A	A, B, H, or S
5	22 - TRAVERSE (CAM) D/A	A, B, H, or T
6	13 - S2 D/A	A, B, H, or U

If an air cylinder moves but does not finish its reset, a number will appear in the display. Either the cylinder has

not moved or the computer cannot read the switch or a safety pad is open. See drawing (Machine Switches & Valves.)

NUMBER	WHAT IS TESTED	POSSIBLE BLOCK FAILURE
7	Check Timer Relay Bit 3-Input port 1	A, B, H, I, J, AC or AC
8	Left Endform Out Switch & Valve	A, B, H, I, J, AC or A
9	Left Arm Up Switch & Valve	A, AI, AF, AG & AH
10	Right Endform In Switch & Valve	A, B, H, I, J, AC or AD
11	Right Endform Out Switch & Valve	A, B, H, I, J, AC or AD
12	Right Arm Up Switch & Valve	A, B, H, I, J, AC or AD
13	Table Left Switch & Valve	A, B, H, I, J, AC or AD
14	Left Endform In Switch & Valve	A, AI, AF, AG & AH
15	Left Rotocyl down	A, B, H, S, P, V, F, R, F & E
16	Right Rotocyl down	A, AI, AF, AG & AH
17	Air Pressure switch	
18	Y3 timer relay	
19	Left Safety Pad on Reset only	
20	Right Safety Pad on Reset only	

The only switch/air valve not tested for safety reasons during reset is table right switch, left and right endform arm down switches.

If machine is equipped with safety guarding:

NUMBER	WHAT IS TESTED	POSSIBLE BLOCK FAILURE
19	Left D-1500 safety door open	A, B, H, J or AD
20	Right D-1500 safety door open	A, B, H, J or AD
21	Pocket door retracted	A, B, H, J or AD
22	Buffer up or STOP string open	A, B, H, or L or AA
23	ENDFORM ON button pressed	A, B, H, I or AD
24	Left endform arm down	A, B, H, I or AD
25	Right endform arm down	A, B, H, I or AD

The only switch/air valve not tested for safety reasons during RESET is table right switch and vertical guard extend.