

SANCTION[®] TECHNOLOGY

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If all else fails . . . Read this manual.

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SECTION I - Introduction

A. Overview

This Lane Cleaning and Conditioning Machine represents unequaled technology in automated lane care. Clean and consistent bowling conditions are accomplished through the use of a "user-friendly" keypad linked to an on-board programmable computer.

An advanced conditioner metering transfer system, vacuum cleaning and squeegee system, and a duster system allow the machine to maintain clean and consistent bowling conditions in a manner never before possible.

With the expandability of the Programmable Computer, future upgrades are easily done, assuring that your machine will not become obsolete.

**IT IS EXTREMELY IMPORTANT THAT THE OPERATOR
THOROUGHLY READ AND UNDERSTAND THIS OPERATING
MANUAL BEFORE USING THE MACHINE.**

Should you have any questions regarding any procedures pertaining to the proper operation of this machine, please contact The Kegel Company, Inc. or your authorized Distributor.

B. Machine Specifications

Power Supply:

Class I - Single Phase
110-120 Volts, 60 Cycle, 18 Amps
220-230 Volts, 50 Cycle, 9 Amps

Dimensions:

Width - 53"
Height - 13"
Length - 39"
Weight - 350 pounds

C. Care and Safety Procedures

This machine is manufactured of the highest quality materials, but keep in mind that this is a sensitive piece of equipment. Care should be taken to see that it is not dropped, knocked around, or handled roughly.

Doing so may damage the programmable computer, its components, the conditioner transfer system, the Duster assembly, or the vacuum cleaning and squeegee system.

For care and safety reasons, follow these precautions:

- Avoid spilling any liquids or chemicals inside of the machine.
- Do not operate the machine with an extension cord or power cord other than the one provided.
- Make sure that the power outlet used provides the correct voltage and amps. It must be a clean circuit with no other loads on it.
- Do not attempt to make any wiring modifications.
- Do not attempt to re-program the computer.
- Do not operate the machine in an upright position.
- Always empty the recovery tank before standing the machine up and transporting it. Failure to empty the tank will cause the dirty cleaner to either spill out through the vacuum motor or out of the squeegee when going over ramps. Then the next time the machine is started, it will blow cleaner out of the vacuum exhaust.

Not following the above recommendations may cause damage to the machine, its computer, persons operating it, or void the warranty.

Persons assigned the responsibility of operating this equipment should be trained in its use by an authorized factory-trained Distributor.

D. Theory of Operation

This machine uses proven Kegel "SANCTION® TECHNOLOGY". This technology is the precise metering of oil to each board by volume. This generation of SANCTION® TECHNOLOGY is greatly improved over the first generation of THE SANCTION MACHINE®. It is much faster and gives more control over the lengthwise distribution of the oil pattern.

The machine uses one Fluid Metering Pump. The piston and cylinder are made of ceramic, milled to almost perfect clearances. The pump has no valves to impair its operation. The piston revolves as well as reciprocates during operation.

With the pump rotating at a constant RPM the oil is pumped at an exact flow rate to a three way valve known as the Oil Pattern Control Valve. The valve in its OFF state routes the oil back to the oil tank. When turned ON the valve routes the oil to a line connected to the Oil Head.

The OIL HEAD travels back and forth across the transfer system at a constant speed, much like the printer head on a computer printer. The Oil Pattern Control Valve is then turned ON and OFF according to the chosen program. This applies a series of board to board streams of oil onto the transfer system as the machine travels down the lane.

This stream of oil is a consistent, adjustable, and measurable amount per board. An example of a common league condition in the U.S. would be three 2 board to 2 board streams, followed by two 9 to 9's, two 10 to 10's, and four 11 to 11's as the machine travels down the lane.

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The total volume amount per board of the pattern can then be represented by an exact amount.

To do this simply multiply:

- 1) the value of the amount of oil per board of the oil stream (done during calibration) **by**
- 2) the number of times the stream crossed each board.

Although it is not information that will be used daily, it is a way of explaining a lane condition in exact terms. These measurements can be written down and duplicated in the future. In other words, it defines a lane condition so that it can be recognized and explained to anyone, much like any other specification of the bowling lane such as the length and width.

Anyone who uses this machine and pays attention, will begin to understand lane conditions like never before. Simply because all adjustments to the oil pattern are exact and repeatable. Sanction® Technology is an instrument, not just a lane machine.

SECTION II - Machine Description

A. Rear; Center; Front; Right; & Left Side

With the machine setting on the approach in a position ready to be operated on the first lane, the following descriptions will be used:

- **CONDITIONING or REAR END:** The CONDITIONING or REAR END shall be the end of the machine closest to the operator and nearest the approach, where the buffing brush is located.
- **COMPUTER or CENTER COMPARTMENT:** The COMPUTER or CENTER COMPARTMENT houses the electrical components and is located between the CONDITIONING END and the CLEANING END.
- **CLEANING or FRONT END:** The CLEANING or FRONT END shall be the end nearest to the pins, where the cleaning tank and the Duster Assembly is located.
- **RIGHT SIDE:** The RIGHT SIDE is the side to the right of the operator as he faces the pins. This is also the ten-pin side.
- **LEFT SIDE:** The LEFT SIDE is the side opposite the right, to the left of the operator as he faces the pins (seven-pin side).

B. Keypad

Located under the lid of the Conditioning end is the computer keypad. This keypad is used to enter all programming information, as well as to start the machine. The keypad consists of 24 input keys and a two-line Liquid Crystal Display (LCD) where the menu items and prompts appear.

The following keys are used on the keypad:

- **MENU:** Pressing this key will display and advance the available main menus for the operator. It will also act as a zero button when the machine is in operation. When it stops the operating machine it resets the program to ZERO.
- **NEXT:** Use this key to advance within a main menu from one menu prompt to the next.
- **LAST:** This key will return the user to the last menu prompt within a main menu.
- **ENTER:** This key is used to complete an entry of data or information requested by a menu prompt.
- **EXIT:** This key is used to return to the Operators Menus from the Managers Menus.
- **START:** This key will activate the handle start button on the machine when it is in the START MENU sequence.
- **UP & DOWN ARROWS:** Use of these keys will increment or decrement numbers asked for in certain menu prompts, such as the starting lane number.
- **LEFT & RIGHT ARROWS:** Use of these keys will increment or decrement the starting lane numbers to the first lane or last lane available in the center. In certain menu prompts, these keys will increment or decrement the displayed values by a count of ten. It functions differently in several menu prompts.

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Also displayed on the keypad are additional input keys.

The following keys are used to test inputs and outputs:

- **TEST OUTPUT (Up arrow):** This key is used to select which output is to be tested. Pressing this key will increment the output number up to the next available output.
- **TEST INPUT (Write):** This key is used to select which input is to be tested. Pressing this key will increment the input number up to the next available input.
- **ON / OFF:** Use of this key will turn ON/OFF the selected output. This key will also turn on and off the duster or pindeck spray in the appropriate menus.
- **EXIT I/O (Down arrow):** This key is used to exit the TEST I/O section.

The following keys are used when preparing the machine:

- **PRIME PUMP (HR):** This key will allow the operator to prime the spray pump prior to cleaning the first lane.
- **TEST CLEAN (Change):** Use of this key will allow the operator to check how well the machine is cleaning the lane prior to cleaning and conditioning simultaneously.

The following keys are used for internal programming functions in the PC of the machine. Tech Support may instruct you to use the following keys during troubleshooting.

- **SHIFT**
- **HR**
- **CONTACT**
- **CHANNEL**
- **DM**
- **CHANGE**
- **MONITOR**
- **SET**
- **RESET**
- **CLEAR**
- **WRITE**

C. Conditioning (Rear) End Components

Located on the Conditioning end of the machine are the following components:

- **DISTANCE WHEELS:** Located on the outside rear wall of the conditioning end and mounted on the ends of the lane distance shaft are the distance wheels. These wheels measure the distance the machine travels down the lane in increments of one inch. This is done by an infrared LDS (Lane Distance Sensor) mounted on the center pillow block.
- **CONDITIONER TANK:** Mounted to the rear wall on the buffing end is the conditioner tank assembly. This tank holds approximately 1-1/4 gallons of lane conditioner when full. This large capacity allows the machine to operate for a longer period before refilling. A float located inside the tank indicates when the conditioner level drops to approximately 1/4 gallon. A filter is also located inside the tank.
- **BUFFING BRUSH LIFT MOTOR:** Mounted on the left side of the rear wall is the buffing brush lift motor. This motor lifts the buffing brush off the lane. The buffing brush needs to be lifted at times where conditioner is not being applied (i.e. from the end of oil through pindeck during all cleaning cycles). The brush parks in the down position. The machine should be stored with the brush down to prevent the transfer rollers from spreading the fibers too much.
- **TRANSFER ROLLERS:** Mounted below the moving head are the conditioner transfer rollers. These two stainless steel rollers are chain driven and transfer conditioner onto the buffing brush.
- **TRANSFER ROLLER DRIVE MOTOR:** Mounted on the right side of the rear wall is the transfer roller drive motor. This motor drives the transfer rollers during conditioning runs.

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- **BUFFING BRUSH:** Located near the rear wall of the conditioning end is the buffing brush assembly. The belt-driven buffing brush removes conditioner from the transfer rollers and places it onto the lane surface.
- **START/INTERLOCK/RESUME BUTTON:** Located on the handle is the Start/Interlock/Resume button. This button is used to START the machine; STOP it any time during the conditioning run; or to RESUME operation after it has stopped for an error message or some other reason.
- **OIL HEAD:** Located above the transfer rollers is the Moving Head. This head rides along a guide bar and applies the conditioner to the transfer rollers.
- **OIL HEAD DRIVE MOTOR:** Located on the outside of the left side panel is the Drive Motor for the Oil Head. This motor, along with a cogged drive belt, moves the head back and forth along a rectangular track above the transfer rollers.
- **PRESSURE GAUGE:** Located on the center wall is the oil pressure gauge. Use the gauge to keep the oil pressure at about 10-15 psi.
- **PROXIMITY SENSORS:** Located at each end of the head mounting bar is a proximity sensor. These sensors feed information to the PC to reverse the conditioning head.
- **CALIBRATION OUTLET:** Located on the rear wall is the calibration outlet. During a machine calibration test, the conditioner is routed to this outlet to allow it to be collected and measured in a graduated cylinder.
- **EMERGENCY STOP BUTTON:** (On 230 Volt Machines Only) Located on the right side of the rear panel on the outside of the machine is an emergency stop switch. This safety button will disconnect power to the drive components of the machine if there is an emergency. This button will have to be rotated to be re-set and the start button will need to be pushed to resume operation.

D. Computer/Center Compartment Components

Located in the Computer Compartment of the machine are the following components:

- **POWER CORD INLET:** Mounted on the left side is the power cord inlet. This is the only inlet to which the power cord can be connected.
- **15 AMP OR 10 AMP BREAKER:** Mounted on the left side panel is a 15 amp or 10 amp circuit breaker. The 15 amp breaker is used in a 115 volt model and protects the circuits for the entire machine. The 10 amp breaker is used in a 230 volt machine and protects the circuits for the entire machine.
- **10 AMP OR 8 AMP BREAKER:** Next to the 15/10 amp breaker is a 10 or 8 amp circuit breaker. This breaker protects the vacuum motor.
- **DRIVE MOTOR SPEED ADJUSTING POTS:** The adjusting pots are mounted to a plate in the center of the computer compartment. These pots regulate the speeds of the drive motor. The furthest **LEFT** pot (as you face the pins) controls the **LOWEST** speed (10 inches/second). As you continue right each pot controls the next available speed.

Facing the unit the proper setting for the pots are in this order:

9-10 IPS

13-14 IPS

17-18 IPS

21-22 IPS

25-26 IPS

29-30 IPS

RANGE Pot (Adjusts speed from all pots) and

54-56 Inches Per Second of travel on the lane.

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- **COMPONENT CONTROL RELAYS:** Mounted on a plate on the right hand side of the computer compartment is the Component Control Relay Assembly. This assembly is comprised of four control relays. Each relay controls a specific function of the machine.

From left to right:

- The first relay **CR #1** controls the forward operation of the drive motor.
 - The second relay **CR #2** controls reverse operation of the drive motor.
 - The third relay **CR #3** controls the operation of the vacuum motor and the lane blower. When this relay is energized the vacuum motor and lane blower will operate.
 - The fourth relay **CR #4** controls the operation of the cleaner spray pump motor. When this relay is energized the spray pump motor will operate.
-
- **BRAKE RESISTOR:** Mounted to the Forward relay and the Reverse relay is the Brake Resistor. This resistor stops the drive motor when the drive motor relays are turned off.
 - **BUFFING MOTOR:** On the left side of computer compartment is the buffing motor. This motor drives the buffing brush.
 - **BUFFING MOTOR CONTACTOR:** Located in the center of the computer compartment just below the Drive Motor Speed Adjusting Pots is the Buffing Motor Contactor. When actuated under power, it will operate the buffing motor. (Note: The transfer roller motor used to operate from the contactor before Kegel ThoughtWare v9.93g.)
 - **SQUEEGEE MOTOR:** Near the center of the computer compartment is the mechanical-brake motor which controls the up and down movement of the squeegee.
 - **STEP-DOWN TRANSFORMER:** (On 230 Volt Machines Only) Near the center of the computer compartment is the step-down transformer on 230V machines. This converts 230 Volts AC to 115 Volts AC to run several components on the machine. The PC runs off 115V AC.

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- **LANE BLOWER:** Located to the left of the buffer contactor and squeegee motor is the lane blower. This motor is used to force dry the lane during cleaning.
- **PROGRAMMABLE COMPUTER (PC):** Just to the right of center in the computer compartment is the Programmable Computer, or PC. The PC is made up of 6 components, the main controller, the power supply, one input module, 2 output modules, and the mounting rack.

WARNING: The PC contains a Lithium battery. When it is replaced, the old battery should be discarded in accordance with local regulations.

- **DRIVE MOTOR:** Mounted directly below the component control relay assembly is the drive motor. It drives the machine on the lane.
- **EMI FERRITE:** (On 230 Volt Machines Only) The 24V DC circuit is filtered at the output of the PC Power Supply. A ferrite is clamped to the Brown and Yellow wires to reduce line conducted emissions. This component is required to comply with CE Directives.
- **PROTECTIVE DEVICES:** Mounted near the buffer motor are several slow-blow fuses. These protect the operator and machine in the event of a current overload.
 - **Transformer Fuse:** Rated at 800mA on a 230V model only.
 - **Oil Pump Motor Fuse:** Rated at 0.5A on a 115V model, and at 500mA on a 230V model.
 - **Cleaner Pump Fuse:** Rated at 0.75A on a 115V model, and at 315mA on a 230V model.
 - **Blower Fuse:** Rated at 1.8A on a 115V model, and at 800mA on a 230V model.
 - **Transfer Roller Motor Fuse:** Rated at 2.25A on a 115V model, and at 1A on a 230V model.
 - **Drive Motor Fuse(s):** Ceramic-type fuse(s) rated at 4A on 115V model (L1) & 4A on 230V model (L1 & L2).
 - **PC Common Fuse(s):** The 115V PC Outputs are protected by a fuse rated at 7.5A. The 230V PC Outputs are protected by two fuses rated at 4A.

E. Cleaning (Front) End Components

The following components are located under the lid on the cleaning end of the machine:

- **PUMP MOTOR:** Mounted on the far left hand side of the cleaning end is the pump motor. This motor pumps the cleaning liquid from the supply tank through the spray jets and onto the lane surface.
- **VACUUM MOTOR:** Located on the right side is the vacuum motor. This motor is used with the squeegee assembly and recovery tank to vacuum the cleaner off the lane. This motor needs special attention in high dirt areas, especially if the gutters and caps are not dusted regularly.
- **SUPPLY TANK:** The tank nearest the left side is the cleaner supply tank. This tank will hold enough cleaner to completely clean in excess of 20 lanes. A screen filter is located inside the tank.
- **RECOVERY TANK:** The tank nearest the right side is the recovery tank. This tank will hold over 20 lanes of used liquid without needing to be emptied.
- **DMR DUSTER/CLEANING CLOTH ASSEMBLY:** Mounted inside and across the entire front end is the DMR Duster Cleaning Cloth Assembly. Two motors, one located on each side, move the cloth from one core to the next. The gear motor on the left side is called the **UNWIND MOTOR**. When operated it will let out new cloth from the supply roll. The gear motor on the right side is the **WIND-UP MOTOR**. When operated it will wind up the used, dirty cloth on the white PVC take up roller.

For best results, use **Kegel Kloth** (Part #153-0047K) or you can use DBA #8460 or Lane DynamX #9460 Lane Cleaning Cloth (or other equivalent). The machine will use approximately 1-1/2" of cloth per lane.

*DBA #8460 is a registered trademark of DBA Products Co., Inc.

*Lane DynamX #9460 is a registered trademark of Lane DynamX. Not affiliated with The Kegel Company, Inc.

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- **SPRAY JET ASSEMBLIES:** Mounted to the front outer wall are the 4 spray jet assemblies. These assemblies can be angled up or down, and left or right, to adjust spray coverage to the entire lane. Mounted with the spray tip is a combination check valve/filter.
- **DUSTER UP SWITCH:** Located on each side wall above the duster cushion roller pivot arms is a microswitch. These switches, when actuated, tell the PC that the cushion roller is in the UP position.
- **FAILSAFE SWITCH:** These switches are found on each side wall, below the Duster Up switches. When the cushion roller drops off the end of the lane, the cushion roller pivot arms actuate the failsafe switches. Once actuated, the machine will travel two inches before it reverses. The failsafe will reverse the machine only when the End Cleaning Distance counter is set too high. The failsafe switches are a backup system only!

F. Underside Components

Located on the underside of the machine are the following components:

- **DRIVE SHAFT:** Located toward the center of the underside is the lane drive shaft. This shaft is driven by the drive motor. The squeegee assembly is also mounted to, and pivots on, this drive shaft.
- **TACH SENSOR:** Mounted to the left side plate is the TACH sensor. A ten-tooth timing sprocket is rotated as the drive shaft turns. As the teeth of the sprocket pass through this sensor pulses are sent to the PC. The PC counts these pulses and calculates the IPS (INCHES PER SECOND) travel speed of the machine. This is used to set the 7 different speeds of the machine. It is also used in the program to sense if the drive wheels are slipping. The PC compares the rate of pulses coming from the tach sensor to the rate of pulses coming from the LANE DISTANCE SENSOR.
- **DRIVE WHEELS:** Mounted on the lane drive shaft are the two drive wheels. These wheels are powered by the drive motor and drive the machine on the lane.
- **SQUEEGEE ASSEMBLY:** Mounted to the drive shaft is the squeegee assembly. This assembly vacuums the cleaner and oil off of the lane during lane cleaning.
- **EMI FILTER:** (On 230 Volt Machines Only) The electrical circuits of the machine are filtered to reduce line conducted and radiated emissions. This filter must be connected properly to ensure compliance with Electromagnetic Compatibility Directives (CE Mark).

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- **LANE-TO-LANE CASTERS:** Located on the exterior left and right sides of the frame are the lane to lane casters. These casters support the machine as it is moved on the approach from one lane to the next.
- **GUIDE ROLLERS:** Mounted inside of the side plates are five spring-loaded guide rollers. These guide rollers ride along the edges of the lane to keep the machine straight and centered on the lane. The bolt for the center guide roller (on the left side) is longer than the other four.
- **OIL PUMP & MOTOR:** Located on the left side underneath the machine is the Conditioner Pump and Motor. Conditioner is pumped from the tank through the *PULSE DAMPENER TUBE* to the *OIL PRESSURE GAUGE*, continuing on through the *PRESSURE REGULATOR TUBING* then to the oil routing valves.
- **OIL PRESSURE REGULATOR BOX:** Located near the bottom of the floor plate is the pressure regulator box (on machines with serial number 2371 and after). This box contains tubing to control the amount of pressure in the oil output line. Various lengths and sizes of tubing are available depending on the viscosity of the conditioner being used in the machine. Refer to the chart in the Appendix to select the appropriate regulator tubing.
- **OIL PRESSURE NEEDLE VALVE:** On machines with serial number 2370 and before, there is a needle valve located between the pressure gauge and the oil control valves. This valve is used to keep the oil pressure at approximately 10 psi. This needle valve has been replaced with the oil pressure regulator box on current production models.

WARNING: If the machine will be using very light oil it should be converted to the pressure regulator box (Order Part Number 154-8259). The new design eliminates the chance of the needle valve becoming clogged when the orifice is very small to create the proper amount of pressure.

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- **OIL ROUTE CONTROL VALVES:** Two valves are used to meter and route the conditioner flow.

The **OIL PATTERN CONTROL VALVE** is controlled by 24V DC. In its normal or OFF state this valve routes the oil from the pump back to the oil supply tank via the oil return line. When turned ON, it routes the oil from the pump to the OIL VOLUME TEST VALVE (115V AC).

The **OIL VOLUME TEST VALVE** in its normal or OFF state the allows the oil to flow to the Oil Head Pencil and on to the main transfer roller. When turned ON, it routes the oil to the *OIL CALIBRATION OUTLET* located on the left rear wall of the machine.

SECTION III - Pre-Installation

Preparation of the Bowling Lanes

Prior to operating this equipment for the first time, it is highly recommended that a thorough inspection of the bowling lane and approach area take place.

All loose foul lights, divisions, cappings and adapter blocks and channels should be tightened, repaired or replaced.

High channels will lift one side of the machine and cause errors. Loose capping screws, loose gutters, and missing capping sections will cause damage to the power cord.

SECTION IV - Operating Instructions

A. Filling the Conditioner Tank

Completely fill the conditioner tank prior to operating on the first lane. To fill the conditioner tank, the machine should be in the down position on a level surface. Pull out both gray tank plugs located on the top of the tank. (Push down on the collet before pulling on the plug.)

Insert the white funnel assembly provided with the machine. Located on the right side end of the tank is a clear sight tube.

Fill the tank until the oil level in the tank reaches the bottom edge of the right angle gray fitting on the top side of the machine. Failure to watch the sight glass could cause the tank to overflow.

This overflow can drain down onto the buffer brush which will cause an excess amount of conditioner to be applied to the lane in that area for several lanes.

You should place an oil rag over the buffer directly below the oil fill vent hole to prevent this. When finished be sure to remember to replace both gray tank plugs. Failure to do so could cause a major mess when the machine is lifted to the transport position.

B. Filling of Cleaner Supply Tank

To fill the Cleaner Supply Tank, the machine should be in the down or operating position. Prepare an appropriate mixture of cleaner and water. Pour the mixture into the Supply Tank using the supplied funnel.

(NOTE: Always use the black funnel supplied with the machine.)

The black funnel has a plastic filter screen. This screen filters out all debris and trash to prevent this from contaminating the supply tank and cleaning system.

Failure to pay attention to this will cause the tank filter (located in the outlet of the supply tank) to become clogged frequently. It can also cause premature failure of the cleaner pump. At the very least, this will reduce the cleaner output of the spraying system and result in inadequate stripping. This will lead to customer complaints, ball calls, and an excess of out-of-range pins. The supply tank can be removed for cleaning.

Do not spill cleaner on the duster switches. Spills may "short" the input and cause a false signal at Input #005 or Input #010. A wet switch may also produce a dim LED light on the PC.

Any spills or drops of cleaner onto the approach should be wiped up immediately! Any spills on the machine will stain the aluminum and make the machine ugly. Ugly machines do not run as well as clean, sharp, and highly maintained machines.

NOTE: If the lanes are going to be cleaned make sure the Cleaner Supply Tank is filled, the Recovery Tank is empty, and an adequate supply of Lane Cleaning Cloth is installed before beginning operation.

C. Turning the Unit On

Carefully set the machine in the operating position on the approach. It should be completely on the approach, with the cleaning end being approximately 6 inches behind the foul line.

Connect the twistlock connector on the power cord to the machine.

Connect the power cord into a suitable outlet. MAKE SURE THAT THE OUTLET IS SUPPLYING THE CORRECT VOLTAGE AND AMP RATING (see Page 1). Connecting the power cord into an outlet located toward the center lanes of the establishment will allow more lanes to be cleaned and/or conditioned without changing outlets.

The power cord supplied with the machine will be long enough to clean in excess of 24 lanes without the need to change outlets. (To accomplish cleaning the maximum number of lanes, the cord should be plugged into an outlet at approximately Lane 12. This will allow enough slack in the cord to place it out of the machine's path as it cleans/conditions lanes 1-24.)

When power is applied to the machine, the menu screen on the keypad will illuminate. The machine is now ready to run.

If the machine does not appear to have any power after it has been plugged in, check the E-STOP switch to make sure it hasn't been accidentally pressed. Rotate the red button to reset this switch. Power will resume immediately.

D. Keypad Display

The keypad display is a two line LCD (Liquid Crystal Display). During operation and selection of programs, various prompts, which are simply questions or data requests, will appear in the display, along with possibly some numbers.

The prompts will request the operator to input or change data or information within the selecting menu. The numbers will display cleaning and/or conditioning program numbers, distances (feet) or "counts". What the prompts and numbers mean for each menu is explained under each menu heading in this section.

When the numbers appear, there will often be two numbers, both the same, displayed in the LCD. When this occurs, both numbers refer to the current setting for that particular prompt.

When changing the setting with the use of the UP or DOWN ARROWS, only the number on the right side of the display will change. The number on the left will remain at the previous setting until the **ENTER** key is pressed, at which time both numbers will change to the new setting.

In other menu screens where multiple variables can be changed, the variable that can be changed will be *blinking*. Pressing the **ENTER** key will advance the blinking value to the next variable. This is used in the CHANGE PROGRAM and the CHANGE AUTO SELECT menus.

E. Operators Menu Selections

The machine's operation is controlled by a series of programs located within the memory of the programmable computer. These programs and settings may be changed or modified by following a simple sequence of prompts within the available menus displayed on the keypad. This section will lead the operator step-by-step through menus and prompts.

To make this section easily understandable, the operator should be familiar with the keypad as detailed in Section II of this manual.

THE FOLLOWING MENU SELECTIONS CAN BE ACCESSED BY THE OPERATOR

1. Sanction Start Menu

The Sanction Start Menu will display the cleaning/conditioning program being used, and allow the operator to select the starting and ending lane number. The operation of the machine is also started from this menu.

Once the machine is turned on, the screen will temporarily display a copyright warning. This screen will appear momentarily each time the Start Menu is accessed:

**(C) COPYRIGHT
KEGEL CO 2000**

After a brief period of time, the display will change and *** SANCTION START** will appear on the top line of the LCD on the keypad. Appearing on the second line will be a four digit number on the left hand side. This number designates how many lanes of cloth are remaining on the duster roll.

*** SANCTION START
0400 MENU ST2004**

The "**0400**" means that approximately 400 lanes are left on the current roll of cloth. The "**ST2004**" refers to the version of programming software currently installed in the computer.

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If one of the sensors has been re-routed, a message alerting the user will toggle on the screen with the Start Menu. Do not ignore this maintenance notification.

Programming Note: An asterisk will appear at the end of the word **START*** when the power interrupt feature is turned off.

To begin operation, press **NEXT** on the keypad. The following prompt will appear:

STARTING LANE ?

01 01

The PC is asking the operator to input the starting lane number. Also appearing in the LCD Display will be two numbers, one on the lower left side and one on the lower right side.

These numbers indicate the starting lane number the last time the machine was operated. This number should always match the actual lane you are starting on. This way the machine knows which lane it is on.

To change the starting lane number, push either the **UP ARROW** or **DOWN ARROW**. The number on the lower right hand side of the LCD will change, while the number on the left side will remain the same. (The left number will always remain the same while the right number is being changed until the **ENTER** key is depressed.)

NOTE: When entering the starting lane number, depressing the Left Arrow key on the keypad will automatically SUBTRACT 10 lanes from the displayed starting lane (unless lane #1 is displayed). Depressing the Right Arrow key will ADD 10 lanes to the displayed starting lane (unless the number of the last lane in the center is displayed).

Once you have reached the desired starting lane number, depress **ENTER**. Now both the right and left side numbers should be the same as the new starting lane number you selected. If this is correct, depress the **NEXT** key.

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The following prompt will appear:

```
          LAST LANE ?  
          16                16
```

Now you must input the number of the last lane to be cleaned/conditioned. Appearing with the above prompt will again be two numbers, this time displaying the number of the last lane cleaned/conditioned during the previous run.

If these numbers are incorrect, you must enter the correct number. Using the **UP** or **DOWN ARROWS** again, change the number to the number desired. Once again, only the right side number will change.

NOTE: When entering the last lane number, depressing the Left Arrow key on the keypad will automatically SUBTRACT 10 lanes from the displayed last lane (unless lane #1 is displayed). Depressing the Right Arrow key will ADD 10 lanes to the displayed last lane (unless the number of the last lane in the center is displayed).

Once you reach the desired number, depress **ENTER**, and both numbers will change to the one you selected. If this is correct, depress the **NEXT** key.

At this point, this prompt will appear:

```
          IS THIS CORRECT?  
          01 => 16 PRG 01
```

This means the machine will run lanes 1 through 16 and the cleaning/conditioning program is #1.

If the starting and ending lane information is incorrect, depress the **LAST** key until you return to the starting and ending lane number prompts.

Operators Manual

If the cleaning/conditioning program is incorrect, it will be necessary to access the Managers Menus to change the program selection.

IMPORTANT! The "**Enter**" key **MUST** be depressed to accept starting and ending lane information, even if new starting and ending lane numbers are not needed. If the "**Enter**" key is not depressed in both the starting and ending screens, the machine will not start.

Once all information is acceptable, depress the **START** key.

At this point, this prompt will appear:

```
0000 #01 IS NEXT
0000      0000  01
```

The top line tells the operator two things. The first four digits (on the left) are the amount of time the conditioning valve is on during the forward and reverse travel. This number can be used to trouble-shoot the head travel of the machine. If the head slows down this counter will get larger. When running the same pattern on every lane this number should stay fairly consistent.

The next number tells the operator which lane is the next to be conditioned. This is one of the reasons you should always enter the starting and ending lanes for the actual lanes you will be doing.

The number displayed on the right side of the bottom line is the program being run. The four digit number displayed on the left is the **running time for the current** lane being cleaned/conditioned (in tenths of seconds).

Operators Manual

The four digit number displayed in the center is the total time for the total of all lanes for the cleaning/conditioning run in seconds (all lanes completed and added together). When all the lanes for the programmed run are finished, it converts this to minutes and seconds.

NOTE: If the pump needs to be primed or a first lane test-cleaning is needed, these functions must be chosen at this time. Once the Start Button on the Handle is depressed the ability to use these functions is turned off. Refer to the RUN PREP SECTION of the manual.

At this time WITH THE MACHINE ON THE APPROACH, depress the start button on the handle once. This will lower the cushion roller/cleaning cloth and the squeegee assembly. The vacuum motor along with the lane blower motor will come on (if the program being used calls for the lanes to be cleaned).

Push the machine into the first lane. Depress the start button on the handle again and it will begin operating on the lane.

When the machine finishes the first lane the screen will change to:

**0151 #02 IS NEXT
0000 0000 01**

If the operator stops cleaning/conditioning the lanes prior to finishing the last lane programmed, this screen will display the next lane to be cleaned/conditioned.

This eliminates the chances of a lane being cleaned or conditioned twice or not at all, but only if you enter the proper starting and ending lanes.

When the last lane is completed the screen will display:

**00 LANES DONE IN
0000 MIN 00 SEC**

2. Return to Foul Line Menu

Depress the MENU key until the following appears on the screen:

*** RETURN>FOULINE**

HIT START BUTTON

To return the machine to the foul line, depress the START BUTTON on the handle or the Up Arrow on the keypad. The machine will return to the foul line at about 22 inches per second.

Pressing the button again will stop the machine. When the machine reaches the foul line, if the operator does not stop it, the machine will shut down automatically when the LDS shaft stops turning.

This function also works by pressing the Up Arrow on the keypad instead of the Handle Button.

3. Duster Control Menu

Depress the MENU key until the following appears on the screen:

```
* DUST CTRL&RSET
0400 HIT EXT ENT
```

While this screen is displayed, depressing the **DOWN ARROW** key will unwind a portion of duster cloth; depressing the **UP ARROW** will wind up the duster cloth. If the Up Arrow does not work check the Wind-Up Switch. Input 010 could be stuck or the machine could be in the upright position.

If more cloth needs to be unwound, depress the **START BUTTON** on the handle. By holding down this button the cloth will unwind until you release the button. Pressing the start button on the handle again will wind up the cloth until the wind-up switch is actuated.

This is very handy when changing the duster cloth. With the handle folded over in the transport position the start button is close to the Cleaning Compartment, right where you need it.

To reset the duster cloth counter, depress the **EXIT** then **ENTER** keys while this screen is displayed. Be certain to perform this procedure each time a new roll of duster cloth is installed.

When reset, the counter will read "**0400**", the average number of lanes that a roll of cloth will last. It also resets the present unwind time of the duster cloth back to the default time.

The *unwind time* is the time the unwind motor is ON to let out duster cloth. While running the machine, this time value increments up one-tenth of a second every **35** conditioning or cleaning runs. Every **80** lanes the *wind-up* time decrements one-tenth of a second. These time values are needed to compensate for the changing size of the duster cloth rolls. The fresh roll gets smaller and needs more time, while the used roll gets larger and needs less time.

Operators Manual

The purpose of this is to let out the same amount of cloth every lane. The machine must also unwind enough cloth to allow the cushion roller arms to drop far enough to actuate the **failsafe switches** located under the cushion roller pivot arms. This signals the machine to stop and reverse at the end of the pindeck.

IMPORTANT WARNING!! It is imperative that the duster counter is not reset before the cloth is changed. If this is done, the unwind time will also be set back to the default. This will cause less cloth to be unwound per run.

A partially used supply roll is smaller in diameter than a fresh roll. When running the machine the cushion roller will not be able to drop far enough off the end of the pindeck to depress the fail-safe switch. **This may cause the machine to run off into the pit area.**

Another problem which may occur is **bad stripping**. This may happen if the cloth is not fully contacting the lane.

These problems can be corrected without changing to a new roll of cloth. In the Managers Menu area under the menu "**SYSTEM CONTROL DUSTER**" the first and second unwind times can be increased.

When power is applied to the machine, if the amount of cloth remaining is less than the number of lanes in the center, the screen will flash the following:

DUST ALMOST OUT
0000 LANE WARNING!!

The remaining number of lanes of cloth will be displayed in the numbers below the message.

Operators Manual

The machine can be operated if this counter decreases to zero and there is still cloth left in the machine. When the supply cloth runs out, the number of additional lanes completed should be noted and the default number of lanes changed in the Managers Menu selections under "SYSTEM CONTROL DUSTER".

Once the cloth runs out the screen will display the following:

**ERROR!! DUSTER
0000 CLOTH EMPTY**

The cloth will need to be replaced to continue operating.

4. Pump Output Volume Tests

Depress the MENU key until the following appears on the screen:

*** PUMP OUTPUT**
VOLUME TESTS

With these menus you will be able to find out exactly how much oil you are using on each lane in Milliliters or Cubic Centimeters (cc).

You can calculate how much oil is being applied per board for every board on the lane, and how much oil is being pumped out by each revolution of the Metering Pump.

- A.** Hit the NEXT key and the following menu will appear:

TEST: PROGRAM#01
FWD OIL VOL.<-->

In this menu you can test the exact quantity output of both forward oil and reverse oil separately. This can be done for any of the 7 programs presently in the memory of the PC.

Using the Up and Down Arrows will change the number in the upper right corner of the screen. This will automatically select that program, you will not need to hit Enter.

1. Place a clean 25 or 50 ml graduated cylinder under the OIL CALIBRATION OUTLET on the left rear of the machine.
2. Depress the **LEFT** arrow. This will start the pump running and turn on the OIL TEST VALVE. If the machine is cold let the pump run for approximately 30 seconds.

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3. Then depress the **RIGHT** arrow. The Oil Head will start running back and forth across the roller as if the machine were operating on the lane. The Oil Program Valve will be turning on and off.

With the Oil Test Valve ON, the oil will be routed to the graduated cylinder instead of onto the rollers. When it finishes the FWD run, the upper left corner of the screen will switch to REV. This designates that the next test will be the reverse oil program.

4. Note the amount in the graduated cylinder.
5. Now depress the **LEFT** arrow again, wait 5 seconds, and press the **RIGHT** arrow. The Oil Head will start running again and the programmed amount for the reverse oil will now be dispensed into the graduate.

Note: How to calculate the actual amount of conditioner that each program should dispense is explained in the beginning of **Section VIII - Oil Patterns**.

IMPORTANT! If different readings occur during calibration there may be a problem with the oiling head as it travels across the width of the machine. During calibration, the oil is dispensed while the head travels from one side to the other. If the head binds up and travels too slowly, more oil will be dispensed and the readings will be higher (since pump runs at constant speed). Make sure the head moves freely on the rectangular bar. Only a slight resistance of the motor gearbox should be felt when the head is moved by hand. However, there should not be excessive play or wobble in the oiling head. A small flat-head screw acts as a tensioner for the head. After cleaning and lubricating the bar, adjust this tension if needed. Make a habit of cleaning the lint and hair from the head after running the machine to avoid this problem.

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B. Depress the **NEXT** key and the following menu will appear.

TEST: VOLUME PER

BOARD HIT: <-->

This menu is used for calibrating the amount of oil applied per board per pass of the Oil Head.

1. Place a clean 25 or 50 ml graduated cylinder under the Oil Calibration outlet.
2. Depress the **LEFT** arrow and wait about 5 seconds. The pump will turn on and the Oil Test Valve will turn on.
3. Depress the **RIGHT** arrow. The Oil Head will start traveling and the oil for **100 boards** will be dispensed into the graduate. Standard setting will be 40 microliters per board.
4. The amount in the graduated cylinder should be **4 milliliters**. The math is simple: 100 times 40 is 4000. This is divided by 1000 microliters to convert the amount to Milliliters. The result is 4 milliliters.

C. Depress the **NEXT** key and the following menu will appear.

**TEST:VOL PER REV
FOR 0000 REVS**

This Menu measures the RPM of the pump. It is used to make sure the pump and motor are warmed up and running at a consistent speed.

This test can be run just before the machine is used each day. Run the test 3 or 4 times until the actual number of revolutions comes out the same each time.

**IT IS ESPECIALLY IMPORTANT
TO RUN THIS TEST IN COLD AREAS OR
WHEN USING VERY HIGH VISCOSITY OILS.**

1. Place a small container under the Oil Calibration outlet.
2. The pump runs automatically when put in this menu.
3. Depress the LEFT arrow and the pump motor will run approximately **480-510** revolutions (at 60 Hz). This menu is important to make sure the pump is running at a consistent speed.

F. Operator RUN/PREP Options

The operator of this equipment is given two RUN PREPARATION Options that can be selected prior to running the machine on the first lane.

NOTE: The RUN/PREP Option **MUST** be selected prior to pressing the Start Button on the Handle.

The RUN/PREP keys are located on right hand side of the keypad.

Once the Starting and Last Lanes have been chosen and the Start key on the keypad has been depressed the following prompt will be displayed:

```
0000 #01 IS NEXT
0000      0000 01
```

At this time either one of the RUN/PREP options can be activated.

1. Prime Pump

NOTE: *If the PRIME PUMP option is going to be used the machine should first be pushed onto the lane surface. This will insure that cleaner is not sprayed onto the approach where the cleaner may damage the approach finish.*

Pressing the PRIME PUMP key will activate the pump motor. This key can be pressed more than once to check the spray pattern and insure proper flow of cleaner from the spray tips.

2. Test Clean

The TEST CLEAN option is available to the operator when cleaning and conditioning are being done simultaneously.

When the TEST CLEAN key is pressed the keypad display will change to:

TEST CLEAN #01
0000 0000 01

The TEST CLEAN key will separate the simultaneous run into a separate run, with the machine stopping at the foul line after cleaning. The machine will perform the TEST CLEAN function using the same speed settings as programmed for the conditioning run. Press the START button on the handle to test clean the lane.

At this time the screen will display:

NOW TO OIL #1
HIT START BUTTON

At this point the stripping of the lane can be examined to ensure cleaning is still adequate.

The Start Button on the HANDLE will need to be pressed a second time for the machine to condition the lane. Once the first lane is completed the display will return to the normal display for the second lane.

THIS CONCLUDES ALL MENUS AND FUNCTIONS
ACCESSIBLE WITHIN THE OPERATORS MENUS!

G. Managers Menu Selections

The operation of the machine is controlled by a series of programs located within the memory of the programmable computer. These programs and settings may be changed or modified by following a simple sequence of prompts within the available menus displayed on the keypad. This section will lead the Manager step-by-step through menus and prompts.

TO ACCESS THE FOLLOWING MENU SELECTIONS, IT WILL BE NECESSARY TO INPUT THE MANAGERS PASSWORD!

The Managers Password is a series of three key entries on the keypad which will allow access to the machine's Manager Menus. To enter the password, the keypad LCD must be displaying the **DUST CTRL & RSET** screen.

The factory-set password information will be given to the Manager by the Authorized Technician during the machine's installation.

To have the Managers Password changed, please contact your Authorized Distributor or The Kegel Company, Inc.

In addition, there is a second password to protect the Change Program Settings Menus within the Manager's Menus. It will be necessary to have both passwords to make changes to the machine programs.

The following numbers can be used when changing Password #1 (Manager): 1, 3, 4, 6, 7, 8, and 9.

The following numbers can be used when changing Password #2 (Change Program): 1, 2, 3, 4, 6, 7, 8, and 9.

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To make this section easily understandable, the Manager should be familiar with the keypad as detailed in Section II of this manual.

1. Override Auto Program

This menu allows the Supervisor to override the Auto Program Selection and enter a manual program selection for the current conditioning run.

When the Managers Password is first entered, the following screen will appear:

```
* OVERRIDE AUTO
01 PROGRAM 01
```

The number 01 will be displayed with this prompt, one on the lower right side of the display and one on the lower left. Use the **UP or DOWN ARROWS** to change the program number. When the desired program number is reached, press the **ENTER** key.

This concludes the OVERRIDE AUTO PROGRAM menu.

NOTE: Programs selected in the Override Menu will only override the normal Auto Program selection for one cleaning/conditioning run, whether it is the entire center or only a portion. Once all designated lanes have been cleaned/conditioned, or if machine has been stopped and "starting" and "ending" lane numbers have been re-entered, the program used will revert back to the Auto Program Selection.

2. Change Program Settings

Seven (7) factory-preset cleaning and/or conditioning patterns are stored in the computer's memory. These preset programs may be altered in the CHANGE PROGRAM SETTINGS menu. This menu cannot be accessed without entering the Manager's Secondary Password. Password #1 allows operators to enter the Managers Menus, but the Program Settings are protected by a second password.

To see a sample graph and default settings for each of the patterns applied by the programs, please see the Section IX in this manual.

To continue within the menu, depress **NEXT**. The following prompt will appear:

```
* CHANGE PROGRAM
01 <CHOOSE> 01
```

Along with this prompt will appear two numbers, one on the lower left side of the display, and one on the lower right. Both numbers will display the current program number.

To change the program number, use the UP or DOWN ARROWS. The number on the right side of the display will change. When the correct number is reached, depress the ENTER key. At this time, both numbers on the display will be the same as the program number you selected.

WARNING! If **ENTER** is not depressed the program will revert back to what was in the left corner, and you will be changing a different program than you intend.

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To continue within the menu, depress **NEXT**. The following prompt will appear:

<1:CLEAN 2:OIL>
03 <3:BOTH> 03

The number displayed will indicate whether the lanes are going to be (1) cleaned only, (2) oiled only, or (3) both cleaned and conditioned when this program is used.

To select cleaning only, oiling only, or both, use the UP or DOWN ARROWS. The number on the right side of the display will change. When the correct number is reached, depress the ENTER key. At this time, both numbers on the display will be the same.

NOTE: During a Cleaning Only Program, the travel speeds and shift points can be controlled by entering "phantom loads". To make the machine shift speeds at a specified point, **set the speed** and then enter loads until the prompt shows the desired footage for the shift point. This also works when the machine is set to clean and oil separately. The machine will automatically travel at 30 IPS after it has reached the Oil Pattern Distance. The pattern distance can be increased up to 55 feet.

To continue within the menu, depress ENTER and then NEXT. The following prompt will appear:

<1:SIMULTANEOUS>
01<2:SEPARATE>01

This screen allows the option of cleaning and oiling the lane (2) separately, or (1) at the same time.

NOTE: If cleaning only or oiling only has been selected, this prompt will be forced to separate.

To select simultaneous or separate, use the UP or DOWN ARROWS. The number on the right side of the display will change. When the correct number is reached, depress the ENTER key. At this time, both numbers on the display will be the same.

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To continue within this menu, press the **NEXT** key and the following prompt will appear:

START CLEANING

00 DISTANCE 00

This prompt will be displayed with two numbers showing the current distance to begin cleaning. To change this distance, use the UP or DOWN ARROWS. Once again, the right side number will change. Once the correct distance is reached, depress ENTER and both numbers will display the new distance.

NOTE: For full lane cleaning, the Start Cleaning Distance should be set at "00". For back-end cleaning, enter the distance where cleaning should begin.

The duster cloth will not drop until the Start Cleaning Distance is reached. The first spray of cleaner will also be delayed on a back-end cleaning run to allow the squeegee time to lower into position.

To continue within this menu, press the **NEXT** key and the following prompt will appear:

END CLEANING

730 DIST 730

This prompt will be displayed with two numbers showing the current distance to end cleaning. The lower limit of this value is based on the oil pattern distance. The machine will not stop cleaning before it has reached the end of the oil pattern.

The upper limit of this menu is 750. If the End Cleaning Distance is too high, the machine may go too far into the pit. Use the Up or Down Arrows to adjust the value.

When setting this distance allow a margin of error for forward travel. Do this by starting the machine a couple of inches past the foul line. This may cause the machine to stop short during the return travel, but it is easier to pull the machine onto the approach, than it is to pull it out of the pit. Once this value is determined all programs should be changed to this setting.

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NOTE: As a check to determine whether the failsafe switch or the travel distance counter is reversing the machine, use the following steps:

1. Once the operator has pressed the Start Key (but not the button on the handle), press the **Monitor** key.
2. The keypad display will change and display the **Pindeck Distance** in the lower left corner and the **Failsafe Distance** in the lower right corner.

Operate the machine down the lane. Check the keypad display as the machine is returning to the foul line. The setting that "tripped" will display "0" indicating that this distance was met. Once the machine reaches the foul line this display will switch back to normal display.

A diagram in Section 5 shows the proper location of the machine when it stops in the pindeck. Refer to this drawing to confirm the correct End Cleaning Distance. To change the display back to the Operators Menu, press the **Monitor** key once again.

If the numbers shown are correct, depress the **NEXT** key. The following prompt will appear:

SPRAY ON TIME

04 IN TENTHS 04

This prompt, along with the two numbers displayed, is referring to the amount of time for the spray to be "ON" each time cleaning solution is sprayed. (NOTE: The number shown refers to "tenths" of seconds. For example, "04" is actually 0.4 seconds.)

To change the time, use the UP or DOWN arrow keys. Once again, the right side number will change. When the correct number is reached, depress ENTER and both numbers will display the new "Spray On Time".

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If this number is correct, depress **NEXT** and the following will appear:

SPRAY OFF DIST.
30 IN INCHES 30

The two numbers displayed on this screen refer to the amount of DISTANCE between sprays. (NOTE: The number shown refers to INCHES. For example, "30" is actually 30 INCHES between spray pulses.)

To change the time, use the UP or DOWN arrow keys. Once again, the right side number will change. When the correct number is reached, depress ENTER and both numbers will display the new "Spray Off Distance".

IMPORTANT!

Correct adjustment of the "Spray On" times and "Spray Off" distances is critical to proper cleaning. For example, if a film remains on the outer boards of the lane, a decrease of the "off" distance and an increase of the "on" time, or both, may be needed. The center jets may also be adjusted if a film remains in the center of the lane.

If this number is correct, depress **NEXT** and the following will appear:

LAST SPRAY DIST
45 IN FEET 45

The number displayed will refer to the distance in feet down the lane at which no more sprays of cleaner will be made. To change this distance, use the UP or DOWN arrows. Once the correct distance is reached, depress ENTER and both numbers on the display will reflect the new Last Spray Distance.

NOTE: When cleaning the lanes a new option for a pindeck spray has been added to the program. The machine will now place an additional spray just in front of the pindeck to insure it is well-cleaned. This allows the last spray distance to be reduced (as short as the oil pattern distance) if desired.

THIS CONCLUDES THE CLEANING PORTION OF THE PROGRAM, TO MAKE CHANGES TO THE OILING PORTION OF THE PROGRAM FOLLOW THE STEPS ON THE FOLLOWING PAGES.

NOTE: These selections will allow the operator to change the load size, the number of loads, the speed, and each menu of the selected conditioner program.

To continue within this menu, press the **NEXT** key and the following prompt will appear:

**OIL PATTERN DIST
37 IN FEET 37**

This prompt will be displayed with two numbers showing the current travel distance (buff out) for the conditioning portion of the program selected. To change this distance, use the UP or DOWN ARROWS. Once again, the right side number will change. Once the correct distance is reached, depress ENTER and both numbers will display the new travel distance.

IMPORTANT NOTE: If the UP or DOWN arrows are depressed in this screen, then all conditioning menus, both forwards and reverses, must have the **ENTER key depressed 4 times** before the NEXT key will take you to another menu or the program change area can be exited. This will insure that overlapping load screens do not occur.

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If this is correct, depress the **NEXT** key. The following prompt will appear:

01F 2L- 2R X 03

00->03 FT IPS=14

01F is the menu number for the first load screen for forward oil. There are 15 possible load screens for forward oil. If the oil pattern distance is reached in less than 15 screens, then the remaining screens will not be shown.

The next item **2L -> 2R** designates the load (the length of the stream of oil applied to the main transfer roller) will run from the 2 board on the left to the 2 board on the right.

The next item **X 03** determines how many 2 to 2's will be applied, in this case it is 3. On the bottom line the **00 -> 03 ft IPS =14** says that the machine will travel from 0 ft (the foul line) to 3 ft at 14 inches per second (IPS).

When the screen is first displayed, the left load size designator **2L** will be blinking. This means it is the one that can be changed.

By depressing the UP ARROW once the 2L will increment to 3L. It is possible to increment this value to as close as **3 boards** away from the right side designator 2R. When the desired left side load designator is reached depress ENTER and the right side designator 2R will begin blinking (kind of like a digital watch).

The blinking designator indicates the right load limit is ready to be changed. Use the Up or Down arrow until you reach your desired number, then depress ENTER.

Now **03** will begin blinking, Up or Down arrow this to the number of loads you want and depress ENTER.

Two things will now happen: 1)The **IPS** number will begin blinking, and 2)the **distance** it takes for that load screen will re-calculate.

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For example, if you increase the load number from 3 to 4 the 00 -> 05 ft will change to 00 -> 07 ft. Since the 14 in IPS=14 is now blinking you now may Up arrow or Down arrow the speed.

The speed choices you have are 10, 14, 18, 22, 26, and 30. When the desired speed is reached depress ENTER. This will be entered into memory.

Note: Speed changes should be an even flow from slower to faster from one screen to the next. Speed changes will control the lengthwise taper of the pattern. They also allow the operator to add-in more loads and still have the last load be within the oil pattern distance.

The left side load designator will now begin blinking again. Also if the speed is changed it will recalculate the area of the lane for that load sequence.

For example, if you have 4 loads at 14 inches per second, the area of the lane for that load sequence is 00 -> 07 feet and you change the speed to 18 inches per second, the area for that load sequence will change to 00 -> 10 ft.

During a Cleaning Only Program, the travel speeds and shift points can be controlled by entering "phantom loads" into these screens. To make the machine shift speeds at a specified point, **set the speed** and then enter loads until the prompt shows the desired footage for the shift point.

Note: The machine will automatically travel at 30 IPS after it has reached the Oil Pattern Distance. The pattern distance can be increased up to 55 feet.

ENTER may be depressed as many times as you want. Depressing ENTER simply steps the blinking variable from one to the next. In the future we will refer to this as "Entering Around", but remember only the variable that is blinking will be changed with either the Up or Down arrow at any given time.

If the Up or Down arrow is depressed while in this menu, the enter key must be depressed 4 times before the NEXT key will let you into the next load screen.

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Now hit the **NEXT** key. The following menu prompt will appear:

02F 9L- 9R X 02
07->10 FT IPS=14

The 9L will be blinking. In the previous screen we left with the load area at 00 to 07 feet, the beginning screen in the second screen forward begins with the ending distance of the previous screen. The area for this screen is calculated from the number of loads and the speed.

Any changes here are performed the same way the first changes were entered. Remember you must depress the ENTER key 4 times before you may use the NEXT key to go into the third screen.

Depress **NEXT** and the following menu will appear:

03F 10L-10R X 02
10->16 FT IPS= 22

You may now change this screen to anything you want. Remember you must depress enter 4 times after any changes of load number or speed before you may use NEXT to enter the next load screen.

Depress **NEXT** and the following menu will appear:

04F 11L-11R X 05
16->31 FT IPS=22

You may now change this screen to anything you want. Since the area for this load screen is getting close to the overall oil distance set previously ... there is one more rule.

* Remember the area for the each load is calculated with the ending distance of the previous load screen. This is the starting distance for each successive screen.

The ending distance is calculated with the number of loads versus the speed the machine is programmed to travel. This is added to the starting distance for each screen.

When changing the number of loads, the program will not allow you to increment the number so that it takes the ending distance beyond the oil travel distance. It won't let you increase the speed so that it takes you beyond the oil pattern distance either. There is an important reason for this.

Remember to hit **ENTER** 4 times. Depress **NEXT** and the following menu will appear:

05F 12L-12R X 00
31->38 FT IPS=22

The **last load screen forward must have a 00** for the number of loads. This screen is the buffer distance control. It is a real good idea to always **end all loads at least 4 feet** before the end of travel. This gives time for the last load to get from the roller to the lane.

When 00 for the number of loads is entered and **ENTER** is depressed on the speed variable, the next blinking variable will now be the ending distance for that screen.

It is possible to increment it up to the travel distance. When the oil travel distance is reached as the ending distance for the screen you are in, it concludes the oil forward screens. Even though 15 screens are possible, the program will show only those needed to reach the travel distance.

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Note: If you were to go into the screen with the last oil distance to increment the number of loads from 0 to 1, the program will not allow you to increase the number of loads until you "enter around" to the travel distance and decrement it. Use the down arrow to change it to something less than the oil pattern distance. You may then enter around to the number of loads and change it.

Don't forget you must hit ENTER 4 times after changing any speed or number of loads. If you do this it will open up another forward screen when you depress the NEXT key.

The number of loads will be 00 automatically and the ending distance could be anything above the oil travel distance (or even below the starting distance of that screen). Be very careful in this instance. Be sure and enter around and increment the distance up or even down to the oil distance.

If each screen going forward does not flow from the foul line to the travel distance, the machine will not function properly. Overlapping load areas are only possible when opening up new screens previously not used.

It is also possible to make the machine have loads right up to the travel distance. This is not recommended. You should set the program so that it has at least 4 feet of buff only. In other words you should have it finish loading at least 4 feet before the oil travel distance. The last screen forward should be 0 loads.

After applying the conditioner loads for the forward pass, the machine will continue down the lane (when cleaning) and enter the pindeck area at a speed of 10 inches per second. This slower speed gives the vacuum a better chance to pick-up the cleaner and oil.

During the reverse travel the machine will shift speeds twice in the pindeck area; once into 14 inches per second, then into 22 ips, before shifting into high speed. This will allow the operator time to work the cord around obstructions, or get out of the way when resuming the machine. (These slower cleaning speeds were added with version 9.93.)

RETURN OIL SCREENS

When the last screen forward has been entered you may now proceed to the next screen.

Depress **NEXT** and the following menu will appear:

01R 10L-10R X 00
38->10 FT IPS=56

Notice the screen number is now 01 again and the F has changed to an **R** (meaning reverse). The area for load screen now starts at the oil travel distance and goes down.

The IPS=56 inches per second. It is possible to go high speed (56 inches per second) in the first screen in reverse only.

The first screen in reverse must be a buff only (0 loads) for at least the first 1 foot of return travel. The last screen in reverse should be 0 loads for at least 4 feet before the foul line (just like the last screen forward).

The transfer roller motor will not come on during the first reverse load. This allows the machine to apply a flat load of oil across the width of the transfer roller before it begins to turn.

NOTE: *If the machine does not oil in reverse at all, check the **01R** screen for loads within the first foot of return oil travel. Remove any loads to change the screen to a buff only for at least 1 foot.*

To move to the next load, remember to depress the enter key 4 times to allow yourself to the next screen. Depress **NEXT** and the following menu will appear:

02R 8L- 8R X 03
10->05 FT IPS=14

You may now change this screen to anything you want.

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Depress **NEXT** and the following screen will appear:

03R 8L- 8R X 00
05->00 FT IPS=14

Remember the last screen in reverse should always end a minimum of **4 feet** before the foul line (or 0 feet). If more than 2 or 3 loads are set for reverse, then end the loads even sooner.

If you don't want the loads to affect the oil pattern on the next lane, then you must pay attention to where the loads end, and how far the machine can travel as it buffs to the foul line.

There are also 15 screens possible in reverse. Normally you will only use the reverse oil to beef up the lay down and or skid area in the first 10 to 20 feet of the lane. Do this with 3 or 4 loads at a slower speed.

Note: When the 15th screen is reached, going forward or reverse, the number of loads is forced to 0. The load area last distance is forced to the oil distance going forward, and forced to 0 when going in reverse.

Depress **NEXT** and the following menu will appear:

YOU MAY NOW
EXIT PROGRAM CHG

In this screen you may exit to the Operators Menu or hit Menu to go into some other Managers Menu.

3. Change Auto Program Select

To reach this menu, depress the MENU key in the Managers area until the following screen appears:

*** CHANGE AUTO
PROGRAM SELECT**

This menu allows the supervisor to choose the specific conditioning programs to be used for each day of the week within each time period of the day. It also allows the flexibility to change conditioning patterns up to a maximum of **3 times** per operation across the center.

The "real time" clock in the machine's PC keeps track of the time of day and will run the program selected for that specific time period. The time periods are not broken down by the hour, but rather are separated into two time categories, AM and PM.

For example, a conditioning program selected for Monday AM means that operation of the machine any time between 12:01 AM and 12 Noon will apply that selected conditioner program.

To continue within this menu, depress the **NEXT** key and the following prompt will appear:

**MON AM01 PROG 01
LANES 01 THRU 16**

When this screen first appears the current program number will flash on and off, designating that the selection being made will be for the program number. Use the UP or DOWN ARROWS to select the number, and depress ENTER once it has been reached.

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At this point the last lane number will flash. Again use the UP or DOWN ARROW to select the number, depressing ENTER when it has been reached.

NOTE: At any time during this section, if the last lane number for the AM or PM setting is equal to the total number of lanes in the center, the remaining program screens will be skipped. The display will change to the next 1st screen (AM or PM). The number of lanes in the center sets the upper limit in the Auto Program Select Menus.

Press **NEXT** and the following screen will now appear:

MON AM02 PROG 02
LANES 17 THRU 32

When this screen first appears, the current program number will flash on and off. Use the UP or DOWN ARROWS to change the program number, and depress ENTER once it has been reached.

At this point again, the last lane number will flash. (The first lane number will automatically be one more than the last lane selected in the previous menu screen.) Use the UP or DOWN ARROW to select the correct number, depressing ENTER when it has been reached.

Press **NEXT** and the following screen will now appear:

MON AM03 PROG 01
LANES 33 THRU 50

Again the program number will flash. Select the correct number by using the UP or DOWN ARROW. (The last lane will automatically be displayed as the last lane in the bowling center for the 3rd change.)

Operators Manual

Depress **ENTER** and **NEXT** and the following screen will appear:

MON PM01 PROG 01
LANES 01 THRU 50

Continue through these screens using the same procedure for entering numbers as explained previously for Monday AM.

The manager will have the opportunity to select programming for the following days and times:

Displayed Prompt Day / Time:

MON AM (1 through 3) Monday, 12:01 AM - 12 Noon

MON PM (1 through 3) Monday, 12:01 PM - Midnight

TUES AM (1 through 3) Tuesday, 12:01 AM - 12 Noon

TUES PM (1 through 3) Tuesday, 12:01 PM - Midnight

WED AM (1 through 3) Wednesday, 12:01 AM - 12 Noon

WED PM (1 through 3) Wednesday, 12:01 PM - Midnight

THURS AM (1 through 3) Thursday, 12:01 AM - 12 Noon

THURS PM (1 through 3) Thursday, 12:01 PM - Midnight

FRI AM (1 through 3) Friday, 12:01 AM - 12 Noon

FRI PM (1 through 3) Friday, 12:01 PM - Midnight

SAT AM (1 through 3) Saturday, 12:01 AM - 12 Noon

SAT PM (1 through 3) Saturday, 12:01 PM - Midnight

SUN AM (1 through 3) Sunday, 12:01 AM - 12 Noon

SUN PM (1 through 3) Sunday, 12:01 PM - Midnight

This concludes the program selections that can be used for the AUTO PROGRAM SELECT feature.

4. System Control Cleaning

This series of screens will be used to adjust various cleaning features in the machine's program.

Depress the MENU key until the following screen appears:

*** SYSTEM CONTROL
CLEANING**

Depress the NEXT key and the following will appear:

**FIRST SPRAY TIME
04 TENTHS 04**

This prompt allows the operator to set how long the First Spray of Cleaning Solution will occur. Use the UP or DOWN ARROW to change the number on the right side of the screen. When the desired time is reached, depress ENTER.

Depress the NEXT key and the following will appear:

**LIFT DUSTER
0030 ADJUST 0030**

This prompt allows the operator to set where the machine will lift the duster. This feature can be used to lift the cushion roller before reaching the end of the pindeck. Lifting the duster early may help eliminate excessive moisture from being pushed off the tail plank. Make sure the travel distance is set properly to reverse the machine when the cushion roller is lifted early. Lifting the cushion roller early will prevent the failsafe switches from reversing the machine.

The numbers on the second line of the display are the number of counts from the end of the travel distance where the duster will lift. Use the UP or DOWN ARROW to change the number on the right side of the screen. When the desired number is reached, depress ENTER.

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Depress the **NEXT** key and the following will appear:

PINDK SPRAY DIST

0050 ON 0050

This prompt allows the operator to add an extra spray of cleaner as the machine enters the pindeck. This will help ensure the proper amount of solution is available to clean the pindeck. If too much cleaning fluid is used on the pindeck, moisture may be pushed off the tail plank. Use this menu to control if, and where the pindeck spray occurs.

The number on the second line of the display is the number of counts from the end of the travel distance where the pindeck spray will occur. If the spray is going into the pit the pins should not be on the deck.

Use the UP or DOWN ARROW to change the number on the right side of the screen. When the desired number is reached, depress ENTER.

The middle of the second line shows whether the spray is ON or OFF. To change this setting press the ON/OFF key located in the TEST I/O Section of the keypad.

Depress the **NEXT** key and the following will appear:

PAUSE AND SUCK

00 TENTHS 00

Don't Laugh! This prompt allows the operator to stop the machine momentarily in the pindeck to allow the vacuum to collect more fluid. By stopping the machine, less fluid is present in the pindeck to be pushed off the back of the tail plank. Use this menu to control how long the machine pauses to extract moisture.

The numbers on the second line of the display are in tenths of a second. The machine will not stop with a setting of 00. Use the UP or DOWN ARROW to change the number on the right side of the screen. When the desired time is reached, depress ENTER.

This concludes the selections in the
SYSTEM CONTROL CLEANING menu.

5. System Control Distance

This series of screens will be used to adjust various travel distances in the machine's program.

*** DO NOT ADJUST THE SETTINGS ACCESSED BY THESE SCREENS UNLESS ABSOLUTELY NECESSARY!!**

Depress the MENU key until the following screen appears:

*** SYSTEM CONTROL
DISTANCE**

Depress the NEXT key and the following will appear:

**RETURN FOUL LINE
0008 ADJUST 0008**

This prompt allows the operator to adjust the travel distance of the machine as it travels from the pindeck to the foul line. The number on the second line of the display reduces the travel counts to prevent the machine from hitting hard at the foul line. As the number in this menu gets larger the machine will travel shorter during return.

Use the UP or DOWN ARROW to change the number on the right side of the screen. When the desired number is reached, depress ENTER.

Depress the NEXT key and the following will appear:

**FAIL SAFE DIST
0003 INCHES 0003**

This screen is used to determine how far (in inches) the machine will travel forward after the failsafe switches are actuated. This menu is needed to ensure the squeegee gets all the way off the tail plank.

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This prompt tells the operator that the machine will move "03" inches forward after the PC receives a signal from the failsafe switches. The machine must travel this distance at 10 inches per second.

The value can be set as high as 12 inches.

CAUTION: Setting the value too high will cause the machine to travel into the pit and not reverse.

Use the UP or DOWN ARROW to change the number on the right side of the screen. When the desired number is reached depress ENTER.

Depress the **NEXT** key and the following will appear:

VACUUM DIST
20 OFF FOR 20

This screen is used to determine how long the vacuum motor will turn off as the machine returns to the foul line. This prompt tells the operator that the machine will move 20' in reverse with the vacuum OFF. At that point the vacuum motor will turn ON for the rest of the travel distance.

If dripping appears on the lane in reverse, the distance it remains OFF may have to be reduced.

This concludes the selections in the
SYSTEM CONTROL DISTANCE menu.

6. System Control Buffer

This series of screens will be used to adjust the distance on the lane in forward or reverse, where the buffing brush is lifted or set down.

Depress the MENU key until the following screen appears:

*** SYSTEM CONTROL
BUFFER**

Depress the NEXT key and the following will appear:

**BUFF UP STP DELY
00 TENTHS 00**

The machine is designed to allow the operator to stop the machine at the end of the oil pattern and lift the buffing brush for a defined oil line. We recommend that this be left at 00 because it is easier on the drive system, and it allows a short feathering out of the oil pattern.

This prompt displays the amount of time the machine will be stopped prior to continuing down the lane. Use the UP or DOWN ARROW to change the number on the right side of the screen. If you want a clean defined oil line, then set this variable to 04 or 05. Less will not give the clean line and more is a waste of valuable time.

What must be done here is really up to the interpretation of your local ABC lane inspection representative. It depends on where they choose to take the graphs of the oil pattern. If the representative insists on taking the tape in the last 12" of the pattern, you will need to enter a stop delay value so the machine has a clean line for them to measure from.

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Depress the **ENTER** and then the **NEXT** key and the following will appear:

DROP BUFFER ADV
50 INCHES 50

The machine is designed to lower the Buffing Brush during a simultaneous cleaning and conditioning run when return oil is being applied. It will be traveling at 54-56 inches per second in high speed. For the Buffing Brush to contact the lane at the programmed distance, it must start lowering prior to reaching that distance.

By changing this setting the brush will be lowered onto the lane at, prior to, or after the designated conditioning distance.

The Voltage Supply in the bowling center ultimately determines the final high speed of each machine. Simply watch the operation of the buffer as it is returning from the pindeck. Adjust the *Drop Buffer Advance* until the buffer turns on at the desired location in reference to the end of the oil pattern.

Use the UP or DOWN ARROW to change the number on the right side of the screen. When the desired number is reached, depress ENTER. The factory default for this parameter is 50.

This concludes the selections in the
SYSTEM CONTROL BUFFER menu.

7. System Setup Clock Menus

This series of screens will allow the operator to change the clock settings.

Depress the **MENU** key until the following screen appears:

```
* SYSTEM SETUP
      CLOCK
```

Depress the **NEXT** key, the following screen will appear:

```
      SET CLOCK TIME
00   MINUTE   00
```

Once this screen is entered the internal clock will stop. Use the UP or DOWN ARROWS to change the number displayed on the right. When the number displayed is correct press ENTER. Both numbers displayed will be the same.

Depress the **NEXT** key, the following screen will appear:

```
      SET CLOCK TIME
00   HOUR     00
```

Use the UP or DOWN ARROW to change the number on the right side of the screen. When the desired hour number is reached, depress ENTER.

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Depress the **NEXT** key, the following screen will appear:

SET CLOCK DAY
00 OF MONTH 00

Use the UP or DOWN ARROW to change the number on the right side of the screen. When the desired day number is reached, depress ENTER.

Depress the **NEXT** key, the following screen will appear:

SET CLOCK
00 MONTH 00

Use the UP or DOWN ARROW to change the number on the right side of the screen. When the correct month number is reached, depress ENTER.

Depress the **NEXT** key, the following screen will appear:

SET CLOCK
00 YEAR 00

Use the UP or DOWN ARROW to change the number on the right side of the screen. When the desired year number is reached, depress ENTER.

Operators Manual

Depress the **NEXT** key, the following screen will appear:

SET CLOCK DAY

00 SUNDAY 00

Use the UP or DOWN ARROW to change the day code on the right side of the screen. When the desired code number is reached, depress ENTER.

Use the following guide for the day codes:

SUNDAY	00
MONDAY	01
TUESDAY	02
WEDNESDAY	03
THURSDAY	04
FRIDAY	05
SATURDAY	06

This concludes the selections in the
SYSTEM SETUP CLOCK menu.

8. System Control Duster Menus

This series of screens will be used to adjust the duster unwind and default times. It is also possible to change the default number of lanes that a new roll of cloth will clean.

Press the **MENU** key until the following screen appears:

*** SYSTEM CONTROL**
DUSTER

Press the **NEXT** key, the following screen will appear:

PRESENT UNWIND
09 TIME 09

This screen will display the current unwind time setting for each "ratchet" of cloth. This number will automatically increase as the size of the supply cloth roll decreases. This value will return to the default setting when a new roll of cloth is installed and the cloth counter is reset.

This prompt is referring to the amount of time in tenths of seconds. The "09" is actually 0.9 seconds. The time can be adjusted by using the UP or DOWN ARROWS. When the desired time is reached, press ENTER.

NOTE: Resetting the DUSTER counter prior to the roll of cloth being empty could reduce the cleaning efficiency of the machine. The cushion roller must be allowed to drop far enough to contact the lane. In this menu it is possible to correct the present unwind time if one of your pinchasers has presented you with this problem.

The unwind time varies from 09 for a fresh roll to 21 for an almost empty roll. If accidentally reset, use an educated guess on how much of the roll is already used and set your time accordingly. EXAMPLE: If the roll is about half used then set the time to 15.

Operators Manual

Press the **ENTER** and then the **NEXT** key, the following screen will appear:

DEFAULT UNWIND
09 TIME 09

This screen displays the default time for unwinding the duster cloth. This is the unwind time for the cloth when a new roll is installed and the duster counter is reset.

If the value is increased, more cloth will be unwound. If the value is decreased, less cloth will be unwound.

Changes can be made to this number by using the UP or DOWN ARROWS. Use ENTER to lock in any changes.

Press the **ENTER** and then **NEXT** key, the following screen will appear:

DUST EMPTY # LNS
0400 ADJUST 0400

This screen displays the default number of lanes that a new roll of cloth will complete. When the duster counter is reset, after installing a new roll of cloth, this is the value that will be displayed.

If changes have been made to the default unwind time, this value may need to be changed. Use the UP or DOWN ARROWS to change the value. When the correct value is displayed press ENTER.

Operators Manual

To continue through the menu, press **NEXT**. The following prompt will appear:

OIL ONLY DUST ?

****** ON ******

This prompt will be displayed showing the current setting of the duster. During an OIL ONLY run, the operator has the opportunity to turn the duster off. This should only be used when conditioning on freshly cleaned lanes. The setting of this prompt will be ignored by the PC if the program is set to clean the lane.

To change this setting, use the ON/OFF key in the TEST I/O section of the keypad.

This concludes the selections in the
SYSTEM CONTROL DUSTER menu.

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9. Adjust IPS Menus

This series of screens will be used to adjust various speeds of the machine as it changes from 1st to 7th. Six speeds are used for conditioning, with one high speed (7th) for returning to the foul line.

**DO NOT ADJUST THE IPS ACCESSED BY THESE SCREENS
UNLESS THE SPEEDS ARE INCORRECT!!**

Depress the **MENU** key until the following screen appears:

*** ADJUST IPS 0
HIT NEXT KEY 00**

Depress the **NEXT** key, the drive motor will run in low speed and the following will appear:

*** ADJUST IPS 1
HIT NEXT KEY 10**

The prompt is telling the operator that the drive motor is running in low speed (1). The second line of the display indicates the speed of the drive wheel surface. This speed is being displayed in INCHES PER SECOND. To change the first speed, adjust the first speed pot on left side of the printed circuit board assembly. The factory setting for the first speed is 10 inches per second.

Operators Manual

Depress the **NEXT** key, the drive motor will run in 2nd speed and the following will appear:

*** ADJUST IPS 2**
HIT NEXT KEY 14

The prompt is telling the operator that the drive motor is running in second (2). The number on the far right of the second line displays the speed of the drive wheel surface. Again this is measured in INCHES PER SECOND. To change the second speed adjust the second speed pot from the left. The factory setting for the second speed is 14 inches per second.

Depress the **NEXT** key, the drive motor will run in 3rd speed and the following will appear:

*** ADJUST IPS 3**
HIT NEXT KEY 18

The prompt is telling the operator that the drive motor is running in third (3). The second line of the display indicates the speed of the drive wheel surface in INCHES PER SECOND. To change the speed, adjust the third speed pot from the left. The factory setting for the third speed is 18 inches per second.

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Depress the **NEXT** key, the drive motor will run in 4th speed and the following will appear:

*** ADJUST IPS 4**

HIT NEXT KEY 22

The prompt is telling the operator that the drive motor is running in fourth (4). The second line of the display indicates the speed of the drive wheel surface in INCHES PER SECOND. To change the speed, adjust the 4th speed pot from the left. The factory setting for the fourth speed is 22 inches per second.

Depress the **NEXT** key, the drive motor will run in 5th speed and the following will appear:

*** ADJUST IPS 5**

HIT NEXT KEY 26

The prompt is telling the operator that the drive motor is running in fifth (5). The second line of the display indicates the speed of the drive wheel surface in INCHES PER SECOND. To change the speed, adjust the 5th speed pot from the left. The factory setting for the fifth speed is 26 inches per second.

Operators Manual

Depress the **NEXT** key, the drive motor will run in 6th speed and the following will appear:

*** ADJUST IPS 6**
HIT NEXT KEY 30

The prompt is telling the operator that the drive motor is running in sixth (6). The second line indicates the speed of the drive wheel surface in INCHES PER SECOND. To change the speed, adjust the 6th speed pot from the left. The factory setting for the sixth speed is 30 inches per second.

Depress the **NEXT** key, the drive motor will run in 7th speed and the following will appear:

*** ADJUST IPS 7**
HIT NEXT KEY 56

The prompt is telling the operator that the drive motor is running in seventh (7). The second line displays the speed of the drive wheel surface in INCHES PER SECOND. To change the speed, adjust the **8th** speed pot from the left. The factory setting for the seventh speed is 56 inches per second (may be lower on 115 volt machines due to the voltage in your center).

The 230 volt machines will go higher than 56 but do not adjust them higher. The pulses coming from the tach and the lane distance sensor will be too fast for the PC to read, and miscounts and errors will occur. If the machine is traveling too fast it usually shows up as an error during reverse travel, frequently just after it comes out of the pindeck and shifts to high.

The seventh pot from the left is for changing the overall **RANGE** of all the speed pots. Only adjust this if you can not get one of the first 6 speeds down low enough or up high enough.

This concludes the selections in the
ADJUST IPS menu.

10. Timing Sensor Adjustment Menus

Depress the **MENU** key until the following screen appears:

*** ADJUST HEAD
SENSORS**

These menu items will make the adjustment of the oil head position sensors a little easier.

Depress the **NEXT** key, the following screen will appear:

**LFT PROX #12 OFF
POS SENSR #1 OFF**

Depress the **NEXT** key AGAIN and the following screen will appear:

**RT PROX #13 OFF
POS SENSR #2 OFF**

These menus will be fully explained in **Section V - Adjustments** later in the manual.

This concludes the selections in the
ADJUST HEAD SENSORS menu.

11. Systems To Be Monitored

This series of screens is useful to the manager to monitor various functions of the machine. These menus can also help the mechanic perform preventive maintenance on the machine.

Depress the **MENU** key until the following screen appears:

*** SYSTEMS TO BE
MONITORED**

Depress the **NEXT** key and the following screen appears:

**ODOMETER
0000 FT 0000 MI**

The Odometer will display the feet and miles the machine has traveled up to that point.

The machine is equipped with automatic maintenance checks. When one of these messages appear it will be necessary to clear it.

The Odometer screen will toggle between the current mileage and the following screen:

**TO CLEAR MAINT
MESSAGE HIT EXIT**

Follow the procedure outlined in Section VI to clear the message.

NOTE: To avoid clearing the Maintenance Message by mistake, the **MENU** key should be depressed before exiting the Managers Menu Selections!

Operators Manual

Depress the **NEXT** key and the following screen appears:

BUFFER SQUEEGEE
0000 HOURS 0000

This screen will display the number of hours the buffer motor and squeegee motor has been operating. The number on the left (below **BUFFER**) indicates the number of hours the buffer motor, belt, and bearings have been running. The number on the right (below **SQUEEGEE**) indicates the number of hours the squeegee motor and blades have been operating. If these components are replaced the value can be reset to zero.

The buffer motor hours can be reset by pressing the **Up Arrow** and the **Enter** key. The squeegee motor hours can be reset by pressing the **Down Arrow** and **Enter**.

Depress the **NEXT** key and the following screen appears:

VAC MTR DRV MTR
0000 HOURS 0000

This screen will display the number of hours the vacuum motor and drive motor have been operating. The number on the left (below **VAC MTR**) indicates the number of hours the vacuum motor has been running. The number on the right (below **DRV MTR**) indicates the number of hours the drive motor has been running. If these motors or motor brushes are replaced the value can be reset to zero.

The vacuum motor hours can be reset by pressing the **Up Arrow** and the **Enter** key. The drive motor hours can be reset by pressing the **Down Arrow** and **Enter**.

Operators Manual

Depress the **NEXT** key and the following screen appears:

SUN	LANES	MON
0000	RAN	0000

This screen will display the number of lanes that the machine ran on the designated day. The number below SUN indicates how many lanes were run on Sunday. The number below MON indicates how many lanes were run on Monday. These values are available for six days and are reset the day before the machine runs. For example on Saturday, the value for last Sunday is reset to zero.

Depress the **NEXT** key and the following screen appears:

TUES	LANES	WED
0000	RAN	0000

This screen will display the number of lanes that the machine ran on the designated day. The number below TUES indicates how many lanes were run on Tuesday. The number below WED indicates how many lanes were run on Wednesday. These values are available for six days and are reset the day before the machine runs. For example on Monday, the value for last Tuesday is reset to zero.

Depress the **NEXT** key and the following screen appears:

THUR	LANES	FRI
0000	RAN	0000

This screen will display the number of lanes that the machine ran on the designated day. The number below THUR indicates how many lanes were run on Thursday. The number below FRI indicates how many lanes were run on Friday. These values are available for six days and are reset the day before the machine runs. For example on Friday, the value for last Saturday is reset to zero.

Operators Manual

Depress the **NEXT** key and the following screen appears:

SAT LANES TOTAL
0000 RAN 0000

This screen will display the number of lanes that the machine ran on Saturday and the Total Lanes that have been run by the machine. The number below SAT indicates how many lanes were run on Saturday. The number below TOTAL indicates how many lanes the machine has completed. The value for Saturday is available for six days and is reset on Friday. The total number of lanes is never reset (unless a program upgrade is performed).

Depress the **NEXT** key and the following screen appears:

NUMBER OF LANES
50 IN CENTER 50

This screen will display the number of lanes in the bowling center. Changes can be made to this number by using the UP or DOWN ARROWS. Press ENTER to lock in a new setting. This number will also automatically change the upper limit in the Auto Program Select Menus.

Depress the **NEXT** key and the following screen appears:

BATTERY CHECKS
GOOD!

This screen will display the condition of the battery in the PC. If the Error Light on the PC is illuminated, and the machine still operates, access this menu to check the battery. Replace a **WEAK??** battery immediately.

This concludes the selections in the
SYSTEMS TO BE MONITORED menu.

12. Emergency Menus

Depress the **MENU** key until the following screen appears:

*** I/O EMERGENCY**
REROUTE MENUS

The machine has 5 infrared pass thru sensors that can fail from getting sloppy with the lane oil, and not keeping the machine clean. This set of menus will allow the functions of one sensor to be taken over by another. In other words, we have backup systems.

Depress the **NEXT** key, the following screen will appear:

TACH 15 =>LDS 14
REROUTE?? NO

The LDS (lane distance sensor) is mounted on the rear of the machine and the Drive Shaft "Tach Sensor" is located on the left side of the machine.

If either of these sensors fail it will cause the machine to display the error message "FORWARD TRAVEL INTERRUPTED" every time you try to start the machine. If it is an intermittent failure you may even get the message "REVERSE TRAVEL INTERRUPTED" periodically with no apparent obstruction that causes the drive wheels to slip.

When "in a pinch" either the LDS or the TACH Sensor can be by-passed so that all functions of the LDS can be transferred to the TACH and vice-versa. When the LDS is by-passed both forward and reverse travel error messages will be turned OFF. By-passing the LDS also permits the machine to operate without being on the lane. This may be helpful to trouble-shoot problems that occur in mid-cycle.

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The left and right arrows control which sensor is to be by-passed. If the RIGHT arrow is depressed the arrow on the screen will point from 15 to 14 which means all functions of the TACH will be taken over by the LDS input 14.

To by-pass simply depress ENTER and the "NO" on the bottom right side of the screen will change to "YES". This means the TACH sensor is no longer used and all its functions are taken over by the LDS.

The arrow cannot be changed with YES on the screen. Depressing enter again will switch the YES back to NO and bring the machine back to normal operation.

If the LEFT arrow is depressed, the arrow on the screen will point from the LDS to the TACH. Depress ENTER and the screen will change to YES. All functions of the LDS such as measuring the distances on the lane will be taken over by the TACH.

When operating like this the machine will tend to travel too far toward the foul line and hit the approach. But it will function without an LDS, and you can get the lanes done without the delay of changing the sensor.

An error message is incorporated into the program that will tell the operator which sensor is not operating properly. When a sensor fails the Error Message will read:

ERROR!! FORWARD

TRAVEL LDS 14

or

ERROR!! FORWARD

TRAVEL TACH 15

Operators Manual

NOTE: Use caution when by-passing the Lane Distance Sensor. This sensor should be double-checked before it is re-routed. It controls the travel distance and is critical to proper machine operation.

The Emergency Menus also have a re-route option for the oil head sensors. Within this menu depress the **NEXT** key and the following will appear:

```
OIL SENSOR 1=> 2
REROUTE??      NO
```

Oil sensor 1 counts from left to right the position of the Oil Head. Oil sensor 2 counts from right to left the position of the oil head.

When properly set they both operate at nearly the same time. In fact, only one is necessary for operation of the machine. We mounted two for redundancy and back-up.

These are the same sensors used on the LDS and TACH sensors, and are interchangeable. They are just as vulnerable to oil and dirt, and can fail.

Use the LEFT and RIGHT arrows to choose which sensor is to be by-passed. Depress ENTER to change the NO to YES. The designated sensor is now by-passed.

After the sensor is either cleaned or replaced, bring the system back to normal by depressing ENTER in this screen and the YES will revert back to NO.

When either of the sensors are by-passed only the by-passed sensor's error message is turned "off".

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When an oil head position sensor fails an automated Error Message will read:

**ERROR! OIL HEAD
SENSOR INPUT #1**

or

**ERROR! OIL HEAD
SENSOR INPUT #2**

This screen will toggle to read:

**OR OIL HEAD
STOPPED MOVING**

The EMERGENCY REROUTE menu is the last menu in the list. Depressing MENU again after these screens will loop you back to the top of the list of main Managers Menus (the OVERRIDE AUTO PROGRAM MENU).

When using MENU to go through the main menus, you can "Menu Around" if you miss the one you're looking for the first time.

This concludes the selections in the
EMERGENCY menu.

**TO EXIT THE MANAGERS MENU SELECTIONS AT ANY TIME
(EXCEPT IN THE PROGRAM LOAD MENUS) DEPRESS
THE "EXIT" KEY AND YOU WILL BE TAKEN
BACK TO THE OPERATORS MENUS.**

THIS CONCLUDES ALL MENUS AND FUNCTIONS ACCESSIBLE
BY THE MANAGERS PASSWORD.

SECTION V - Adjustments

A. Cleaning Cloth Replacement & Adjustment

The machine uses a patented DMR (Dual Motor Ratcheting) Cloth system. The DMR assembly operates by means of two cone-brake motors. The first unwinds cloth and sets the cushion roller down on the lane surface. The second winds up used cloth onto the used core.

The wind-up motor also lifts the cushion roller off the lane at the end of the run. This dual action simulates that of a ratcheting duster, helping to eliminate dirt lines during a conditioning run. This system also better controls cloth usage, and has no clutch mechanism to adjust.

IMPORTANT! The machine can NOT be operated without Lane Cleaning Cloth installed.

Lane Cleaning Cloth should be loaded into the machine using the following procedure:

1. Unroll about 3 feet of cloth and lay it on the lid. Insert the duster support pipe into the new roll.
2. Route the cloth down between the squeegee and the cushion roller. Wrap the cloth around the cushion roller and pull it up above the front wall.
3. Distribute the cloth evenly around the cushion roller (removing all folds) before routing it around the stainless steel bar. Don't forget to route around the stainless steel bar. Failure to do this will drastically reduce the cleaning efficiency.

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4. Once the cloth is square in the machine, push it between the cushion roller and the stainless steel routing bar.
5. Pull the cloth far enough through the Routing assembly to get at least 3 or 4 wraps around the PVC take-up reel. Make sure the cloth is wrapped evenly from side to side around the pipe. Use the PVC clamps to hold the cloth.
6. Place the take-up reel in the machine first and then the fresh roll of cloth.
7. Apply power to the machine and bring up the **DUST CTRL&RSET** menu.
8. The start button on the handle can be used to take-up the slack from the fresh roll of cloth. Push and hold the button in, the unwind motor will operate. The next time the button is depressed and held in, the wind-up motor will run until the wind-up switch is actuated. The cloth should be rolled up taut and evenly across the assembly.

WARNING!! If the button is held too long when winding the cloth up, it could break the PVC take up roller if the Wind-Up Switch is not working properly.

B. Cleaning Cloth Counter

The machine is equipped with a Cloth Counter which indicates the number of lanes remaining on the current roll of duster cloth, and it also warns the operator when no cloth is remaining.

When approximately 20 lanes of cloth are left, the LCD screen will toggle between the * SANCTION START screen and the following:

DUST ALMOST OUT!

When the Cleaning Cloth Counter reaches zero, the keypad will display the following message:

DUST CLOTH EMPTY

REPLACE CLOTH

The machine will not operate until the cloth is replaced and the Cloth Counter is reset. To reset the counter, follow the instructions in this manual under DUST CONTROL MENUS.

After resetting the counter, re-program the machine to continue operation.

C. Filling of Cleaner Supply Tank

To fill the Cleaner Supply Tank, the machine should be in the down or operating position. Prepare an appropriate mixture of cleaner and water.

Disconnect power and pour the mixture into the Supply Tank using the supplied funnel. (NOTE: The supply tank on the machine is removable for cleaning). Do not spill cleaner inside the machine. Spills may "short" the input and cause a false signal at Input #005 or Input #010. A wet switch may also produce a dim LED light on the PC.

Any spills or drops of cleaner should be wiped up immediately!

D. Emptying of Recovery Tank

To empty the Recovery Tank, the machine must be in the down or operating position. Disconnect the inlet from the side of the recovery tank and the outlet hose from vacuum plate by removing the PVC elbows.

Remove tank from machine and dispose of used cleaner **properly**. Do NOT dump recovery tank in a septic tank or sanitary sewer system. Follow your local environmental regulations for the best method of disposal.

NOTE: When dumping liquid from Recovery Tank, it is best to let liquid flow out the inlet end, or the end which was connected to the squeegee assembly.

If liquid accumulates between baffles on the opposite side of tank, dirty cleaner may be discharged from the vacuum exhaust and onto the lane until the line is cleared.

To reconnect, reverse disconnect procedure.

E. Adjustment of Spray Jets

The machine uses a four spray jet system to spray cleaner onto the lane surface. These specially designed stainless steel jets spray in a "V" pattern and when properly adjusted spray cleaner across the entire width of the lane.

The spray jets are factory-set, but may need to be adjusted so all boards across the lane are covered, and so that overspray into the channels does not occur.

If coverage is too narrow and edge boards are not being sprayed, adjust by raising the spray tips slightly, or rotating the jet mounting angle.

If coverage is too wide and overspray occurs, adjust spray tip down or toward the center.

To adjust, simply loosen the hex bolt on the aluminum body of the spray assembly. Rotate the spray jet up or down as needed. The middle tips are at an angle, positioned at about a 45-degree or a 135-degree angle as shown below. Adjust these until you get the best spray pattern, then tighten hex bolt.

The outside jets can be angled toward the center to eliminate any overspray into the channels. The outside jets should be positioned vertically as shown below.



Typical Factory Settings for Spray Tips

F. Guide Roller Adjustments

Adjustment of the guide rollers may be needed if the bowling center has lanes that have been injected, or if the channels are even with the lane surface. In most cases adjustment to the guide rollers on one side will be all that is needed.

To adjust the guide rollers, remove the mounting bolt, guide roller, spring and bronze bushing from the mounting block. (Bronze bushing is normally between the roller and the side plate of the machine.)

Place the bronze bushing between the head of the mounting bolt and the guide roller. This will give approximately 1/4" additional clearance between the guide rollers as the machine travels on the lane surface.

There is an additional guide roller that can be added on the left side. The middle roller will be inset more than the others to help keep the machine square on the lane. Additional spacers are provided on this roller to allow proper adjustment if it is installed.

G. Squeegee Assembly Adjustment

The Squeegee Assembly is adjusted at the factory to insure proper cleaning. This adjustment should be checked when the machine is installed.

To check this adjustment and make changes, the machine should be in the upright or transport position. The squeegee will need to be lowered to the down position. To lower the squeegee apply power to the machine and bring up the SANCTION START menu.

At the TEST I/O section of the keypad depress the OUTPUT key until the SQUEEGY MOTOR (OUTPUT 203) is displayed.

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Depress the ON/OFF key once. The squeegee motor will activate and rotate 180°, this will lower the squeegee.

With the squeegee down, take a straight edge and place it from the squeegee blade across the drive wheels to the lane distance wheels. The gap between the straight edge and the drive wheels should be **1/8" to 3/16"**.

If the distance is more or less follow the steps below to make the adjustment.

1. Locate the squeegee motor in the center of the machine. Mounted to the motor is a cam. Mounted to the cam is a rod end and rod. This rod lifts and lowers the squeegee.
2. Remove the bolt that connects the rod end to the cam. Loosen the jam nut between the rod end and the rod.
3. Rotate the rod end as needed to increase or decrease the distance between the straight edge and the drive wheel.
4. Tighten the rod end to the rod with the jam nut and insert and tighten the bolt to connect the rod end to the cam.
5. Re-check the gap between the straight edge and the drive wheels.

H. Buffing Brush Replacement & Adjustment

The buffing brush is manufactured of a long-lasting synthetic bristle which, under normal circumstances, can be expected to last approximately 18 months. An Amp Draw should be taken on the buffer motor when adjusting the brush. Too much crush can cause excessive load on the motor and wear on the brush.

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To check the buffing brush adjustment the brush must first be lowered onto the lane. This is done at the TEST I/O menu. Depress the OUTPUT key until output #205 is displayed. Depress the ON/OFF key to activate this output. This will lower the Buffing Brush into the operating position.

With the brush down, stand the machine in an upright position and hold a level or straight edge across the drive wheels and rear lane distance wheels. The buffing brush material should extend approximately **3/32" to 3/16"** beyond the level for proper adjustment. This crush is determined by the amp draw of the buffer motor and smoothness of the conditioning pattern. The buffing brush is factory adjusted prior to being shipped at approximately 1/8". (NOTE: Amp draw is also affected by the amount of crush the transfer rollers have into the brush.)

If an adjustment is needed, place the machine in an upright position on the approach. Loosen the jam nuts on the two adjusting screws, along with all three lane distance shaft pillow blocks.

Turn the adjusting screws until proper adjustment is reached. (Each full turn on an adjusting screws is equal to about 1/16" adjustment.)

Tighten jam nuts and outside two pillow blocks. Check that the lane distance shaft spins as freely as possible. Then tighten the center pillow block.

Recheck that the lane distance shaft turns without any bind. At this time check for excessive end play with this shaft (1/16" maximum).

NOTE: When cleaning the Buffing Brush, NEVER use any type of cleaner on the brush. Use of cleaners will decrease the brush's ability to hold conditioner, and greatly affect the lengthwise taper of the conditioner pattern. All that is needed to clean the Buffing Brush is a clean, soft, dry rag. Wipe the brush clean daily.

I. End Cleaning Distance Travel Adjustment

When the machine is installed the End Cleaning Travel Distance should be checked.

This distance is different in each bowling center around the world. These vary because of specification tolerances that are allowed during the construction of the lanes. Always leave a margin of error when setting the end cleaning distance. This can be accomplished by starting the machine a couple of inches past the foul line when making this adjustment.

Making sure that the machine is traveling the correct distance is important to how well the pindecks are cleaned. If the pindecks are not getting cleaned well enough, the pins slide more, creating Out-of-Ranges. This is an unnecessary call for any bowling center.

To check the End Cleaning travel distance press the **Monitor** button after the starting lane, ending lane, and program number has been entered.

The **Monitor** button must be pressed after the START key is pressed, but before the start button is depressed on the handle for the first time. Pressing the Monitor button a second time will exit this screen.

After pressing Monitor the display will change to:

0000 #01 IS NEXT
PDCNT 0730 FS03

When the machine is placed on the lane and the start button on the keypad is depressed, the counter will start counting down from 730. **PDCNT 0730** is the length of the lane in inches, which is counted by the LDS sensor.

FS means **failsafe**. The failsafe switches are located in the cleaning end. These switches (2) are actuated when the cushion roller drops off the end of the lane. Upon the PC receiving the signal from the failsafe switches, the machine is told to overtravel three inches, wind-up the cloth, and then reverse.

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When the machine reverses itself to exit the pindeck, the screen should read:

**0080 #01 IS NEXT
PDCNT 0000 FS03**

The counter on the second line must read **0000** and the failsafe will read **03**. This means the machine reversed itself through the counter (of the lane distance sensor).

When traveling in reverse the screen may read:

**0120 #01 IS NEXT
PDCNT 0002 FS00**

When numbers remain in the counter (**0002**), this tells us that the machine reversed after a signal from the failsafe switches (**FS00**).

The machine is designed to reverse by using the counter. The failsafe switches are a backup system ONLY! If the machine is always reversing by the failsafe switches, the machine may end up in the pit if they wear out.

To adjust the pindeck travel, get to the **CHANGE PROGRAM SETTINGS** menu and press the **NEXT** key until the screen reads:

**END CLEANING
0730 DIST 0730**

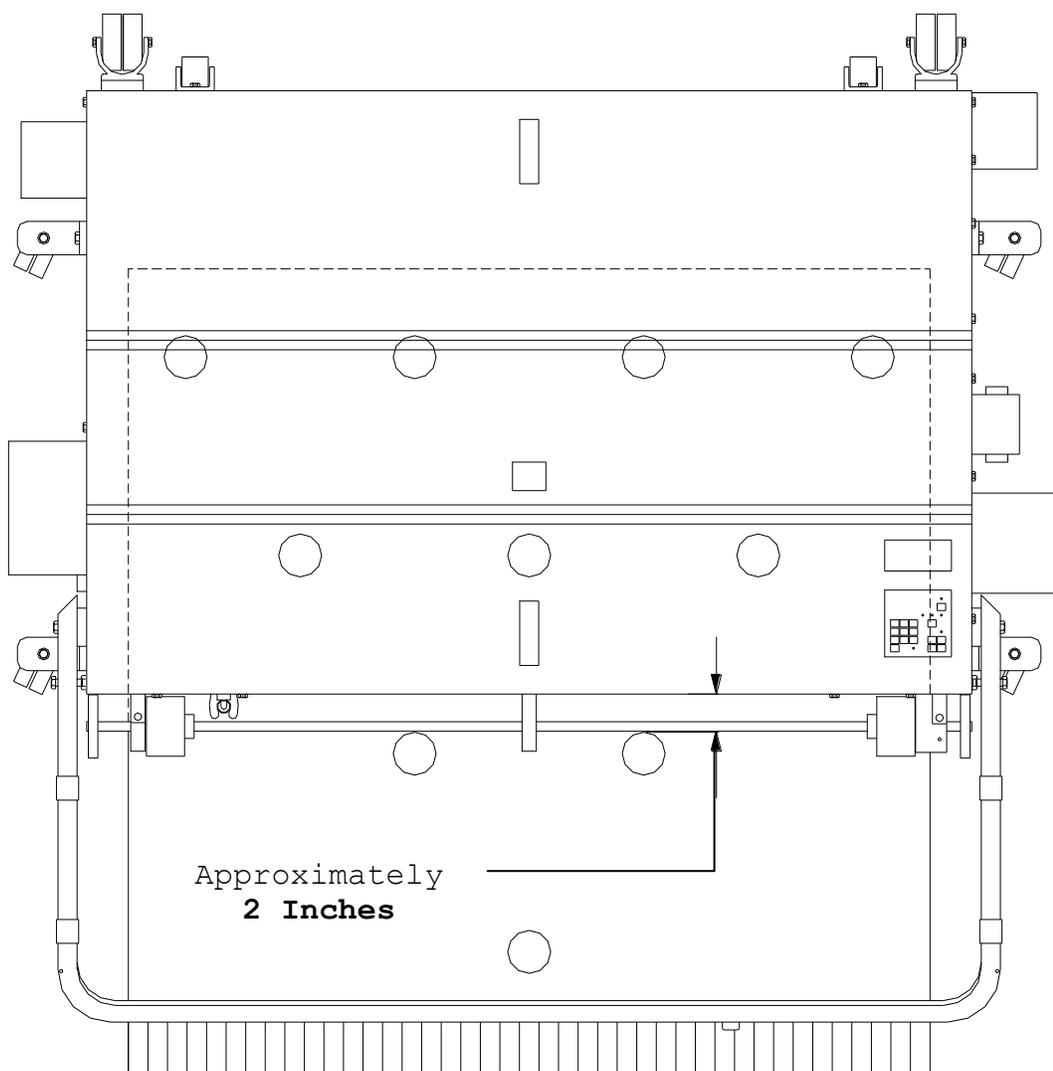
If the number of counts that remain are **0002**, then decrease the Distance to End value by this number of counts (728). Be sure to press **ENTER** otherwise the PC will not accept the new number.

After the change is made, use the pindeck counter to check your adjustment. When the distance is correct, the machine will travel far enough for the squeegee to clear the end of the pindeck and leave no moisture. The figure on the next page shows where the machine will stop in the pindeck.

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Note: An adjustment may be necessary for the **Return To Foul Line** menu. This adjustment is the first menu in the **System Control Distance** menu. It should be adjusted so the machine travels the correct distance back to the foul line. The return distance may be a couple of counts different than the distance to the end of the pindeck. Adjust these numbers to control forward and reverse travel distances. (The squeegee must travel beyond the tail plank and the machine should not hit the approach too hard during the return trip.)

When the correct **END CLEANING DISTANCE** is determined for your bowling center, this value needs to be entered in every program (in the CHANGE PROGRAM SETTINGS menu).



*Squeegee Goes Off the Pindeck When the
Rear Wall is About 2" Behind the 2 & 3 Spots*

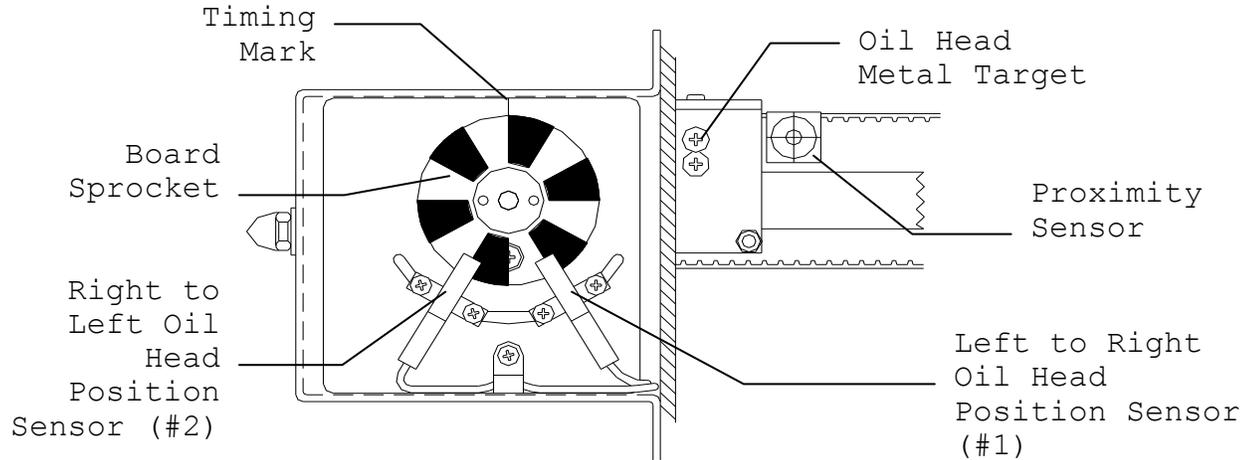
J. Oil Head Timing Adjustment

The timing for the oil head is a precise adjustment. This should not be touched unless the head drive belt needs replacing or the machine is displaying a Head Timing Error.

On the 10-pin side of the machine is a cover for the head timing sensors. Remove the two 5/16-18 cap nuts that hold the cover. Slide cover off of the mounting bolts. Once the cover is off you will be able to see the belt tension and head timing assembly.

On the face of the timing plate is an etched timing mark for the board counting sprocket. There is also a timing mark on the top of the oil head. Follow these steps closely to avoid confusion.

1. Move the oil head against the 10-pin side wall.
2. The tension for the head drive belt should be adjusted at this time. Pushing down on the belt, half-way across the head track, you should feel the belt get tight just before it touches the track.
3. With the head against the wall, loosen the set screws for the board sprocket. Once loose, the sprocket should be turned so that one of the set screws is to the top side. The left-hand leading edge of the black section on the sprocket should line up with the sensors as shown in the figure on the next page.



View of Head Timing Sprocket & Sensors

4. The next procedure is to make the position sensors come "ON" in the MIDDLE of the proximity sensors. To do this, you must enter the Managers Menu and advance to the ADJUST HEAD SENSOR screen.

NOTE: The distance between the metal target on the oil head and the proximity sensor should be a gap of **0.038"**.

5. Once in the ADJUST HEAD SENSOR menu press the NEXT key and you will see:

LFT PROX #12 OFF

POS SENSOR #1 OFF

6. Move the oil head all the way to the 7-pin side wall (outside of the prox). Slowly move the head toward the middle of the proximity sensor. When the screen reads LEFT PROX ON, slowly continue to move the oil head from left to right.
7. When the screen changes and reads POS SENSOR #1 ON, stop moving the head. The timing mark on the top center of the head should be in the center of the left prox (the center of the head and prox are both marked).

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8. If not, then an adjustment is needed to the left head position sensor. With the head in the middle of the prox, loosen the two small screws that hold the left position sensor. Rotate the position sensor so that the sensor comes "ON". Tighten the screws and move the belt to make sure that the sensor comes on in the middle of the prox.
9. Press the NEXT key again and this screen will appear:

RT PROX #13 OFF
POS SENSOR #2 OFF

10. Now perform the same procedure as you did for the left position sensor by sliding the head to the 10-pin side wall and repeating steps 6 and 7 for the right side.
11. If you were successful getting the sensors to come on in the middle of both proximity switches then you have successfully timed the oil head.
12. Now it is time to make sure that the sensors are secured and the head assembly is tight. Place the cover back on the head assembly and tighten the acorn nuts.
13. Take the machine out to the lanes and access the Change Program Menu. Enter in **01F** about ten 2L - 2R loads.
14. Run the machine to make sure that the oil is distributed properly from 2L - 2R, with a 1/4 inch overlap when it starts and stops. If the loads are distributed properly then the head timing is correct. If the head timing appears correct, but the loads do not overlap properly, the tip height may need to be adjusted. Refer to Section VI for instructions to set the tip height. This information is located in #4 of Letter J (Changing of Conditioner - Checking the Load Stream).

The machine's computer has to park the oil head on the right side to ensure the proper starting point for loads of conditioner. When the head goes to the home or zero position it will bump into the side wall and kick back. The clicking sound that is heard is normal and no damage is occurring to the machine.

Section VI - Maintenance

Maintenance: The following items should be done to the machine on a regular basis:

A. Power Cord

Care should be taken to see that the power cord is handled properly and stored correctly.

Do **NOT** wrap the cord around the machine for storage. Some type of cord wrap or cord spool for suitable means of storage will add life to the cord.

Make large loops when wrapping the cord.

Should the power cord become damaged or frayed, it should be repaired or replaced **IMMEDIATELY!**

To keep the power cord clean, pull it through a rag as it is being wound for storage.

B. Squeegee

Wipe with a clean cloth after each operation. Check the blades for wear and tear. The edges of the blades should be sharp and square. Rounded edges mean it's time to replace the blades.

C. Sensors

All sensors can be cleaned by blowing out with an air compressor. This will remove oil and dust build-up which could cause false sensing. Sensors may need to be sprayed lightly with electrical contact cleaner (the type for PC boards).

D. Lane-to-Lane Casters

Clean after each operation.

E. Drive Wheels

Clean daily after each operation.

F. Vacuum Motor

Important! This motor should be wiped off daily and blown out weekly. This is especially important in high dust areas, or bowling centers who do not dust gutters and caps daily. Dirt can build up on the electrical end of the motor which will obstruct the air flow. This will result in increased heat and wear of the brushes and commutator. This will drastically decrease the life of the vacuum motor. You have been warned!

G. Inside Machine

Wipe up excess dust and dirt daily.

H. Recovery Tank Removal

Remove and drain after each operation.

I. Filters

The cleaner supply tank filter is 1/2 inch diameter by 5 inches long (on Serial Number 2240 and up). It can be inspected by removing the supply tank fill plug. Look inside the opening in the top of the tank to check the filter. There are also four check-valve filters, one on each spray jet, that should be cleaned.

Another 5" filter is located inside the oil tank, and the oil supply line has an in-line filter.

J. Changing of Conditioner

1) DRAINING THE TANK:

Located on the left top side of the oil tank is a right-angle fitting with a plug. Provided with the machine is a clear drain line and elbow fitting. Remove the plug from the tank and install the drain line into the fitting with the machine setting down (as it would on the approach).

Go to the I/O Test menus and turn ON the tank vent valve (this is Output #111). Hold the drain line in the air and stand the machine up to the transport position. (**NOTE:** The tank vent valve has a 15 minute time-out function that turns it off.)

Place the line into an empty oil jug. Then place a one-and-a-half foot 2 x 6 under the right side transport wheels. Allow the conditioner to drain until the tank is empty.

After draining, set the machine back down and remove the drain hose. Insert the plug into the tank fitting.

2) FLUSHING THE LINES:

The oil lines should be flushed to remove all the old conditioner. Located on the top left of the conditioner tank is the Oil Tank Return Line. Disconnect it by pressing in on the gray collet and pulling out on the line. Place the line into a clean cup.

With the return line in the cup, turn the Pump Motor ON through the "Test Output" (this is Output #103). This will pump the majority of the remaining oil out of the lines.

When a large amount of air starts to flow through the lines, turn OFF the output. Do NOT run the pump dry for an extended period of time...damage may occur.

Important Note: When changing to a conditioner with a higher viscosity, be prepared to change the pressure regulator tubing (or adjust the needle valve). Failure to monitor the pressure may result in damage to the pulse dampener tube.

Remove the two gray fill plugs on top of the oil tank and fill it with the new conditioner. Turn the output ON for the Pump Motor and allow it to run until the new conditioner flows into the cup. Re-connect the return line into the fitting.

Exit the "Test Output" and menu to the "Pump Output Volume Tests" screen located in the Operator's Menu. Press NEXT three times to access the following screen.

**TEST: VOL PER REV
FOR 0000 REVS**

The pump will begin running when this menu is accessed. Place a cup under the Calibration Tip on the rear of the machine and press the LEFT Arrow. The pump will run about 500 revolutions which will flush the calibration line. Press the LEFT Arrow at least three times to expel all the old conditioner out of the line.

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Stand the machine up to the storage position. On the bottom side, locate the two small valves. Remove the line coming from the bottom of the right-hand valve and drain into cup. (The gray collet must be depressed to release the hose from the fitting.) This will drain the line that runs to the transfer roller.

3a) CHECKING THE PRESSURE:

On Serial Number **2371** and after, (or machines upgraded to the pressure regulator tubing box), place the machine in the operating position and turn ON the Oil Pump (this is Output #103). Check the pressure gauge on the transfer compartment wall. The normal operating pressure is approximately **10-15 PSI**.

The pressure will affect the amount of pulse dampening for the streams of oil. It primarily determines the appearance of the oil stream, giving it a consistent flow on the transfer roller. Having too little pressure (5 psi) is not a fatal error, but excessive pressure (more than 20 pounds) may blow the pulse dampening tube.

Note: ALWAYS run a Calibration Check when adjusting the pressure. This is the best way to insure the machine is operating properly.

The conditioner pressure is primarily dependent on *viscosity*. The type of conditioner and the temperature are what will affect the pressure the most. If an adjustment is needed, remove the wing nut on the pressure regulator box (on the bottom of the machine) and adjust the length of tubing inside the box.

The factory supplied tubing is 3/16" OD at a length of 6". This typically provides 12-15 pounds of pressure using Defense-S at a temperature of 72° Fahrenheit.

Various lengths and sizes of tubing are available depending on the type of conditioner being used. Sizes range from 3/16" OD (light oil) to 1/4" OD. The length of tubing may vary from a few inches to several feet. A chart in the Appendix recommends the proper pressure regulator tubing for each viscosity range, however adjustments may be needed depending on the operating climate.

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NOTE: When using conditioners with a viscosity less than 18 centipoise, use the special reducer attachment found in the accessory kit. Attach to the oil return line and adjust the pressure as stated above. (Figure 12 of the Parts Drawings shows the reducer fitting.) This attachment will increase the back pressure of the return line at the oil control valve.

3b) CHECKING THE PRESSURE:

On machines with Serial Number 2370 and below the pressure will need to be adjusted with the needle valve. Place the machine in the upright position and loosen the Jam Nut on the needle valve with a 3/8" wrench. Turn the needle clockwise to increase the pressure and counterclockwise to reduce the pressure.

4) CHECKING THE LOAD STREAM:

Once the previous procedures have been completed the oil load stream must be checked. This is done by running a couple of lanes to prime the oil head line.

Select any program and change screen **01F** to 2L- 2R x 06 and 02F to ##L-##R x 00. (The other values are not important.) Run the machine down the lane to the end of the pattern.

As the machine does the 2-2 loads, watch closely where the oil streams begin and end. On the top transfer roller there are etched marks at the outside edge of each 2-board. The oil stream should begin about 1/8" inside the mark when the load begins and 1/8" outside of it when it ends. Adjust the height of the tip UP if the stream is starting early, or DOWN if it starts too late.

NOTE: In order to make the loads stop and start consistently the distance between the transfer roller and the tip must be the same on both ends of the roller. The head bar can be raised or lowered slightly at each end to make the distance the same. Contact Technical Support before attempting to adjust the head bar height.

After the tip height is set properly, tighten both set screws that secure the tip and return the program values to their original settings.

K. Buffing Brush

If build-up of dirt occurs, the brush should be wiped with a clean cloth. Do not use any cleaner. Cleaning agents can affect the brush's ability to hold oil.

L. Automatic Maintenance Checks

The machine features an Automatic Maintenance program which alerts the operator when to perform regularly scheduled maintenance. In addition to normal daily maintenance, the machine requires inspections at 20, 100 and 200 miles of travel.

Each time these distances are reached, a maintenance message will appear. These messages can only be cleared by the Supervisor once the inspection has been completed.

An odometer in the machine records distance traveled through the LDS. When the pre-determined maintenance distances are reached, maintenance messages will toggle on the screen opposite the SANCTION START screen:

MAINTENANCE INSP

20 MILE NOW DUE

(or 100 MILE NOW DUE or 200 MILE NOW DUE)

For the specific maintenance items that need to be checked at these intervals, refer to the worksheets in the Appendix Section of this manual.

To clear a maintenance message, access the Managers Menus by using the Managers Password and depress the **MENU** key until the following screen appears:

*** SYSTEMS TO BE**

MONITORED

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Depress the **NEXT** key and a screen similar to the following will appear:

ODOMETER
0005 FT 0040 MI

This screen will toggle with the following screen:

TO CLEAR MAINT
MESSAGE HIT EXIT

Depress the **EXIT** key and the maintenance message will now be cleared. Be sure to complete the necessary maintenance before resetting the counter.

Section VII - Inputs and Outputs

The PC of the machine has 16 inputs (all of which are used) and 24 outputs (21 of which are used).

Inputs accept data from various components in the machine, and then use that information to control functions of the machine through its outputs. As an example, distances are input to the PC from the lane distance and tach sensors, at which point data in ROM or RAM chips activate certain outputs as programmed. An output example would be one of the cone-brake motors.

Here is a list of the **INPUT** numbers for the PC of the machine, along with their designations:

<u>INPUT#</u>	<u>FROM:</u>
000	CORD KILL INPUT
001	LEFT TO RIGHT OIL HEAD POSITION SENSOR
002	RIGHT TO LEFT OIL HEAD POSITION SENSOR
003	BUFFER UP SWITCH
004	BUFFER DOWN SWITCH
005	FAILSAFE SWITCH
006	SQUEEGEE UP SWITCH
007	SQUEEGEE DOWN SWITCH
008	START BUTTON (HANDLE)
009	OIL LEVEL FLOAT SWITCH
010	DUSTER UP SWITCH
011	PUMP TACHOMETER SENSOR
012	LEFT OIL HEAD REVERSING PROXIMITY SENSOR
013	RIGHT OIL HEAD REVERSING PROXIMITY SENSOR
014	LANE DISTANCE SENSOR (LDS)
015	DRIVE SHAFT TACHOMETER SENSOR

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Here is a list of the **OUTPUT** numbers for the PC, along with their designations on the machine:

OUTPUT# CONTROLS:

100 OIL PROGRAM CONTROL VALVE (24V DC)
101 LEFT TO RIGHT OIL HEAD DRIVE
102 RIGHT TO LEFT OIL HEAD DRIVE
103 OIL PUMP MOTOR
104 SPEED CONTROL 2ND SPEED RELAY
105 OIL CALIBRATION TEST VALVE (115V AC)
106 SPEED CONTROL 3RD SPEED RELAY
107 SPEED CONTROL 4TH SPEED RELAY
108 SPEED CONTROL 5TH SPEED RELAY
109 SPEED CONTROL 6TH SPEED RELAY
110 SPEED CONTROL 7TH SPEED RELAY
111 OIL TANK VENT VALVE

NOTE: This output module controls the 24V DC valve and the rest of the module is AC Voltage.

OUTPUT# CONTROLS:

200 SPARE 24 VDC OUTPUT
201 FORWARD DRIVE MOTOR RELAY CR #1
202 REVERSE DRIVE MOTOR RELAY CR #2
203 SQUEEGEE MOTOR
204 CLEANER PUMP (CR #4)
205 BUFFER UP/DOWN MOTOR
206 VACUUM AND BLOWER MOTORS (CR #3)
207 DUSTER CLOTH UNWIND MOTOR
208 DUSTER CLOTH WIND UP MOTOR
209 BUFFER MOTOR CONTACTOR
210 TRANSFER ROLLER MOTOR
211 NOT USED

NOTE: This output module has a spare 24V DC output and the rest of the module is AC Voltage.

DESCRIPTION OF INPUTS

The machine monitors the Input Module for DC Voltage. If the terminal strip pops loose, an Error Message will appear on the keypad display. This error will appear:

INPUT ERROR!

CHECK TERM STRIP

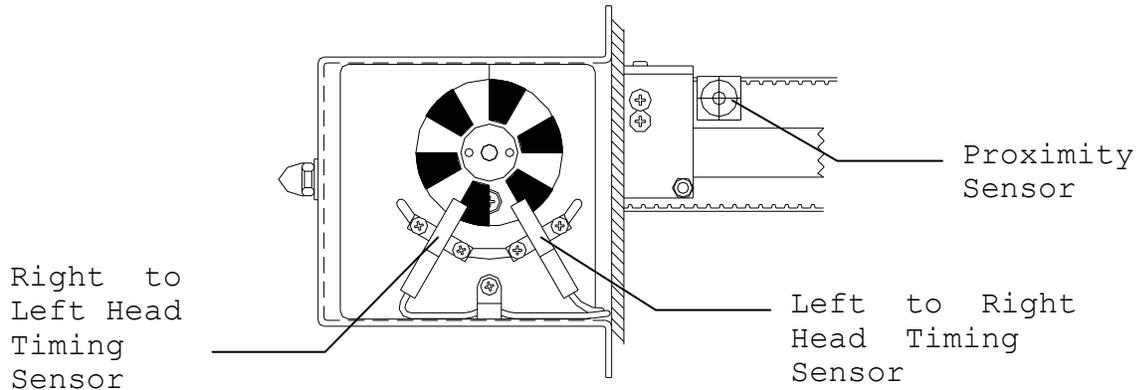
This screen is alerting the operator to check the terminal strip on the ID212 Input Module of the PC Assembly. If the terminal strip is in place, check the Yellow and Brown wiring on the PC Power Supply.

000 Cord Kill Plug: These plugs are located in two different places depending on when the machine was manufactured. They can be found on each side plate for early models (before #2248) or on both sides of the handle. Attached to the power cord is a plastic connector that has a jumper wire on each pin in that plug. (The jumper wire completes the circuit.)

This switch does not have to be plugged-in to operate the machine. When the machine is started (before each lane) the PC searches for this input. If the kill plug is not being used, the PC ignores it.

If the PC reads that the plug is being used, it will watch for the circuit to be broken. If the circuit is broken, a signal is sent to the PC to stop the machine before the cord is damaged. (LED #0 will light on the input module.)

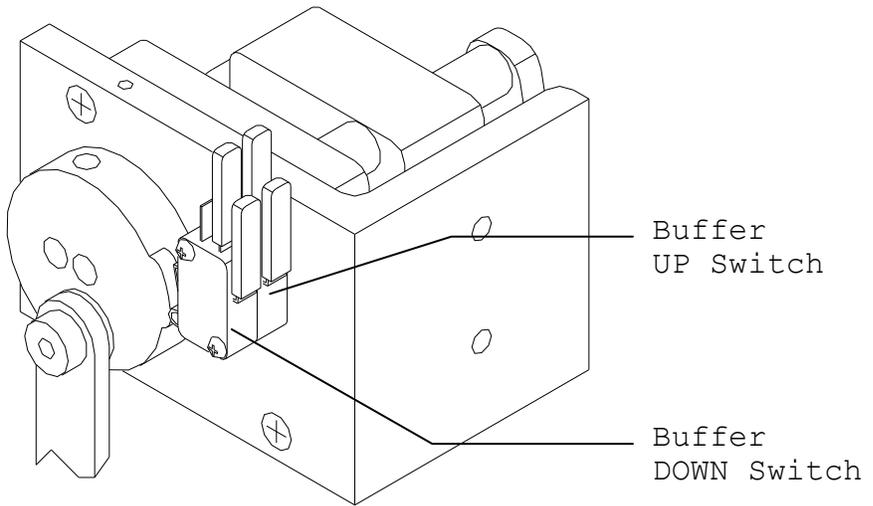
001 Left to Right Oil Head Sensor: This sensor is located next to the side wall when looking at the Head Timing Assembly. This sensor counts the number of boards that the head crosses from left to right. This works along with the proximity sensor that will show the lane edge when moving left to right.
(LED #1)



Oil Head Position Sensor Timing Assembly

002 Right to Left Oil Head Sensor: Another sensor is also located on the Head Sensor Timing Assembly across from the left to right oil head sensor. This counts the number of boards from right to left.
(Figure on previous page.) (LED #2)

003 Buffer Up Switch: This switch is located nearest to the Buffer Up/Down mounting bracket. When the lobe of the cam on the motor shaft actuates this switch, the PC receives a signal that the brush is in the UP position. This switch is wired Normally Open. (LED #3)



Buffer Brush Lifting Motor Assembly

004 Buffer Down Switch: This switch is located furthest from the Buffer Up/Down mounting bracket (next to the up switch). When the lobe of the cam actuates this switch, the PC receives a signal that the brush is in the DOWN position. The down switch must be actuated for the buffer drive motor to function during any oiling operation. This switch is wired Normally Open. The brush parks in the Down Position and this switch indicates the brush is in the zero position. (LED #4)

If the motor cam coasts past the switch an Error Message will occur. The screen will change to:

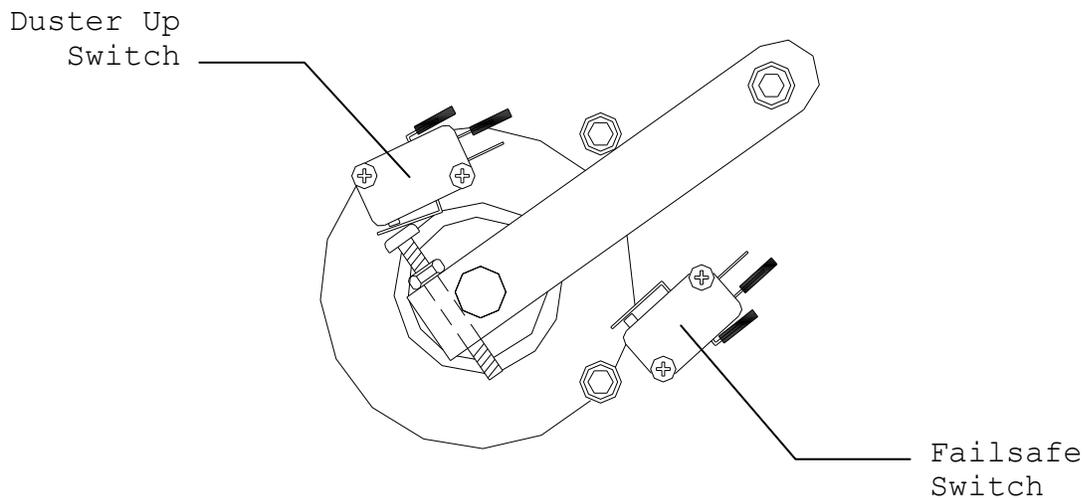
CHECK INPUT #4

BRUSH DOWN SWITCH

The machine will have to be re-started after this error.

005 Failsafe Switch: There are two of these microswitches, located across from each other on the side walls, below the Cushion Roller Pivot Arms. When the pivot arms drop and actuate the switches, the machine will travel for three more inches before it reverses itself to exit the pindeck.

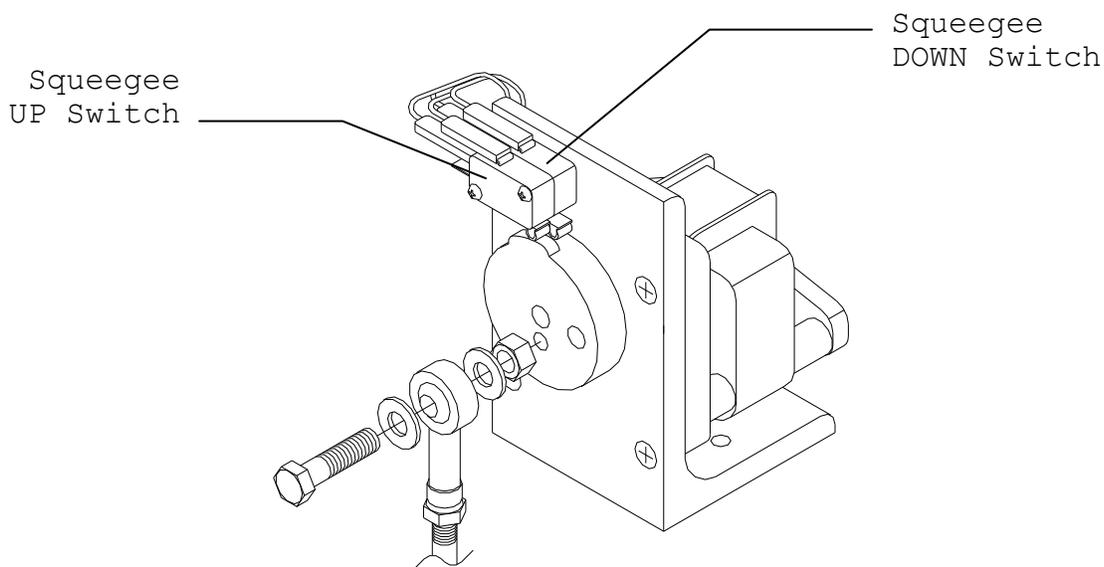
This is just a backup system for the machine. The reversing of the machine should be controlled through the **End Cleaning Distance Menu** which is adjusted in your Change Program Settings Menu. These switches are wired Normally Open. (LED #5)



Duster Up & Failsafe Switches

Note: All microswitches on the machine are wired Normally Open. When replacing switches make sure the wiring is connected to the **COM** and **NO** contacts.

006 Squeegee Up Switch: This switch is located on the Squeegee Motor Mounting Bracket (furthest away from the angle). The switch works the same way as the Buffer Up Switch. When the cam lobe actuates the switch the PC receives the signal telling the machine the squeegee is UP. This switch is wired Normally Open. The squeegee parks in the Up Position and this switch indicates the squeegee is in the zero position. (LED #6)



Squeegee Motor Lifting Assembly

007 Squeegee Down Switch: Located next to the Squeegee Up Switch, between it and the mounting bracket, is a microswitch that tells the PC when the squeegee is in the DOWN position. A signal is sent to the PC when the switch is actuated by the cam lobe. While operating the squeegee must be in the down position. If the PC does not get the signal from this switch, an error message will appear on the screen. This switch is wired Normally Open. (LED #7)

If the motor cam coasts past the switch an Error Message will occur. The screen will change to:

CHECK INPUT #7

SQUEEGEE DOWN SW

The machine will have to be re-started after this error.

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008 Start Button: Located on the handle, this normally open push button has a couple of different functions during operation. (LED #8)

- With the machine in the RUN mode, when the button depressed for the **FIRST** time, it will send a signal to the PC. This signal will tell the PC to run specific outputs as needed in the program (i.e. lower the squeegee, duster cloth, and brush).

The **SECOND** time the button is depressed, the PC will begin running the program on the lane.

* **NOTE:** The **UP ARROW** is also a backup switch which will start the machine only.

- During operation, the button acts as a **Pause and Resume** Button for the machine.

In the **Return to Foulline Menu**, when the start button is depressed, the machine will automatically return to the approach from the area where the error has happened.

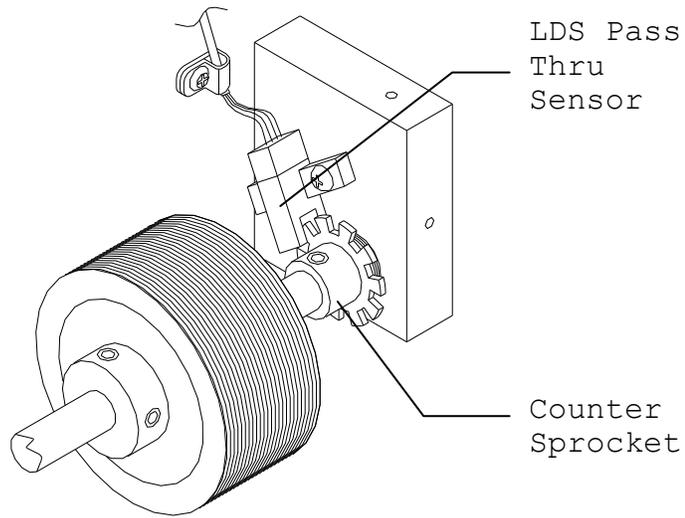
- In the **Duster Control & Reset** screen, the **FIRST** time the button is depressed, the cone-brake motor will unwind cloth until the button is released.

The **SECOND** time it is depressed, the motor will wind-up cloth until the wind-up switch is actuated.

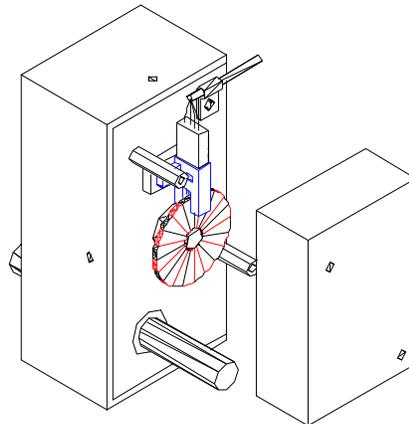
009 Oil Level Float Switch: This switch is located inside of the top right corner of the conditioner tank. This float switch is actuated by the oil level. When the oil level is one inch from the bottom, the float switch is actuated, lighting up the LED #9, and placing a message on the keypad screen.

- 010 Duster Up Switch:** These two microswitches are located on the top side of the Cushion Roller Pivot Arms. When the cloth is wound up, a signal is sent to the PC by one or both of these switches. These switches are wired Normally Open. (LED #10)
(See drawing for Input 005.)
- 011 Pump Tachometer Sensor:** This pass-thru sensor is located on the Oil Pump Motor Assembly, which is mounted on the underside of the machine. The sensor counts each revolution of the pump. (LED #11)
- 012 Left Proximity Sensor:** This sensor is found on the left side of the Conditioning Compartment (1-1/8" from the left side wall). The proximity sensor senses metal, which is in the form of a flat head screw located on the backside of the oil head block. This sensor along with the right sensor have multiple purposes. The main purpose is to reverse the head drive motor. The proximity sensor also acts as a guide for the position sensor by indicating the lane edge when the oil head is traveling from left to right. LED #12 will light up on the input module.
- 013 Right Proximity Sensor:** This sensor is found on the right side of the electrical wall in the Conditioning Compartment (1-1/8" from the right side wall). The proximity sensor senses metal, which is in the form of a flat head screw located on the backside of the oil head block. This sensor along with the left sensor have multiple purposes. The main purpose is to reverse the head drive motor. The proximity sensor also acts as a guide for the position sensor by indicating the lane edge when the oil head is traveling from right to left. LED #13 will light up on the input module.

014 Lane Distance Sensor (LDS): This infrared pass-thru sensor is mounted on the rear of the machine (on the right pillow block before Serial Number 2459 or on the center block on from Serial Number 2459 and higher). A sprocket passes through this sensor as the shaft turns. It counts in one inch increments as the machine travels down the lane. If this counter does not receive one pulse to the Drive Shaft Tach Sensor's three pulses the machine will give either a *Forward* or *Reverse Travel Error Message*. LED #14 will flash very quickly.

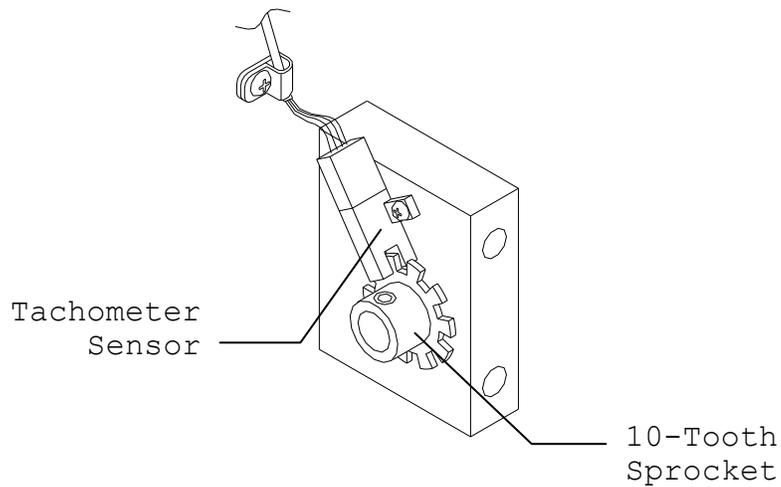


Original Design of the Lane Distance Sensor & Sprocket

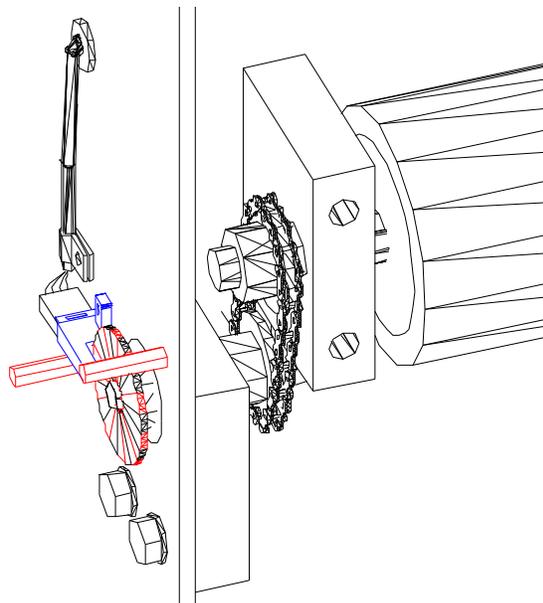


Lane Distance Sensor on 2459 and Up

015 Drive Shaft Tachometer Sensor: Mounted to the left side of the machine is the TACH sensor. A ten-tooth timing sprocket is rotated by the drive shaft. As the teeth of the sprocket pass through this sensor pulses are sent to the PC. The PC counts these pulses and calculates the **IPS** (INCHES PER SECOND) travel speed of the machine. This is used to set the 7 different speeds of the machine. It also is used in the program to sense if the machine's drive wheels are slipping. The PC compares the rate of pulses coming from the tach sensor to the rate of pulses coming from the LANE DISTANCE SENSOR. LED #15 will flash very quickly.



*Original Design of
Tachometer Sensor & Sprocket*



Tachometer Sensor & Sprocket on 2459 and Up

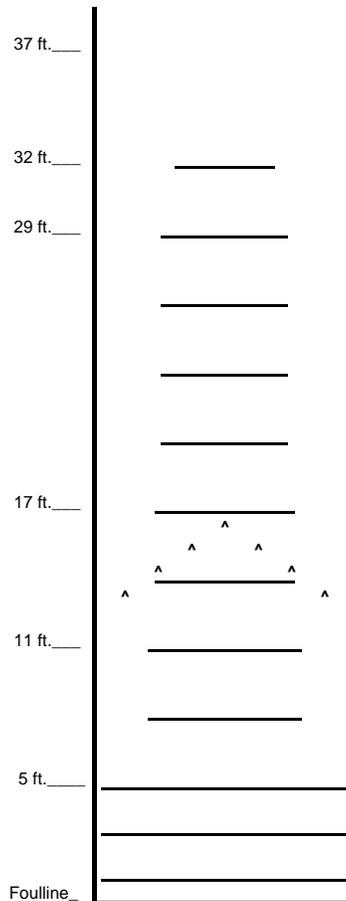
SECTION VIII - Oil Patterns

A. Understanding the Machine

How the machine controls the amount of oil.

The machine is capable of applying precise amounts of lane conditioner. An explanation of how this is accomplished will help you understand the operation of the machine.

When conditioning a lane the head travels back and forth across the transfer roller, applying streams of oil as it goes. The streams (or loads) are shown in this figure.



The size of the stream can be set to an exact amount or volume. We achieve this exact stream volume by using a highly accurate fluid metering pump. This pump, running at a constant speed, gives absolute positive displacement of the oil. The accuracy of the pump is $\pm 1\%$.

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The oil head traveling at a constant speed lays down the same amount of oil as it travels across each board. The pump allows us to set the exact amount of oil that goes on each and every board within the stream. We measure this amount as the **Volume Per Board**.

The pump output is measured in *microliters*, a very small quantity. This is a metric measurement for fluid volume. The factory setting for the pump is 40 microliters per board.

To give you a visual perspective of how much oil is being applied in 40 microliters, we'll measure only one drop of oil. About 16 microliters make up one drop of oil. So each time a stream of oil crosses one board, it applies less than 3 drops of oil.

 = 16 microliters

Since three drops of oil are too small to measure with the naked eye, we must use a minimum of 100 boards to get an amount we can visibly measure. Using 100 boards also makes the math much easier.

The following exercise teaches you to calibrate the machine to confirm the factory pump setting. The pump should be set at 40 microliters per board.

1. Apply power to the machine and menu to the:

*** SANCTION START**

MENU

2. Press **MENU** three times to access the:

*** PUMP OUTPUT**

VOLUME TEST

No Password is needed to access this menu.

3. a.) If the machine is already warmed up, press **NEXT** twice to access the:

TEST: VOLUME PER

BOARD HIT: <-->

If the pump has been running skip to Step 8.

- b.) If the machine is not warmed up press **NEXT** three times to access this display:

TEST:VOL PER REV

FOR 0490 REVS

The pump will begin running as soon as this screen appears. The pump should run between 460 and 510 at 60 Hertz and 385 to 430 for 50 Hertz.

4. Place a small container under the calibration outlet on the left rear panel.
5. When the **LEFT ARROW** is pressed the number on the screen will change to zero and the pump output will begin running out of the calibration outlet.

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6. Run this test several times, until the number of revolutions on the screen stops at the same number each time. This indicates the pump is running consistently. The number of revolutions should typically fall between 480 - 510.
7. Once the pump is warmed up, press the **LAST** key to return to this screen:

**TEST: VOLUME PER
BOARD HIT: <-->**

8. Place a **CLEAN** 25 or 50 milliliter graduated cylinder under the calibration outlet.
9. Press the **LEFT ARROW** to start the pump and wait about 5 seconds.
10. Then press the **RIGHT ARROW** to start the head travel. The output of the pump is routed to the calibration outlet instead of the transfer roller.
11. The head will travel back and forth 4 times, depositing oil from **2-to-2** twice and **14-to-14** twice in the graduated cylinder. This is equivalent to a total oil stream of **100 boards**.
(37 + 37 + 13 + 13 = 100)
12. Remove the graduated cylinder and read the amount. If the pump is set at 40 microliters, then the output in the cylinder should be 4000 microliters or **4 milliliters**.

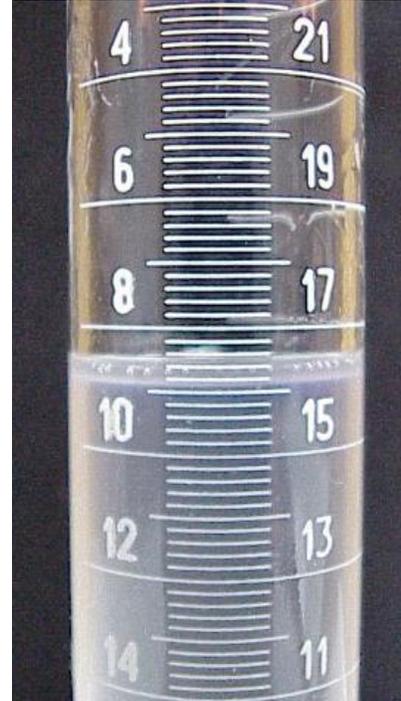
NOTE: There are 1000 *microliters* (unit of measurement for pump) in one *milliliter* (unit of measurement for graduated cylinder), we divided 4000 by 1000 to get 4.

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13. This test should be ran **4 times** into the same graduated cylinder. This will multiply the deviation of the pump (from 40 ml) by 4 times, making it more visible in the graduated cylinder.

14. After running the test four times the amount in the cylinder should be **16 mL** (read bottom of bubble as shown in diagram).

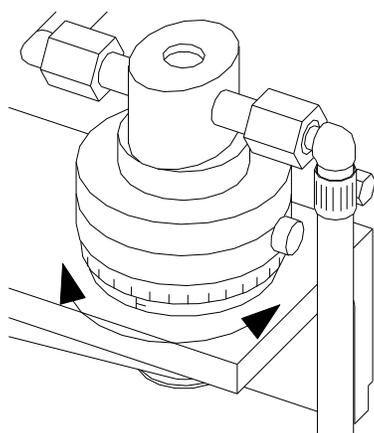
15. If the amount of oil is higher or lower than 16, a pump adjustment is necessary. (Note: Check to make sure the head is moving freely. If it binds up during travel the oil output may be affected.)



16. Beneath the cover on the bottom of the machine is the pump assembly. The diagram shows the calibration ring of the pump. If an adjustment is necessary, turn the dial only about 1/2 microliter.

Each small mark on the dial is 1/10 microliter, each large mark is a one microliter change in the output of the pump per 1 revolution of the pump. The pump is revolving at 3400 RPM. At the speed the oil head is traveling across the transfer roller, the pump actually revolves about 2-1/2 revolutions as it crosses one board.

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Clockwise will decrease the output and counterclockwise will increase the output. (Remember the amount above was the output of four tests.)

17. Clean out the graduated cylinder using the long felt wick that is provided with the machine. A thorough cleaning is important because any oil left clinging to the sides of the cylinder will give inaccurate readings.

NOTE: When felt gets soaked with oil it can be cleaned by squeezing it in a rag.

18. Repeat steps 8 through 17 to check any adjustments that were made (i.e. If a change makes the output too low, then unscrew the pump about 1/2 of the amount it was previously adjusted.)
19. Keep repeating the test until the amount in the graduated cylinder reads **EXACTLY 16 mL**.

This calibration sets the machine to a standard stream size of 40 microliters per board. This allows us to "prove" the oil pattern that is programmed into the machine.

B. Proving the Oil Pattern

We will use some sample settings for Program #1 as an example. The chart below shows the number of boards crossed for each load and how many times this load is applied.

PROGRAM 1

2 - 2 x 4 (Forward Loads)
 9 - 9 x 1
 10 - 10 x 2
 11 - 11 x 3
 12 - 12 x 1
 13 - 13 x 1

12 - 12 x 2 (Reverse Loads)
 11 - 11 x 2
 10 - 10 x 2
 8 - 8 x 1
 8 - 8 x 1

Each load can quickly be condensed to a total number of boards by referring to the Board Chart at the beginning of the Lane Graphs Section. Using the Board Chart we can determine that a load or stream of oil from **2 - 2 covers 37 boards.**

After converting all the loads for Program 1, the numbers become very simple.

PROGRAM 1

37 x 4
 23 x 1
 21 x 2
 19 x 3
 17 x 1
 15 x 1

17 x 2
 19 x 2
 21 x 2
 25 x 1
 25 x 1

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When all these loads are multiplied and added together, the result is the total number of boards that are covered by a stream of oil.

PROGRAM 1

37	x	4	=	148
23	x	1	=	23
21	x	2	=	42
19	x	3	=	57
17	x	1	=	17
15	x	1	=	15
17	x	2	=	34
19	x	2	=	38
21	x	2	=	42
25	x	1	=	25
25	x	1	=	<u>25</u>

466 Total Boards

In our example there are 302 boards covered during forward travel and 164 boards covered during the reverse travel. This total number (466) can be multiplied by the pump setting (40 ml) to determine the exact amount of oil used when conditioning with this pattern.

466	Boards
<u>x 40</u>	microliters
18,640	microliters

The total amount is 18,640 microliters. To convert this to milliliters the number has to be divided by 1000.

$18640/1000 = \mathbf{18.64 \text{ milliliters}}$

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This total program amount can be tested by running a **PROGRAM # VOLUME TEST**. The following exercise will make you familiar with this procedure.

1. Apply power to the machine and menu to the:

*** SANCTION START
MENU**

2. Press **MENU** three times to access the:

*** PUMP OUTPUT
VOLUME TEST**

3. Press the **NEXT** key to access this screen:

**TEST: PROGRAM #01
FWD OIL VOL.<-->**

In this screen the PC will run only the oiling part of the program.

4. The program number is displayed in the upper right corner of the screen. If the number is different than the one you want to check, use the UP or DOWN ARROWS to change to the correct program number.

**TEST: PROGRAM#01
FWD OIL VOL.<-->**

5. Place a CLEAN graduated cylinder under the calibration outlet.
6. Press the **LEFT ARROW** to start the pump and wait about 5 seconds.

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7. Then press the **RIGHT ARROW** to start the head travel. The output of the pump is routed to the calibration outlet instead of the transfer roller.
8. When the head stops moving, the FWD in the bottom left corner of the screen will change to **REV**. This tells you the machine is now ready to apply the reverse oil loads.

TEST: PROGRAM#01

REV OIL VOL.<-->

9. Press the **LEFT ARROW** to start the pump and wait about 5 seconds.
10. Then press the **RIGHT ARROW** to start the head travel and dispense the 3 reverse loads.
11. When the head stops moving, remove the graduated cylinder and read the amount of oil.
12. The bottom of the oil line should be between **18.5** and **19** milliliters.

Running this test 3 or 4 times should be enough to convince anyone of the machine's accuracy and repeatability. Any time you run a different program you should calculate the total boards and volume.

Blank worksheets are provided at the back of the lane graph section to assist with this task. Having the total output for the program will insure that the program values are entered correctly. It will also help you to better understand each change you do make.

C. Board Chart for Calculating Program Loads

This chart shows the total number of boards the head travels across when distributing conditioner. This will make it much easier to determine the amount of oil that is used for your pattern, on paper, before it is measured by the machine through the Program Calibration Test.

		R I G H T																		
		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
L E F T	2	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19
	3	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18
	4	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
	5	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
	6	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15
	7	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14
	8	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13
	9	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12
	10	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11
	11	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10
	12	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9
	13	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8
	14	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7
	15	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6
	16	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5
	17	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4
	18	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3
	19	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	*
	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	*	*

* Each load of oil must cross at least three boards.