AGL Corporation

EZ - PAV™
Sonic Paving System

Cedarapids
A **Terex** Company

22806 (01/02)

Cedarapids
A Terex Company

To the Owner & Operator:

We have tried to provide information that gives our customers a clear understanding of equipment construction, function, capabilities and requirements. This information is based on the knowledge and experience of qualified people at our company and in our field organization. Proper use of this information rewards users of our equipment with high efficiency, maximum service life and low maintenance costs. That is why we strongly recommend that anyone using our equipment be familiar with this manual.

Information presented here should not be considered authoritative in every situation. Users will as a matter of course encounter problems and circumstances that raise questions not anticipated here. Such questions should be directed to their distributor or the factory.

Anyone who uses this equipment for any purpose other than that for which it was intended assumes sole responsibility for dangers encountered and injuries sustained as a result of such misuse.

⚠DANGER

Federal, state and local safety regulations aim to protect both people and property from accident, injury and harmful exposure. When complied with, such regulations are often effective. Hazards to personnel and property are further reduced when this equipment is used in accordance with all operation and maintenance instructions. Generally:

(1) Read and heed all danger, warning, caution, and notice decals. Know what guards and protective devices are included and see that each is installed and in operational condition. Additional guards and protective devices may be required and must be installed by the user (owner) before operating.

(2) Never attempt to maintain, lubricate or adjust this equipment while it is running. Lock out and tag out all energy sources before doing maintenance, cleaning, adjusting or repairing this equipment. Make it impossible for anyone to start this machine while others are working on it or in it.

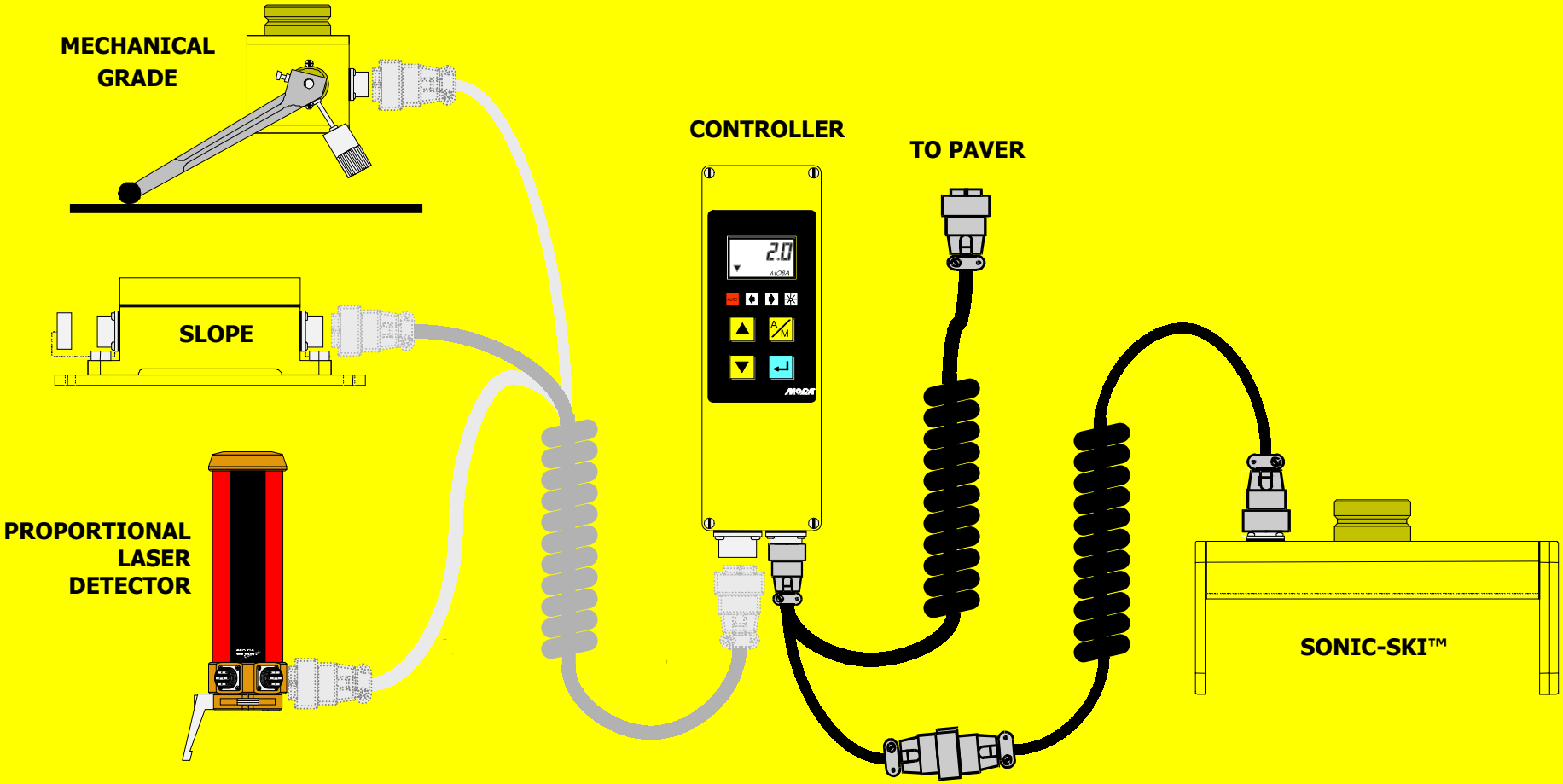
(3) Wear personal protective equipment such as hard hats, ear plugs, safety glasses and safety shoes when operating this equipment. Do not wear loose clothing or long hair.

(4) Think safety and act safely. Stay alert at all times. Eliminate or neutralize potential hazards as soon as you spot them. Never allow anyone to engage in horseplay when near this equipment.

⚠DANGER

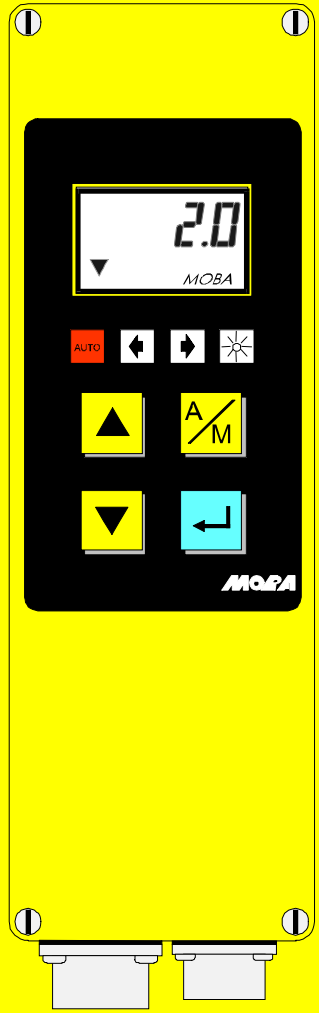
Failure to take these precautions will result in death or severe personal injury.

EZ-PAV™ System Overview



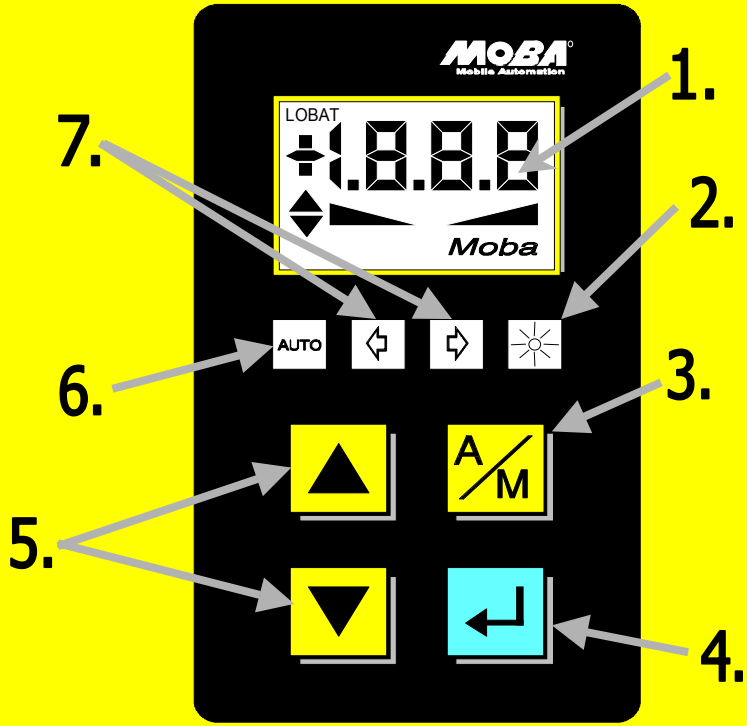
The Controller

- The controller is the interface between the operator and the EZ-PAV™ System. It allows the operator to:
  - Null the sensor
  - Switch from manual to automatic or automatic to manual mode.
  - Increase or decrease the set point.
  - Displays the position of Sonic-Ski™ above string line.
  - Adjust the sensor sensitivity.
  - Set up machine specific parameters.
  - Displays system fault conditions.
- The controller compares the elevation or slope sensor input value to the stored set value. If the controller is in automatic and there is a difference between the input value and set value the controller sends a correction signal to the hydraulic circuit.



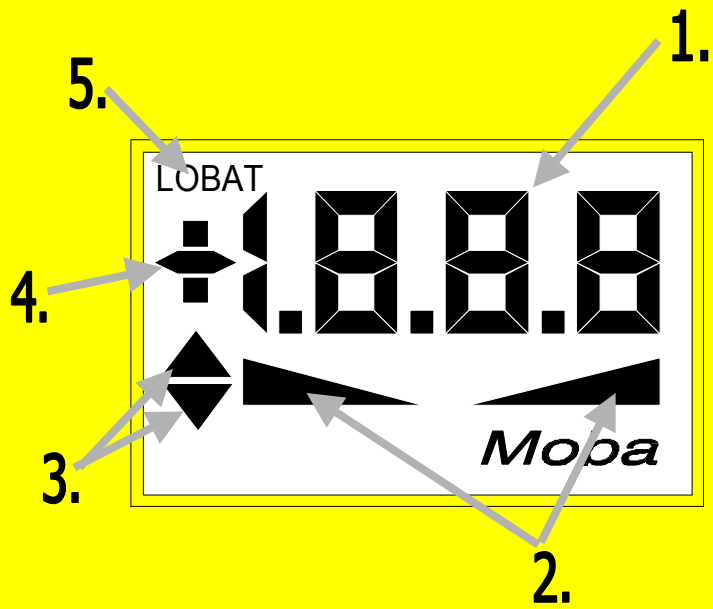
The Control Panel

1. LCD (Liquid Crystal Display)
2. String line mode indicator
   ON = String Line Mode ON
   OFF = String Line Mode OFF
3. Automatic/Manual Button
Switches System From Manual to Automatic or Automatic to Manual.
4. Set Button
5. Increase/Decrease Buttons
6. Automatic Mode Indicator
7. String Line Move Left or Move Right Indicator.



The LCD

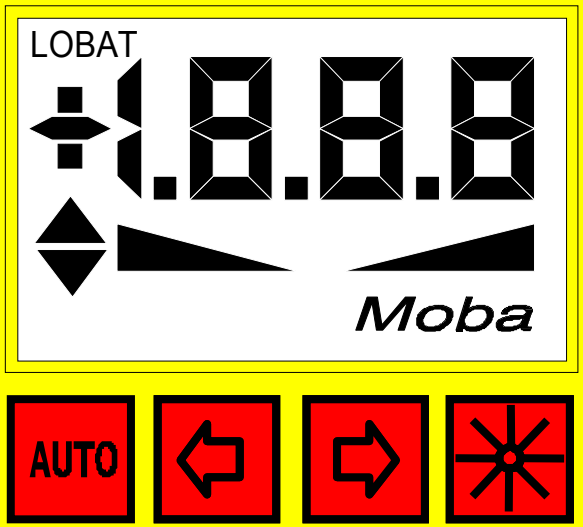
1. Numerical value for elevation or slope.
2. Slope direction indicator.
3. Direction of the grade or slope correction.
4. Negative value indicator.
5. Internal memory battery condition.

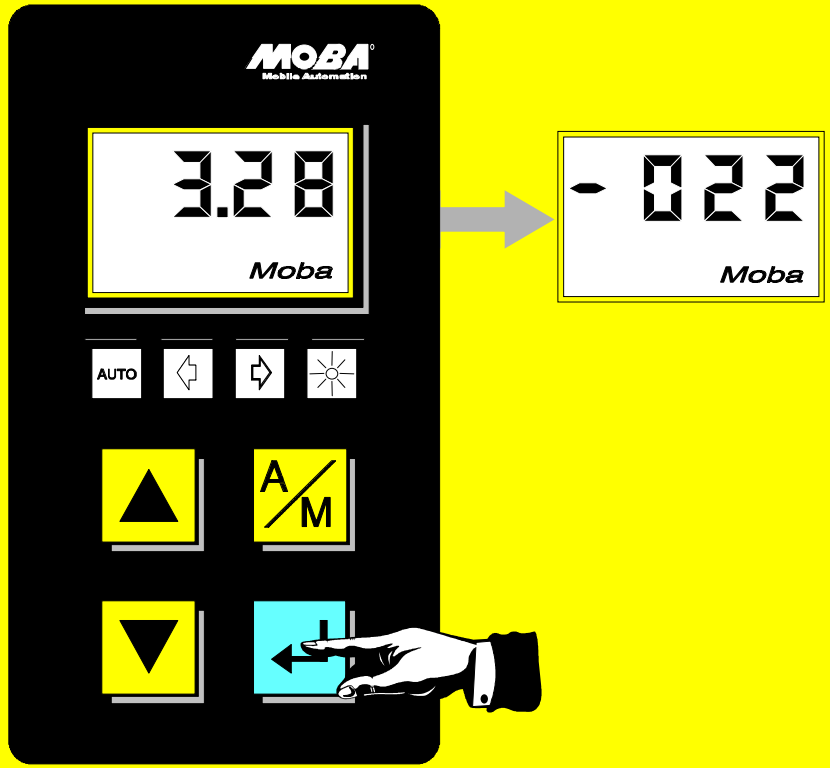


The Power On Self Test (POST)

When power is first applied to the controller it runs a (POST) routine and gives the operator an opportunity to check the LCD segments and the lamps. The indication should as shown below.

If the operator presses any button during the (POST) test the controller will display its software version.

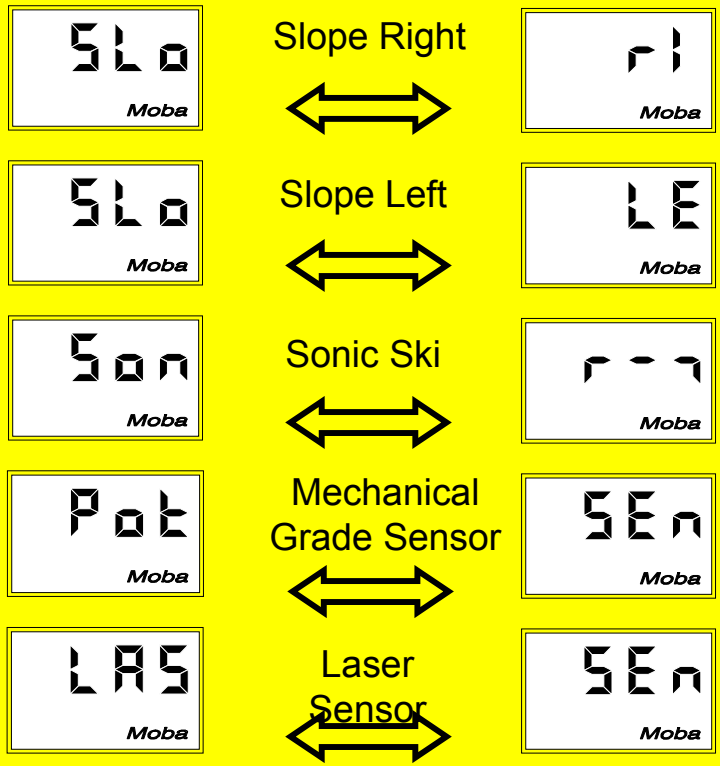




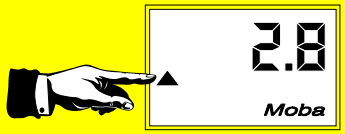
The current software version is 3.28-022. The display will alternate between the 3.28 and 022 for 5 seconds and then revert to the work display.

Sensor Identification Indications

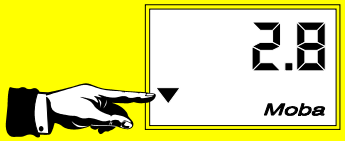
After the Power On Self Test the controller indicates with an alternating display, the type of sensor that is connected. During the display of the sensor type the two direction lamps flash. If the controller was attached to the same sensor when it was last powered up it will show the sensor type twice and then go to the last known reference distance. If the controller was previously attached to another type of sensor the sensor identification will continue to alternate between the two displays until you acknowledge the new sensor type by pressing the SET button.



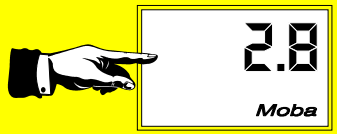
Typical LCD Indications (Work Window)



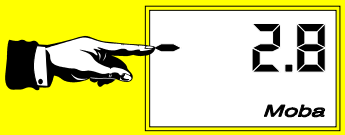
1. Raise arrow, indicates the controller hydraulic output.



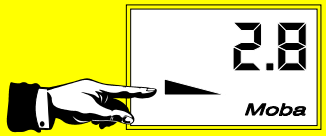
2. Lower arrow, indicates the controller hydraulic output.



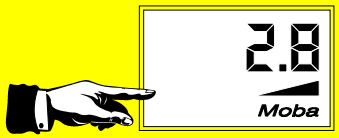
3. Positive Indication.



4. Negative Indication



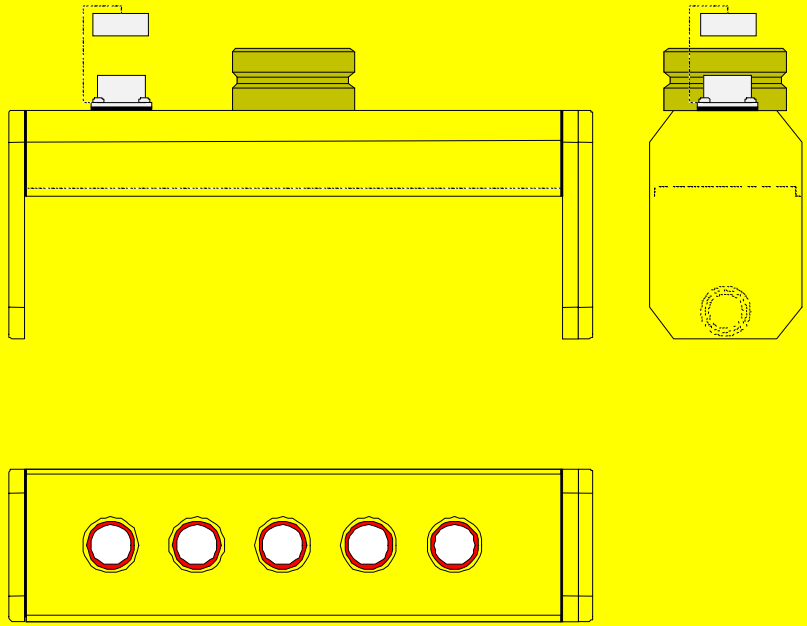
5. Slope to the Right.



6. Slope to the Left.

The Sonic-Ski™

- More accurate than the single sonic sensor.
- Accuracy to ±1/16 inch.
- Better temperature compensation than single sonics because the Sonic-Ski™ is physically closer to the reference.
- 12” to 16” typically instead of 18” to 30”
- **Ultra reliable** ceramic transducers instead of the flimsy foil transducers found in single sonics.
  - No need to replace transducer because of contamination. ***The EZ-PAV™ sonic element doesn’t fail.***
- A 10” steering zone above sting line with no error due to the position of the Sonic-Ski™ above string line. A single sonic might get 6” if it is 30” above the string line, but the last inch left or right will produce almost 1/2” error compared to the center of the sensor.

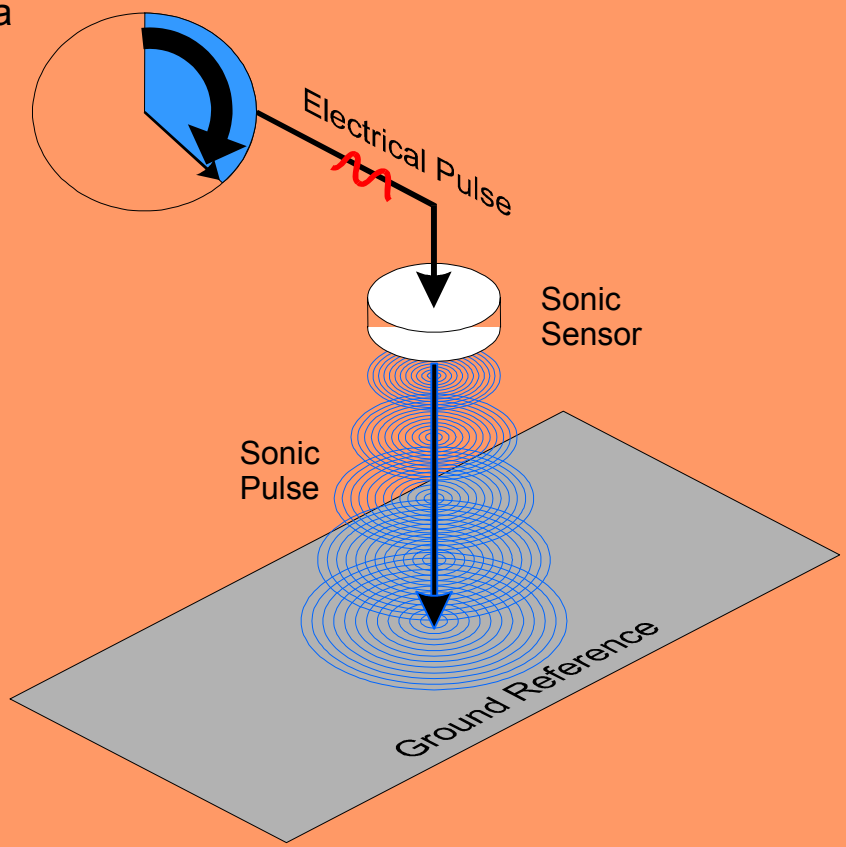


How Sonics Work

• A pulse is transmitted from the sonic sensor and a timer (stop watch) starts

•The sonic pulse travels to the ground or string line reference at the speed of sound.

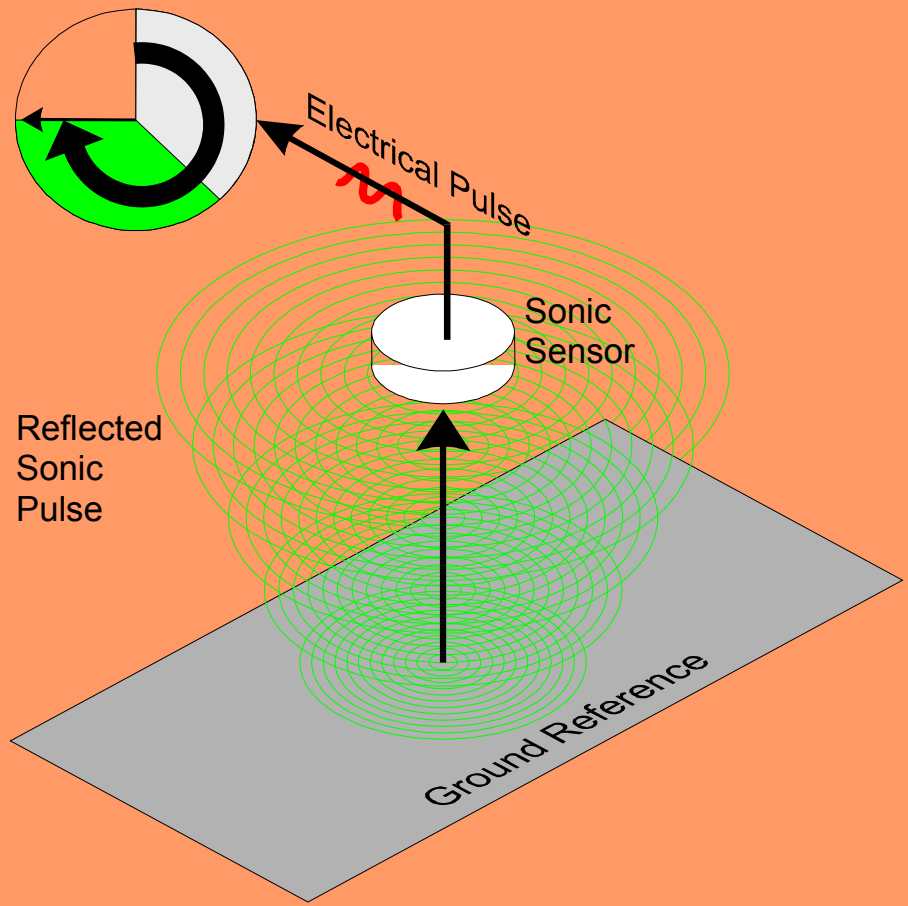
•The timer continues to run.



Transmitted Sonic Pulse

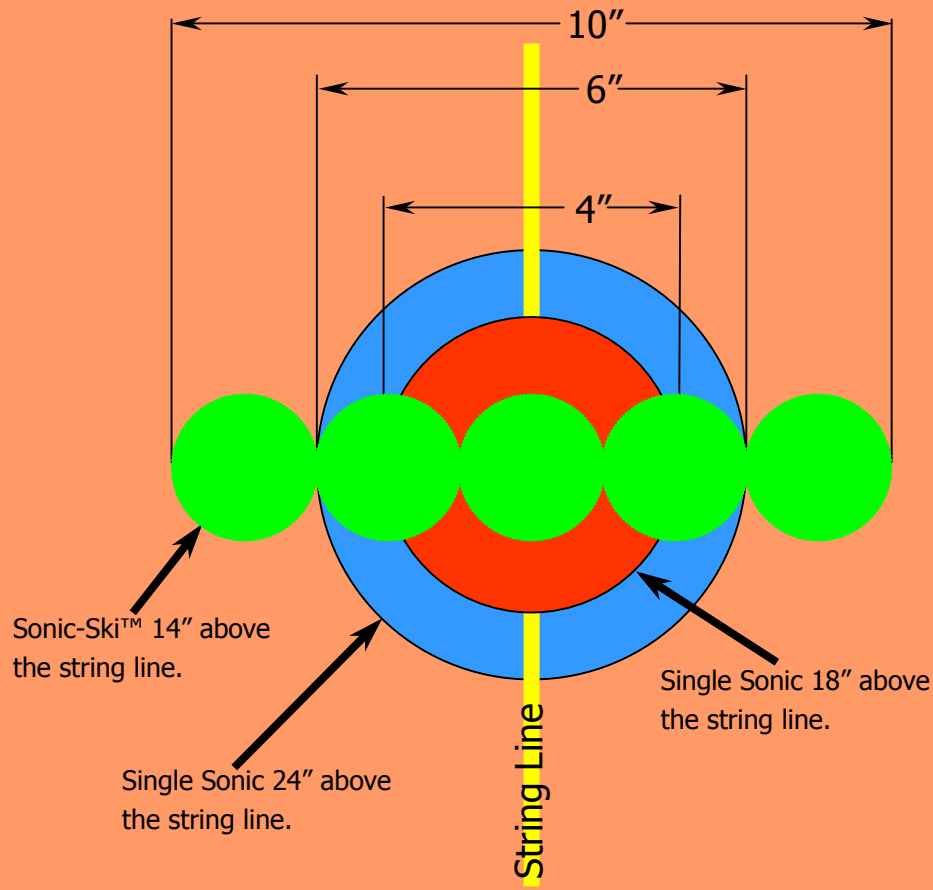
How Sonics Work

- The sonic pulse is reflected off of the reference.
- The reflected sonic pulse travels back to the sonic sensor.
- When the reflected sonic pulse strikes the sonic sensor the timer stops.
- The distance is determined by time it took the sonic wave to travel from the sonic sensor to the reference and return to the sonic sensor.



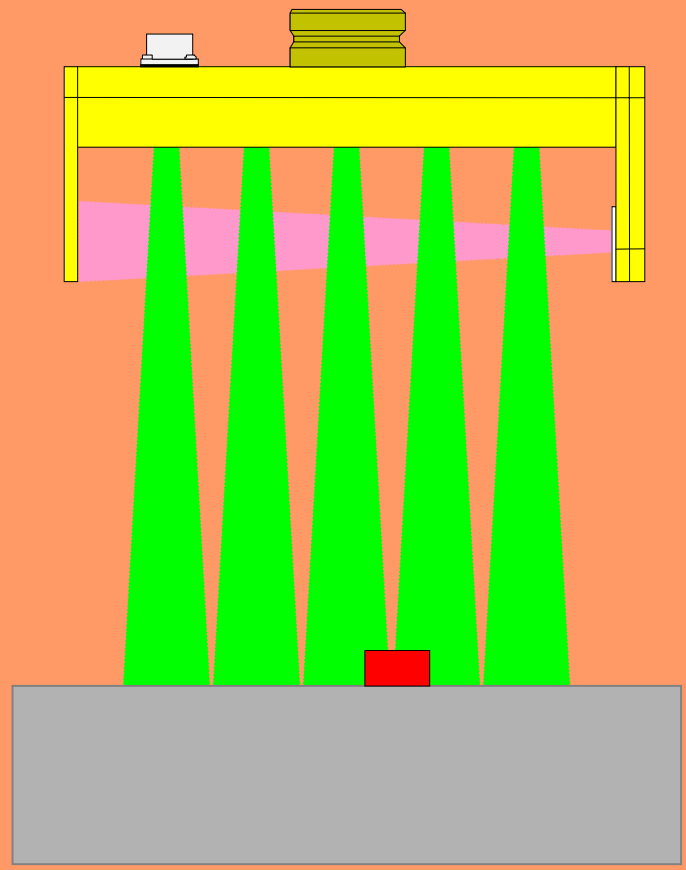
Footprint Comparison

- String Line Following
- The EZ-PAV™ system with the Sonic-Ski™ reduces some of the hassle when working with string line.
- 10” detection width. When compared to a single sonic with a 6” detection width or a mechanical sensor with an 8” detection width, the Sonic-Ski™ has an advantage.
- The single sonic has a problem when the sensor is not directly above the string. If the string is at the edge of the 6” detection width the error at the sensor will be more than 1/2”. That’s only 3” off the line of travel. At 5” off of the line of travel if the sensor will still pick up the string the error is more than ½”.



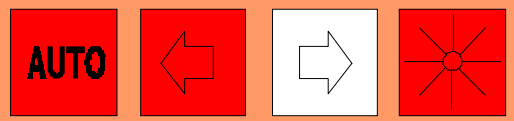
Sonic-Ski™ Ground Sensing

- Joint Matching :The footprint of the Sonic-Ski™ is 10” by 2” at 14” above the string or surface. When debris is detected only one of the sensors typically see the change in elevation. The other sensors tend to read the actual reference and with the averaging filter a smoother mat is produced.
- For example: A rock is about 1” in height and about 1” long. With the paver traveling about 60’ per minute and the combination of the multiple sonic heads and the filter the actual vertical error produced at the screed is less than 1/8”. Under the same conditions the mechanical grade sensor would cause a vertical error of 1/4” to 3/4” and a single sonic would produce a vertical error of 1/4” to 1/2” , depending on the grade sensor’s electronics ability to filter the error out.

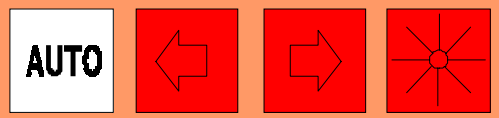


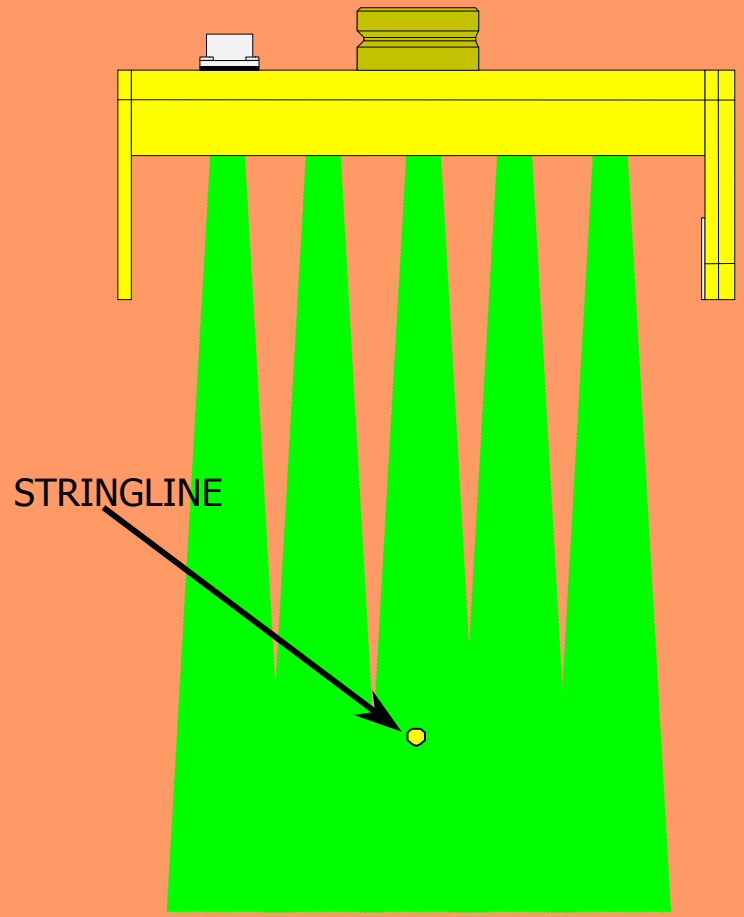
Sonic-Ski™ Over String Line

- String Line Following
  - The Sonic-Ski™ because of its shape and the nearness to the string line enable the operator to better steer the paver keeping the sensor over the string line. The alignment indicator lamps on the controller warn the screed operator when the sensor is about to come off of the string line.



˜If the sensor does move off the string line the controller goes into manual until the string is back under the Sonic-Ski™.

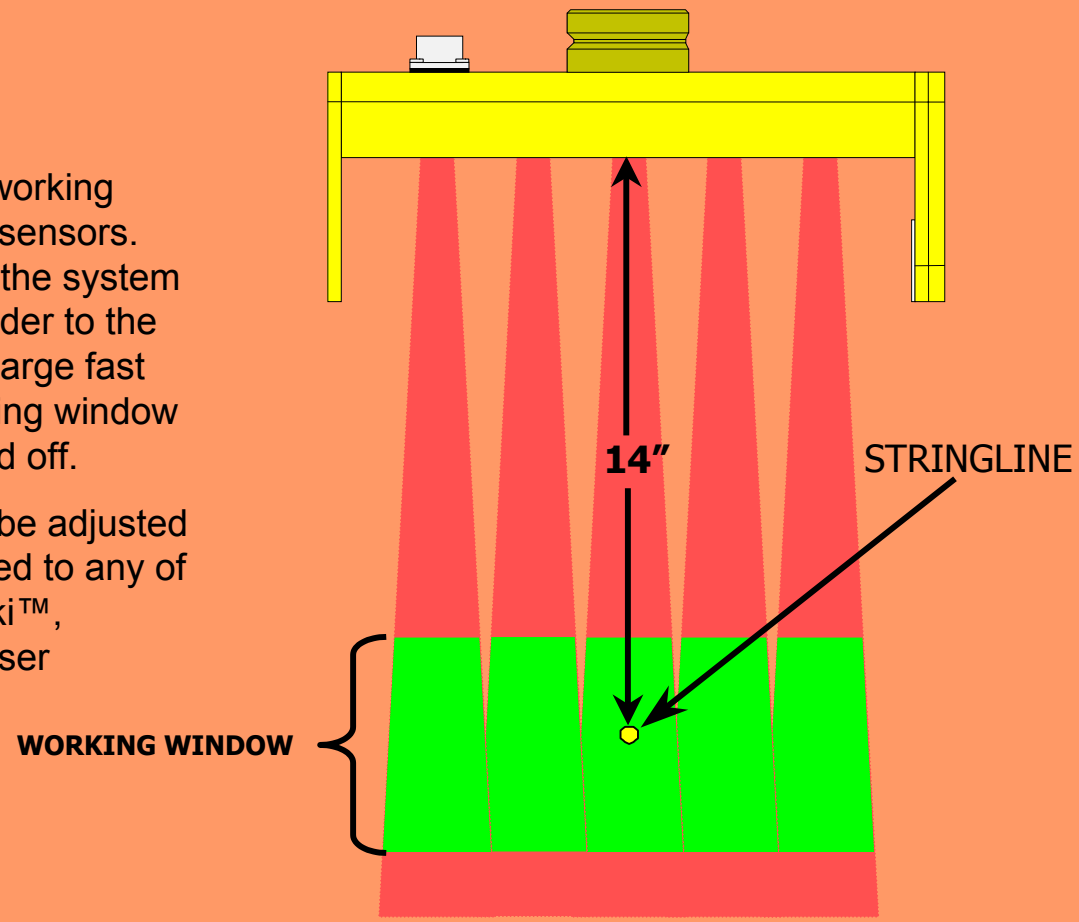




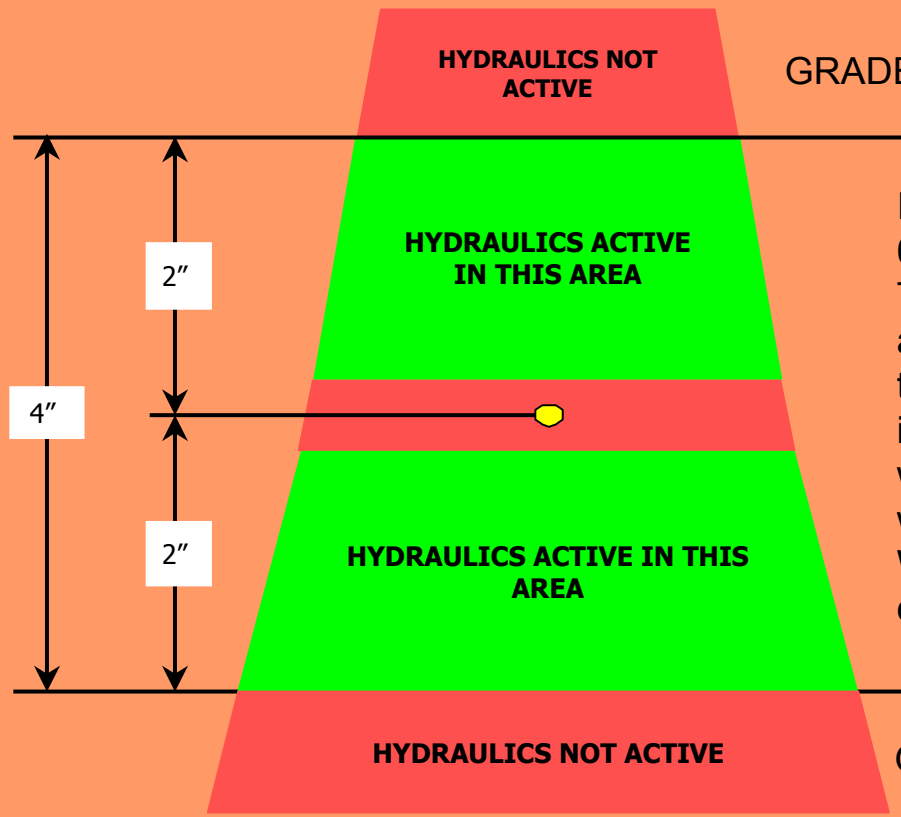
WORKING WINDOW

The EZ-PAV™ system has a working window for all of the elevation sensors. The working window prevents the system form driving the tow point cylinder to the limit if the sensor is reading a large fast change in elevation. The working window is adjustable and can be turned off.

The working window can only be adjusted when the controller is connected to any of the following sensors Sonic-Ski™, Mechanical grade sensor or laser detector.)



WORKING WINDOW CONTINUED



GRADE REFERENCE ABOVE THE WORKING WINDOW

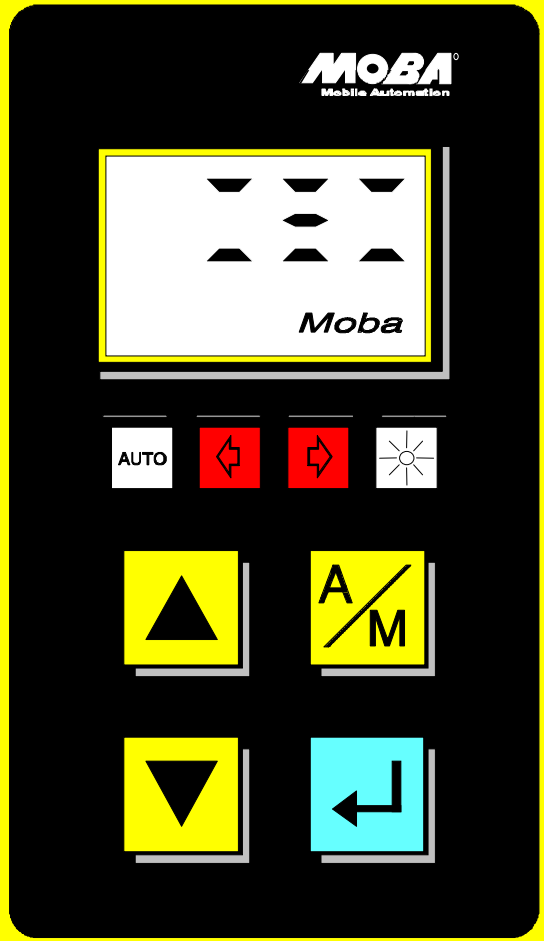
If the working window is set at 4 inches (10.2 cm or 0.33 ft) the total total working window is 4 inches. This means that there is 2 inches (5.1 cm or 0.16 ft) above and below the center of the working window that the hydraulics will be active when the system is in automatic. The area in the center of the working window is called the dead band. Its thickness or width is adjusted with the SE (sensitivity) setting. When using the Sonic-Ski™ and SE is at 6 the dead band is 5/64 of an inch (2 mm).

WORKING WINDOW

GRADE REFERENCE BELOW THE WORKING WINDOW

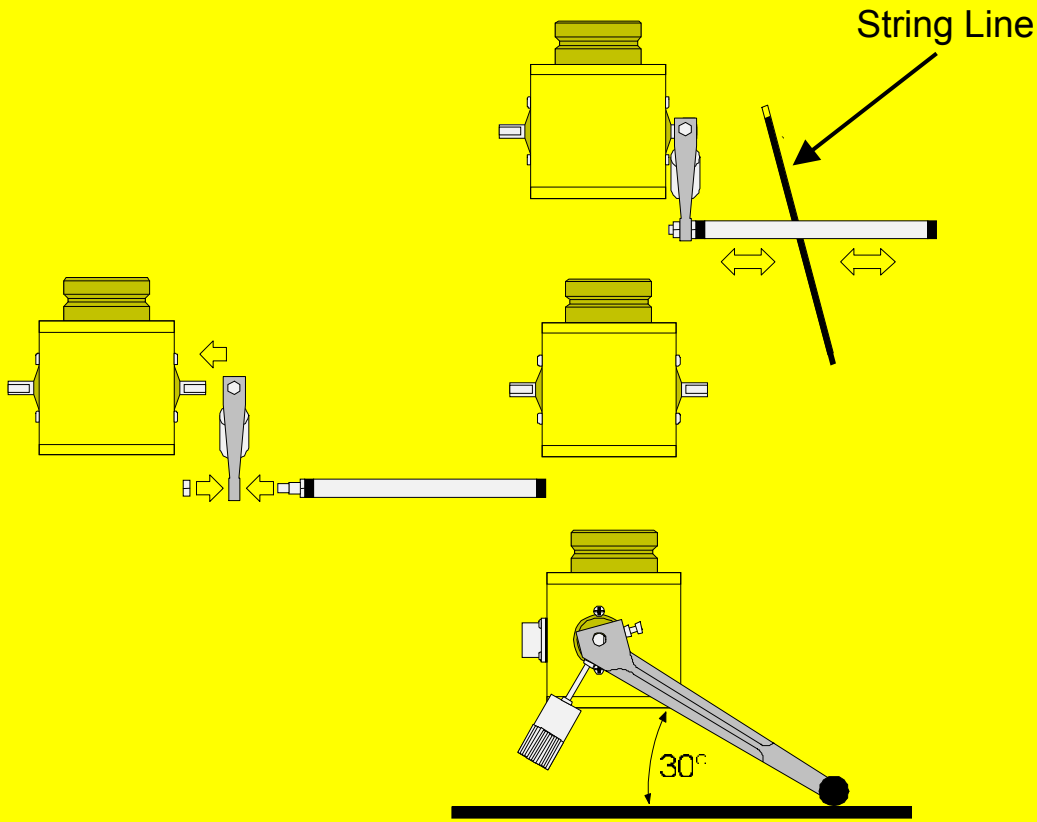
WORKING WINDOW ALARM

If the elevation sensor determines that the reference is out of the working window the controller displays an alarm condition and shuts down the hydraulic valve drivers until the reference is back to the proper height. For example, a crew member places a shovel under the Sonic-Ski™ the working window alarm will appear in the display as shown to the right.



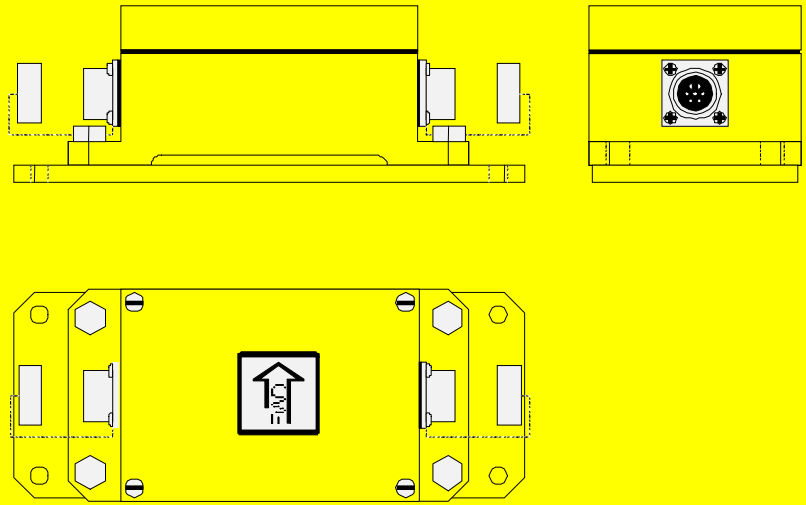
Mechanical Grade Sensor

- Will work in any weather.
- Includes grid arm, string line wand and joint match shoe.
- Measuring accuracy greater than 1/64 inch.
- Null or Zero the sensor by simply pressing the set button on the EZ-PAV™ controller.
- Relative sensor height can be adjusted without a mechanical screw jack to move the sensor. Simply use the the UP/DOWN buttons on the controller for normal adjustments. The adjustment range is about 4” or ± 2” from the set position if the angle of the grid arm is about 30º.



Slope Sensor

- The slope sensor measures and controls the cross slope of the screed. It has a range of ± 25% slope. (3” per foot) The sensing element is a force balance accelerometer. The Force Balance Accelerometer in less susceptible to error due to vibration and temperature than liquid style slope sensors.
- The EZ-PAV™ controller makes slope jobs a breeze. Setting the displayed value in the LCD of the controller is simple and quick. It can be adjusted in the manual or automatic mode of operation.



The Proportional Laser Detector

- The Laser Detector is used for large area's, e.g. parking lots, airport runways, sports complexes, etc.
- It has eight inches of vertical detection area.
- The on grade zone can be adjusted from 1/16 inch to more than an 3/4 inches wide.
- The on grade window can be moved up or down ±3 inches without moving the laser detector physically.
- Simple mounting method.
- Easy set up procedure.

Features & Benefits

- System
  - The most popular system in the world.
  - Widest range of sensor available today.
  - Simple configurations….Plug and Pave.
  - Improves operator safety.
  - Works with a wide range of asphalt pavers.
- Controller
  - Simple operation.
  - Easy 2-button setup.
  - Digital readout.
  - Easy sensitivity (tow point reaction) adjustment.
  - Hand-held operation.
  - Easy to move from one machine to another.
  - Not susceptible to damage from moisture or dust.

Features and Benefits (continued).

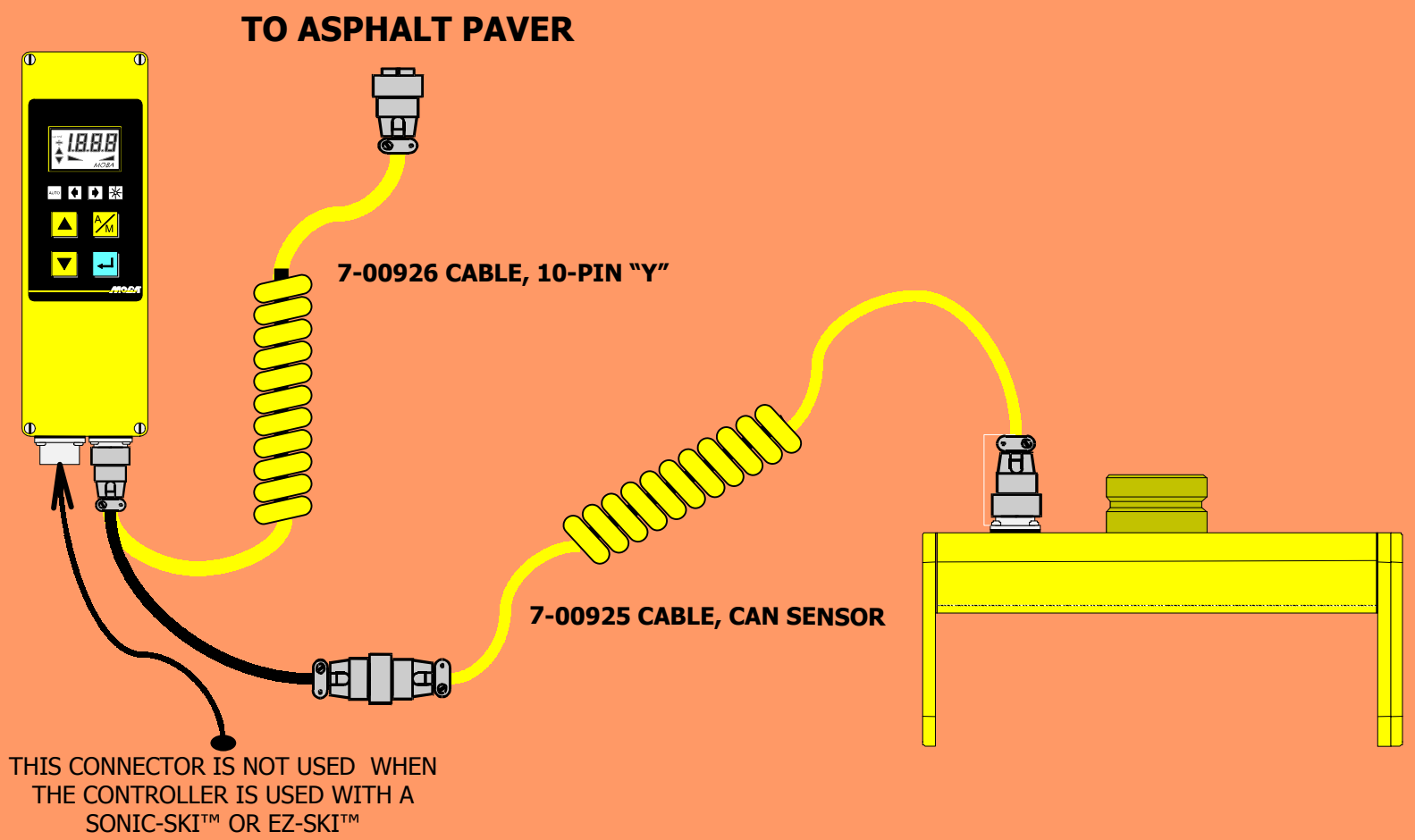
Sonic-Ski™

- The most construction tough grade sensor available.
  - Patented technology.
  - Accuracy of better than ± 1/16 inch.
  - No grid arm balancing act.
  - No wands to bend, break or lose.
  - No wire temperature bails to bend, break or replace.
  - No shoe to bend, break or catch on obstructions.
  - 10 X 2 inch footprint.
  - Ultra-reliable high temperature ceramic sensor technology.
  - Not susceptible to damage from moisture or dust.

Features and Benefits (continued).

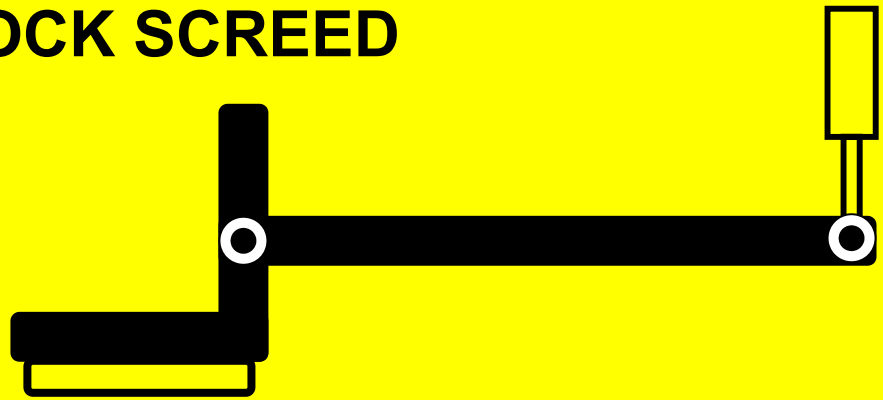
- Sonic-Ski™ ; Joint Matching
  - Works as a joint match shoe without;
    - error due to tack buildup.
    - catching on anything.
    - the see it, pave it problem.
- Sonic-Ski™ String Line Reference
  - 10” sensing width
  - Warns operator when sensor is near its sensing limits.
  - If sensor sees the string-line it is accurate.
  - No deflection of string-line due to contact.
- Slope Sensor
  - Wide sensing range ±25%
  - Stable
  - Durable
  - One button null

EZ-PAV™ QUICKSTART for the SONIC-SKI™ CABLE GUIDE



EZ-PAV™ QUICKSTART for the SONIC-SKI™: OPERATION

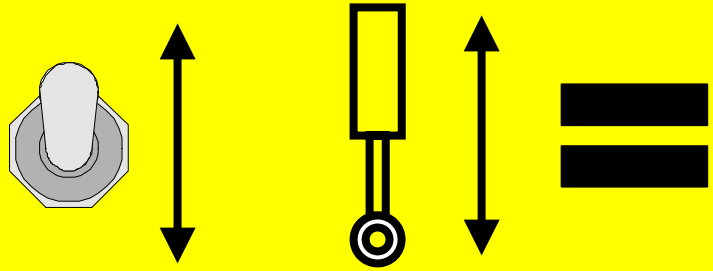
1. BLOCK SCREED



Place blocks under the screed that are the same thickness as the desired thickness of mat.

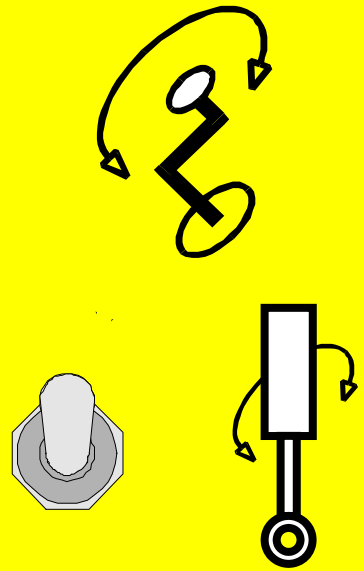
2. CENTER TOW-POINT

Using the tow-point jog switch center the tow point cylinder.



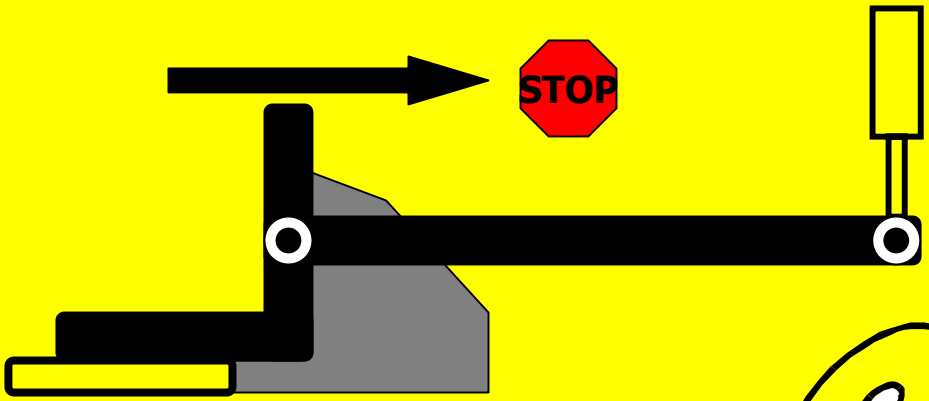
3. NULL THICKNESS CONTROL

Using the thickness control screw or switch null the screed and add about 1 turn increase in thickness.

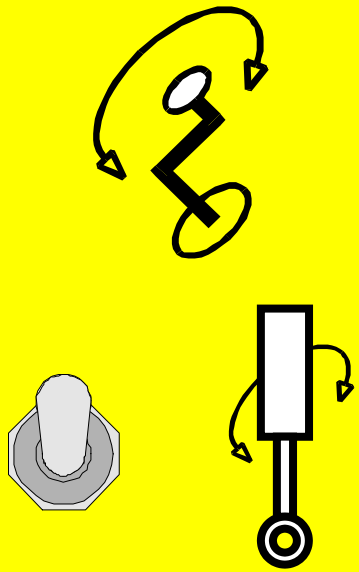


4. LOAD AUGER BOX WITH MATERIAL

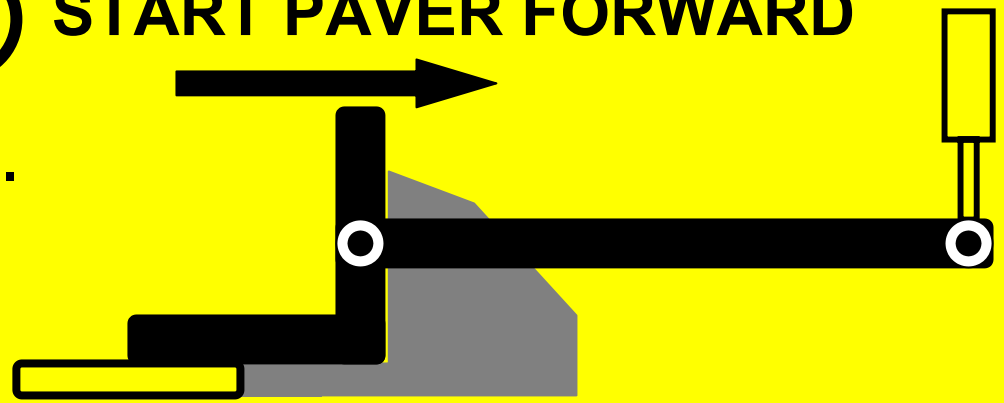
Load the auger box with material, pull forward a couple of inches and STOP.



Check thickness control for null plus a little increase. (Approximately 1 turn of the screw.)



5. START PAVER FORWARD



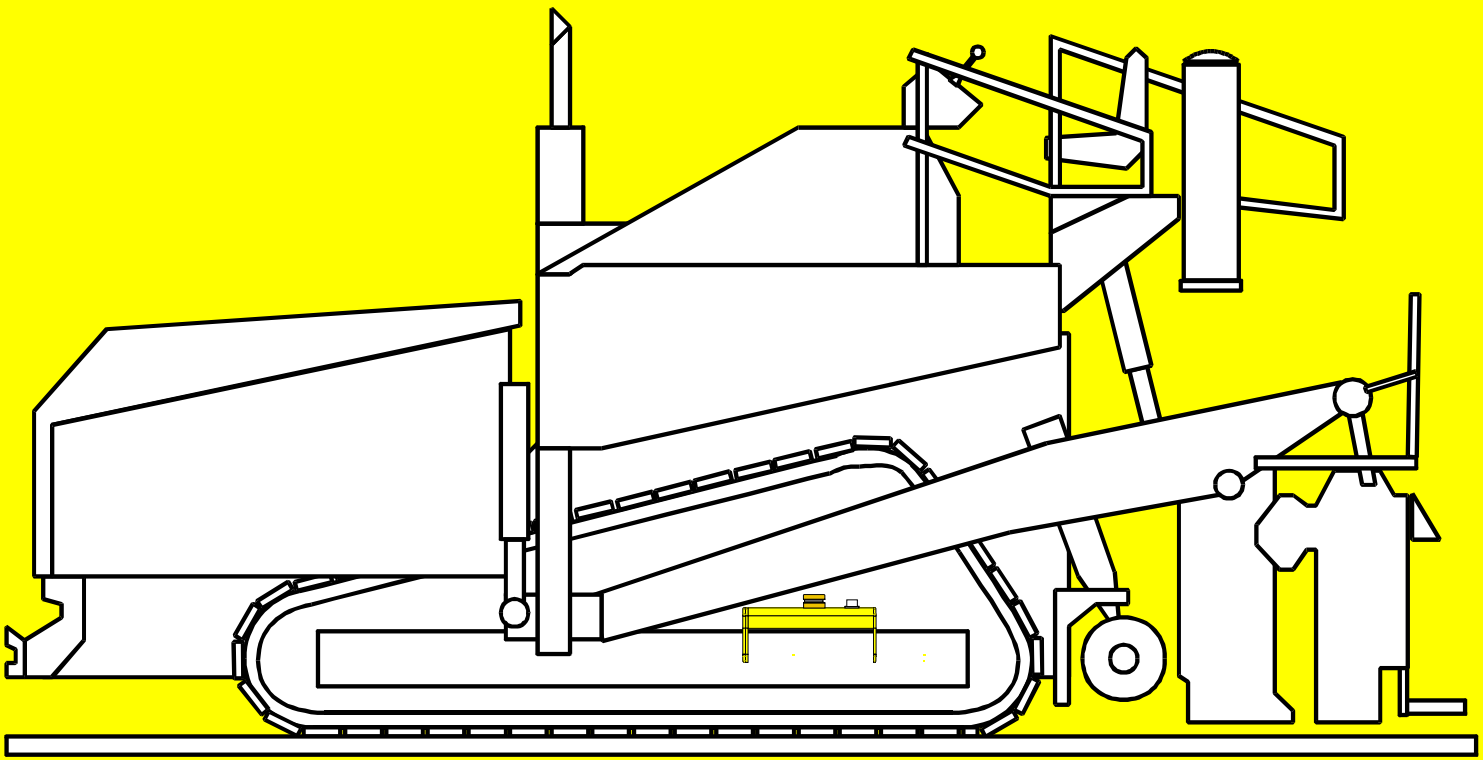
6. PRESS THE SET BUTTON

Press and hold set button until 0.0 appears in the display. (This nulls the sensor to the reference and zero's the display.) Press and release the set button and the sensor is nulled but the display indicates the difference in elevation from the last null point.

7. PRESS THE A/M BUTTON

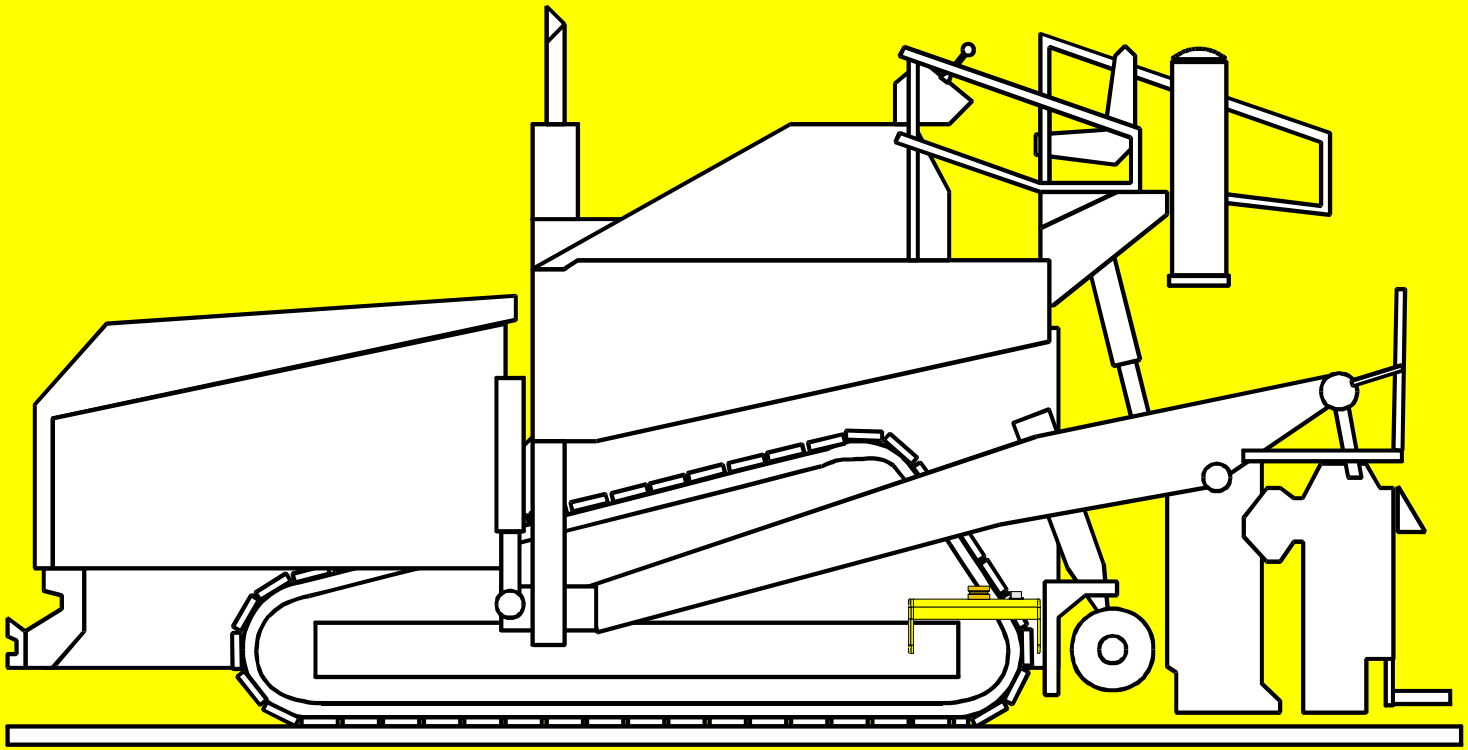
This action switches the controller from the manual mode of operation to the automatic mode of operation.

Sonic-Ski™ Placement



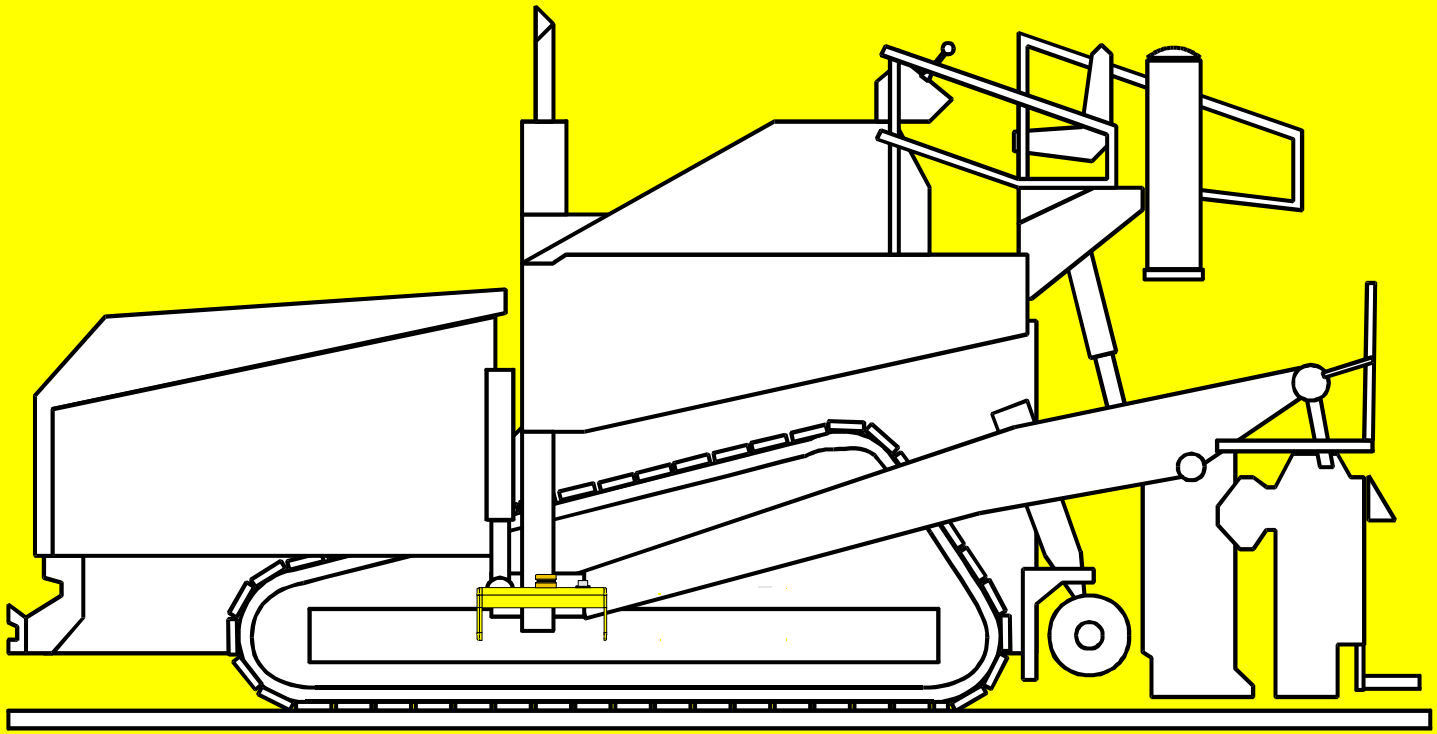
- Typical Position of the Sonic-Ski™

More Reactive Screed



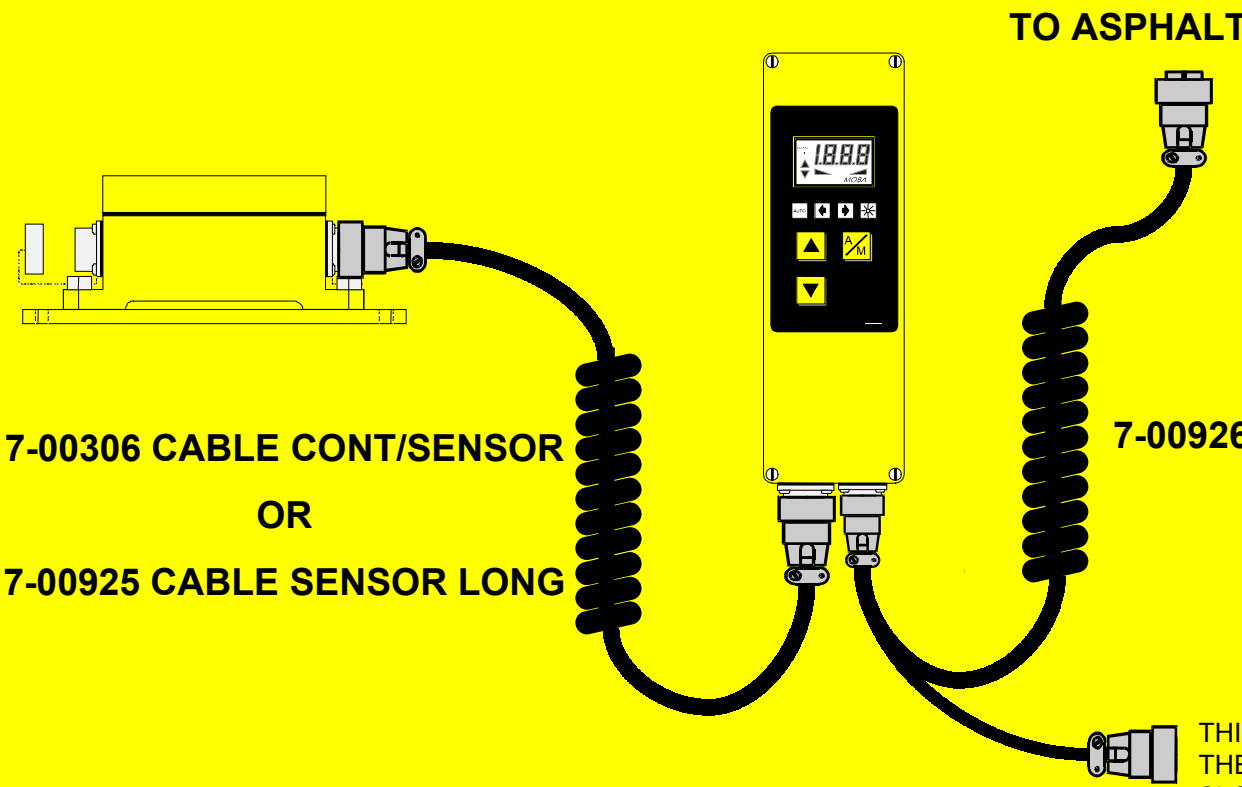
- Joint Matching
- Curb Following

Less Reactive Screed



- Main Line Paving
- Smoothness

EZ-PAV™ QUICKSTART for the SLOPE SENSOR: CABLES & HOOKUP



TO ASPHALT PAVER

7-00306 CABLE CONT/SENSOR

OR

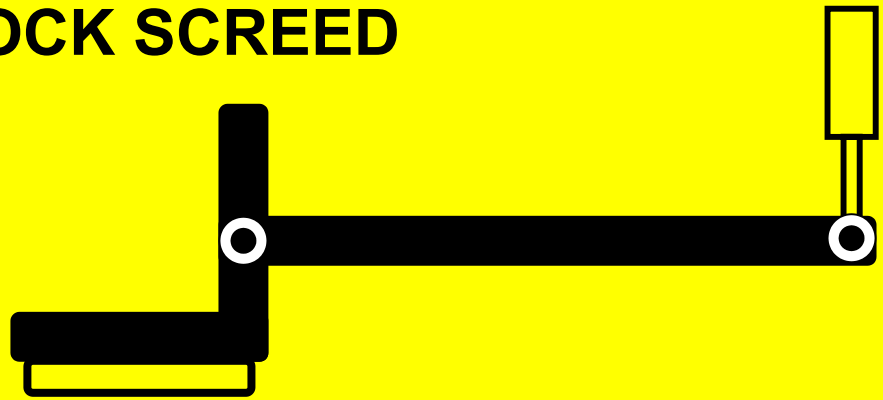
7-00925 CABLE SENSOR LONG

7-00926 CABLE, 10-PIN “Y”

THIS CONNECTOR IS NOT USED WHEN THE CONTROLLER IS USED WITH THE SLOPE SENSOR.

EZ-PAV™ QUICKSTART for the SLOPE SENSOR: OPERATION

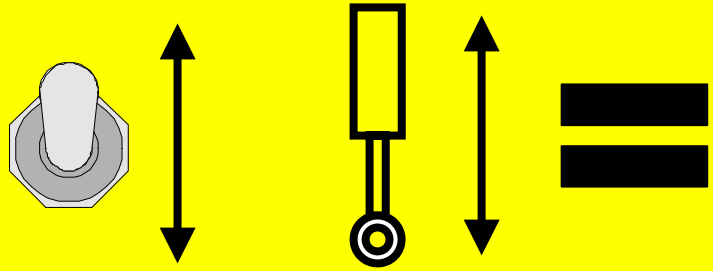
1. BLOCK SCREED



Place blocks under the screed that are the same thickness as the desired thickness of mat.

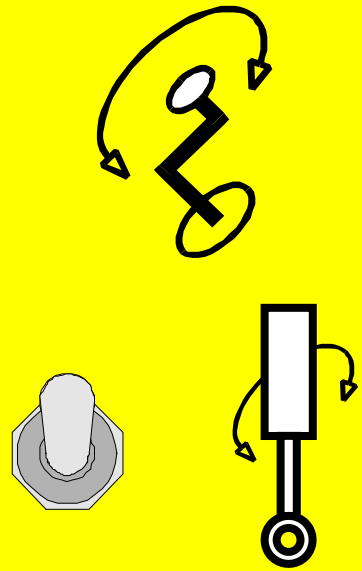
2. CENTER TOW-POINT

Using the tow-point jog switch center the tow point cylinder.



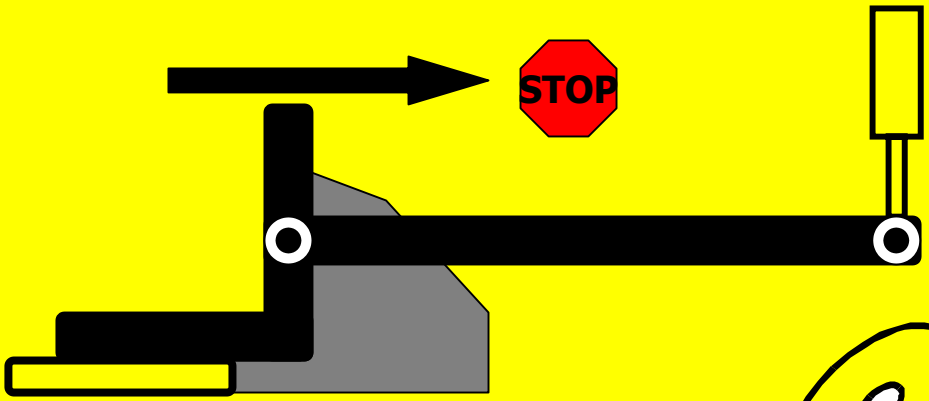
3. NULL THICKNESS CONTROL

Using the thickness control screw or switch null the screed and add about 1 turn increase in thickness.

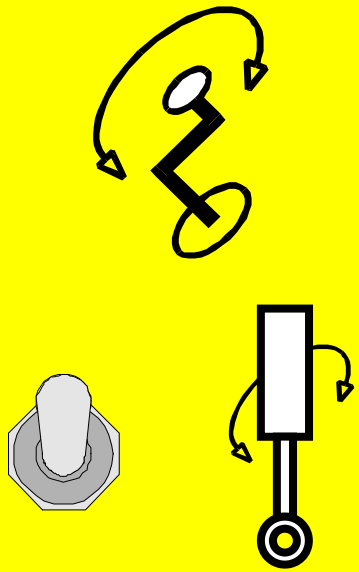


4. LOAD AUGER BOX WITH MATERIAL

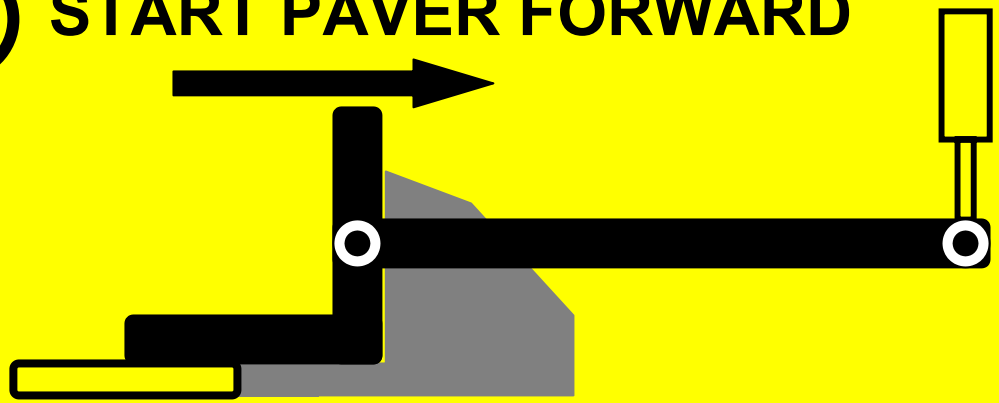
Load the auger box with material, pull forward a couple of inches and STOP.



Check thickness control for null plus a little increase. (Approximately 1 turn of the screw.)



5. START PAVER FORWARD



6. PRESS THE SET BUTTON

Press and hold set button until 0.0 appears in the display. (This nulls the sensor to the reference and zero's the display.) Press and release the set button and the sensor is nulled but the display indicates the difference in elevation from the last null point.

7. PRESS THE A/M BUTTON

This action switches the controller from the manual mode of operation to the automatic mode of operation.

8. Check Slope

After the paver travels forward a few feet (10 to 20) check the slope with a slope board. If the slope board agrees with the display on the controller continue paving. If it doesn't continue to step 9.

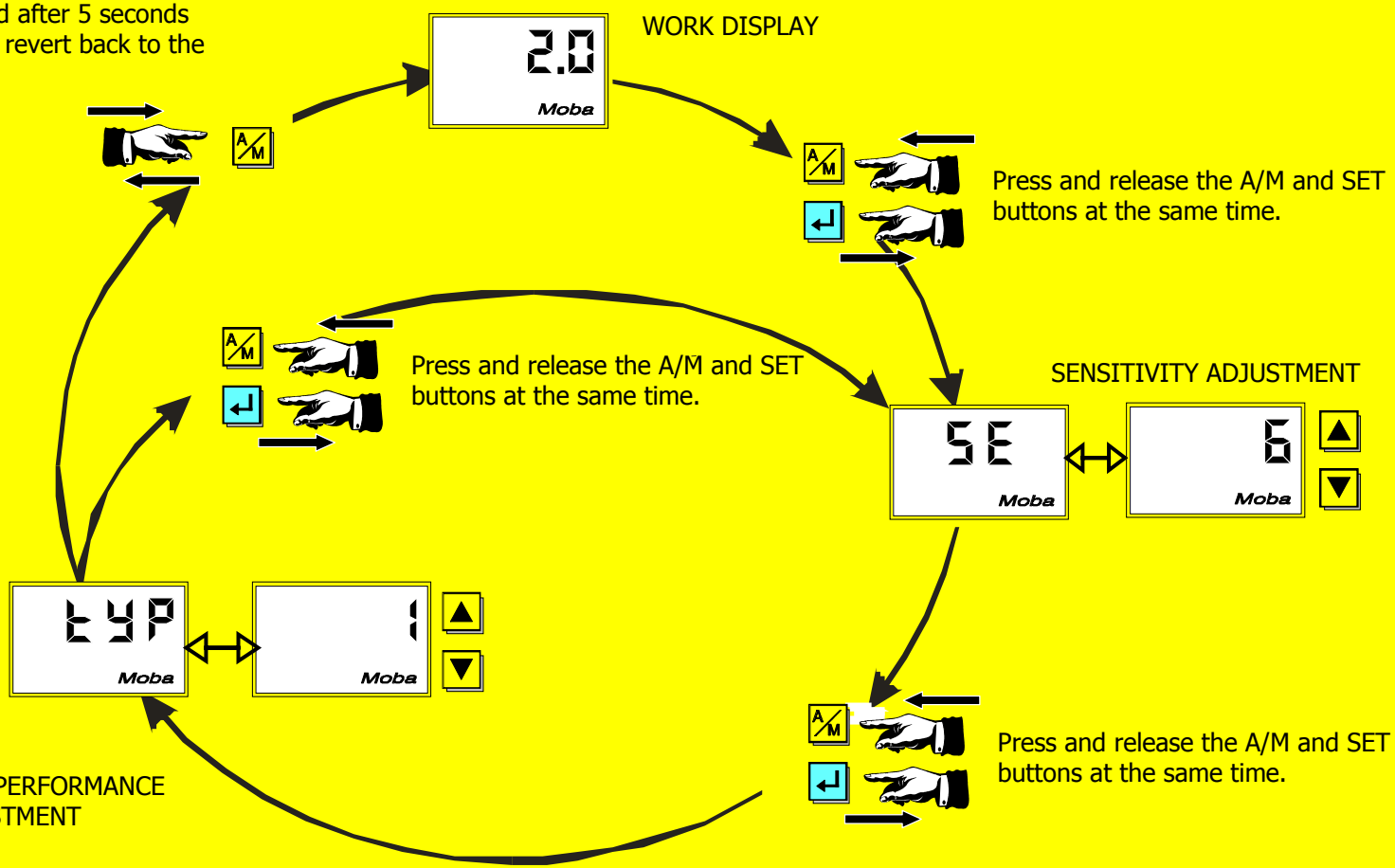
9. Adjust Displayed Slope to Match Mat Slope

a. Press and hold the Set button until Set is no longer displayed on the LCD.

b. With the Set button still pressed, use the up/down arrow buttons to adjust the LCD value to match the mat slope.

OPERATOR'S MENU SLOPE

Press the A/M button to exit the operators menu. If there are no buttons pressed after 5 seconds the system will revert back to the Work Display.

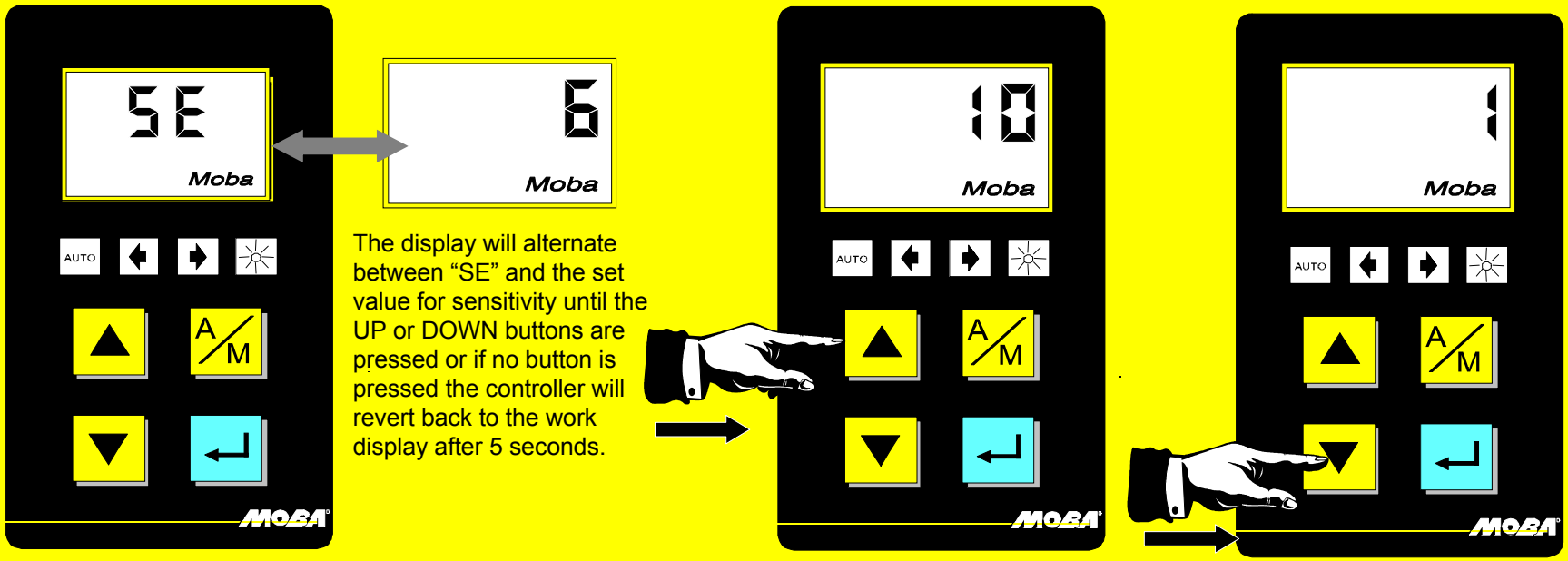


OPERATORS MENU SLOPE

- The operators menu is an easy to access set of functions that allow the operator to change the sensitivity of the elevation or slope sensor, change the working window of the elevation sensors, change the unit of measurement of the elevation sensor and change the controller from one machine to another.
- Access to the operators menu is achieved by pressing the A/M and SET buttons at the same time and then release.
- Switch from one function to the next by pressing the A/M and SET button again.
- Adjust the menu option by pressing the UP/DOWN buttons.
- Exit the operators menu by pressing the A/M button or waiting 5 seconds.

ACCESS THE OPERATORS MENU BY PRESSING THE A/M AND SET BUTTON AT THE SAME TIME AND THEN RELEASE. "SE" WILL APPEAR IN THE DISPLAY

OPERATORS MENU (Sensitivity) SLOPE

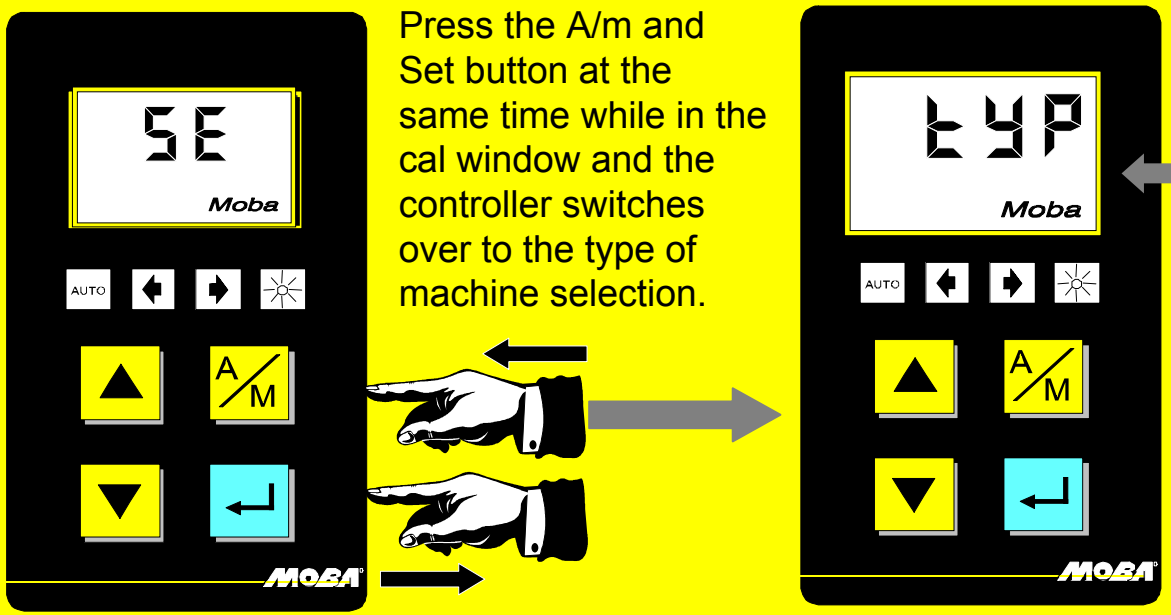


The display will alternate between “SE” and the set value for sensitivity until the UP or DOWN buttons are pressed or if no button is pressed the controller will revert back to the work display after 5 seconds.

Sensitivity: Adjusting this value will increase or decrease the system sensitivity. A higher number decreases the dead band width and the proportional band widths making the system respond to smaller deviations in the reference. The system will also respond faster to larger deviations because the proportional band is smaller.

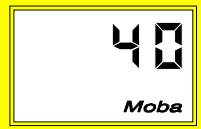
10 is the most sensitive while 1 is the least sensitive. The typical value is 6.

OPERATORS MENU (Machine Setup) Slope



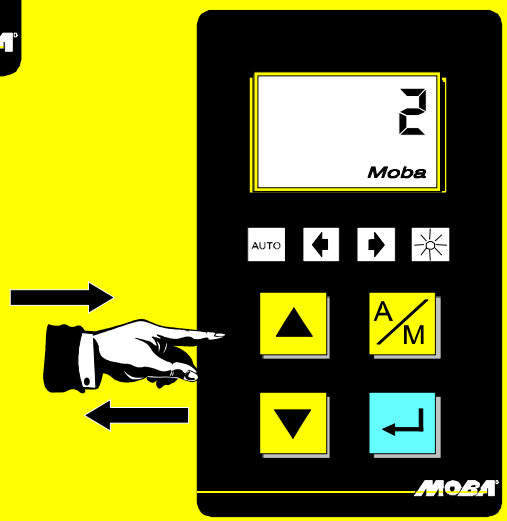
Press the A/m and Set button at the same time while in the cal window and the controller switches over to the type of machine selection.

Type 1, typical setting for most customers.

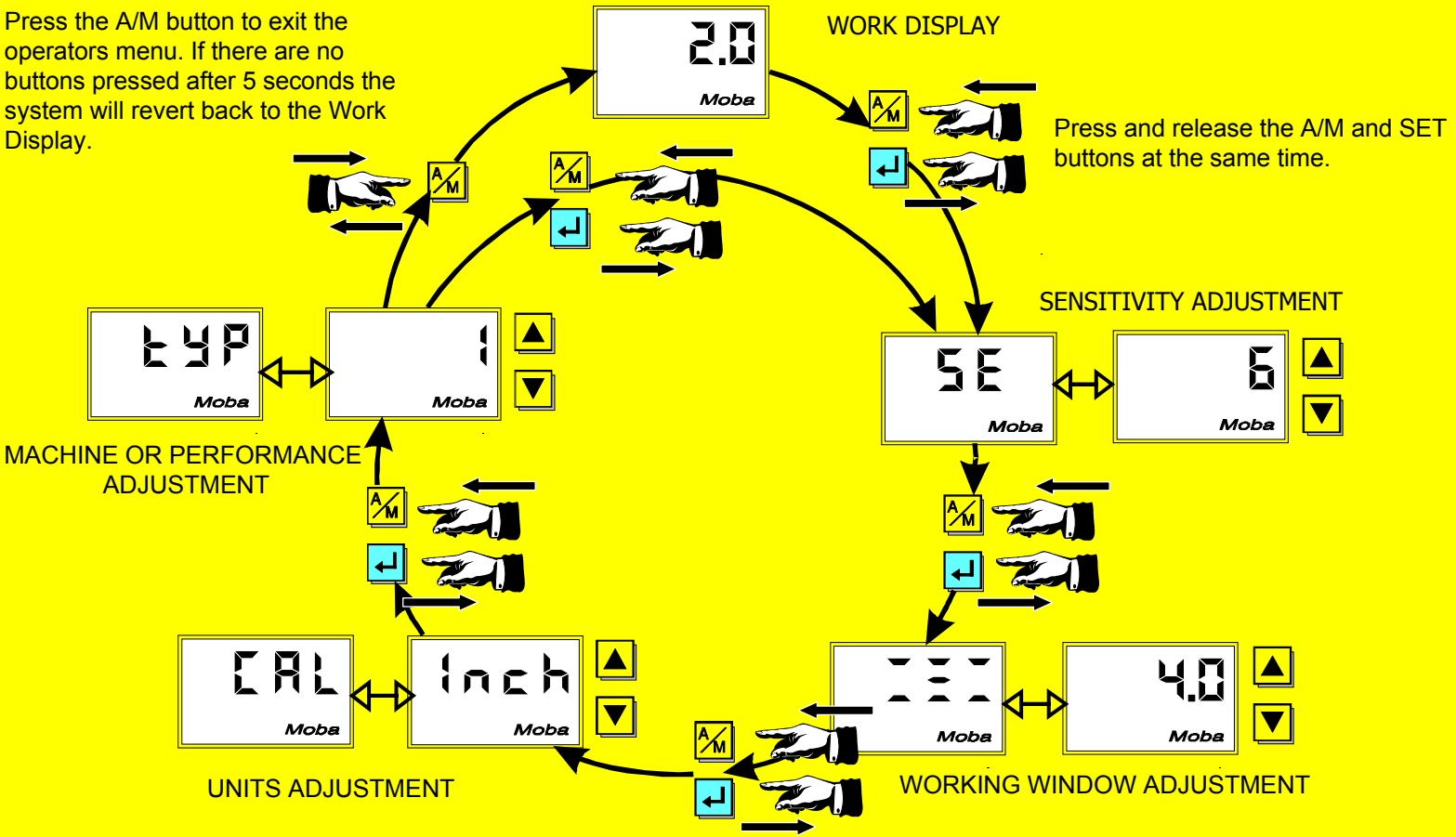


Type 2-40 programmed for each customer.

Use the UP/DOWN buttons to select the machine type. The EZ-PAV™ controller can be set up to work at 40 different stations. A authorized technician can preset the controller so that it will work on the left or right side of the paver even if the hydraulic characteristics are different. It can also be field programmed to work with several types of machines with different hydraulic valves altogether. All the operator has to do to switch from machine to machine is select the number for that machine from the TYP menu.



OPERATORS MENU SONIC-SKI™



OPERATORS MENU SONIC-SKI™

- The operators menu is an easy to access set of functions that allow the operator to change the sensitivity of the elevation or slope sensor, change the working window of the elevation sensors, change the unit of measurement of the elevation sensor and change the controller from one machine to another.
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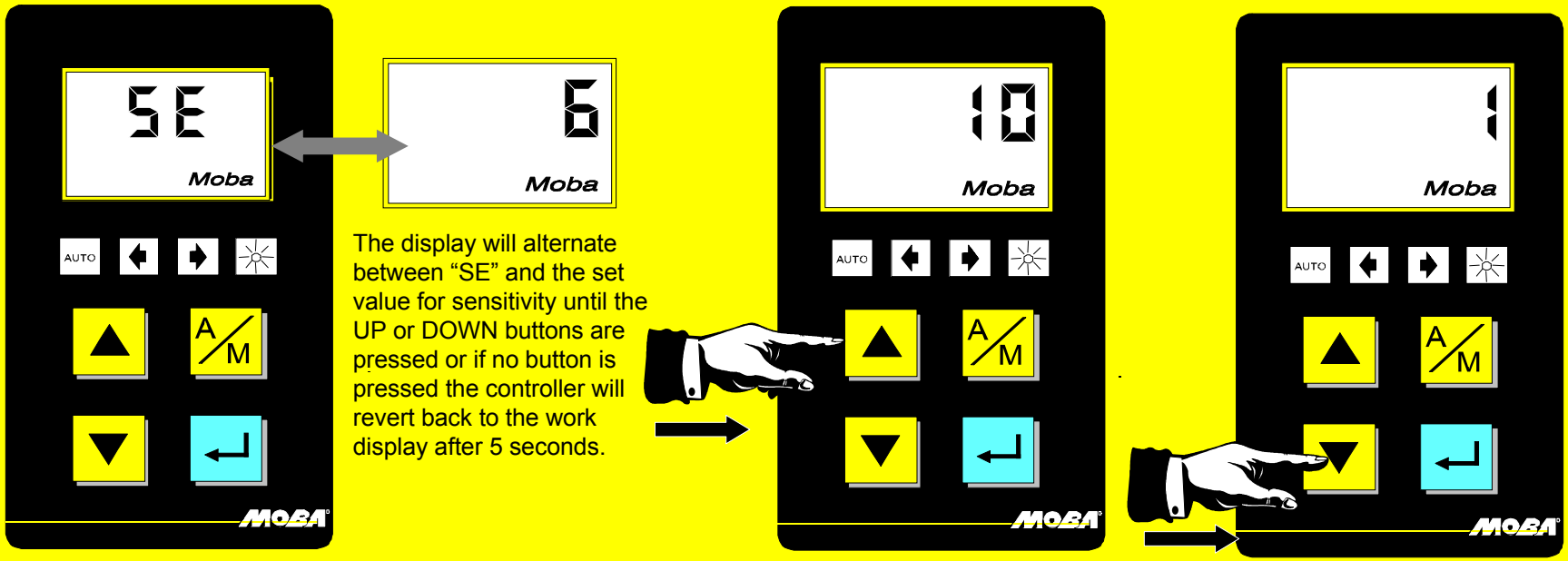
- Switch from one function to the next by pressing the A/M and SET button again.
- Adjust the menu option by pressing the UP/DOWN buttons.
- Exit the operators menu by pressing the A/M button or waiting 5 seconds.

ACCESS THE OPERATORS MENU BY PRESSING THE A/M AND SET BUTTON AT THE SAME TIME AND THEN RELEASE. “SE” WILL APPEAR IN THE DISPLAY

OPERATORS MENU (Sensitivity) SONIC-SKI™

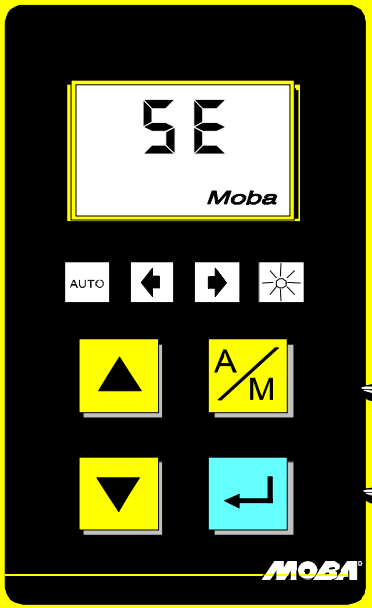


The display will alternate between “SE” and the set value for sensitivity until the UP or DOWN buttons are pressed or if no button is pressed the controller will revert back to the work display after 5 seconds.

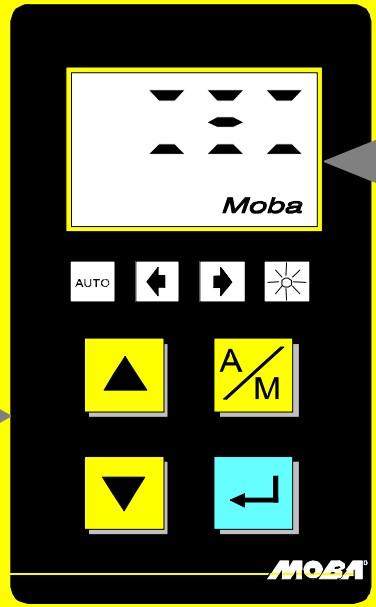
Sensitivity: Adjusting this value will increase or decrease the system sensitivity. A higher number decreases the dead band width and the proportional band widths making the system respond to smaller deviations in the reference. The system will also respond faster to larger deviations because the proportional band is smaller.

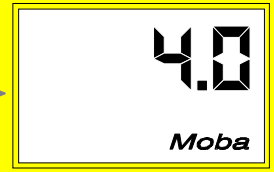
10 is the most sensitive while 1 is the least sensitive. The typical value is 6.

OPERATORS MENU (Working Window) SONIC-SKI™

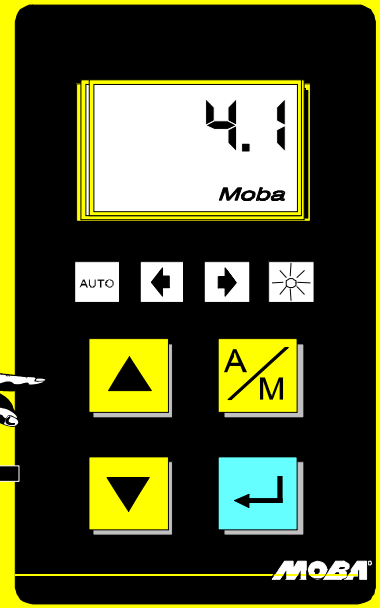


Press the A/m and Set button at the same time while in the sensitivity window and the controller switches over to the working window adjustment.



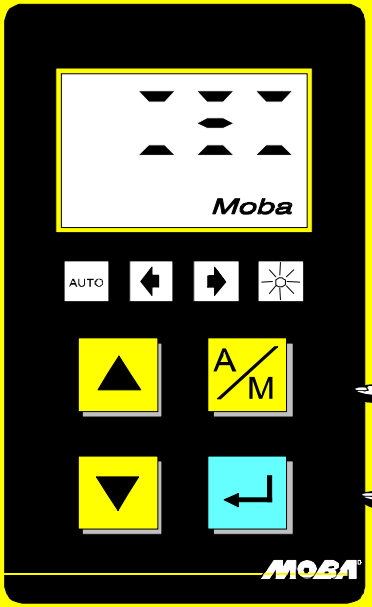


The value shown is in the units of measurement selected in the CAL window.

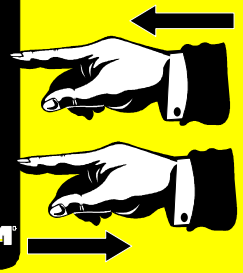


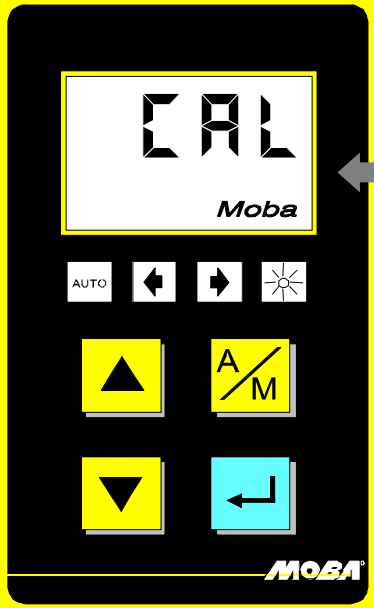
Use the UP/DOWN buttons to adjust the working window from 0.8 inches to 8.0 inches or OFF. (0.06 feet to 0.60 feet, 2.0 CM to 20.0 CM)
When using the Sonic-Ski™ the typical setting is 4.0 inches (±2 inches). When using the EZ-SKI™ the typical setting is 6.0 inches (± 3 inches).

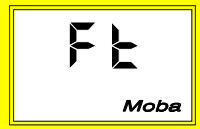
OPERATOR MENU (Unit of Measurement) SONIC-SKI™



Press the A/m and Set button at the same time while in the sensitivity window and the controller switches over to the working window adjustment.



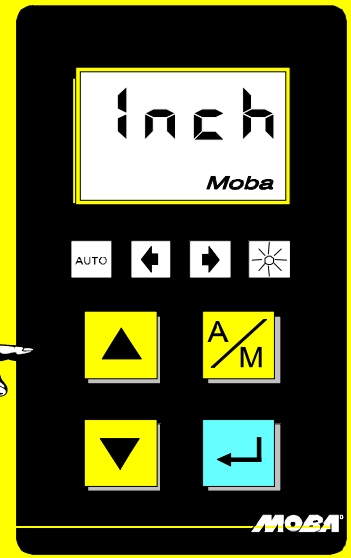




Imperial Feet, tenths & hundredths

Metric, centimeters, millimeters

Imperial, Inches & tenths of an inch.



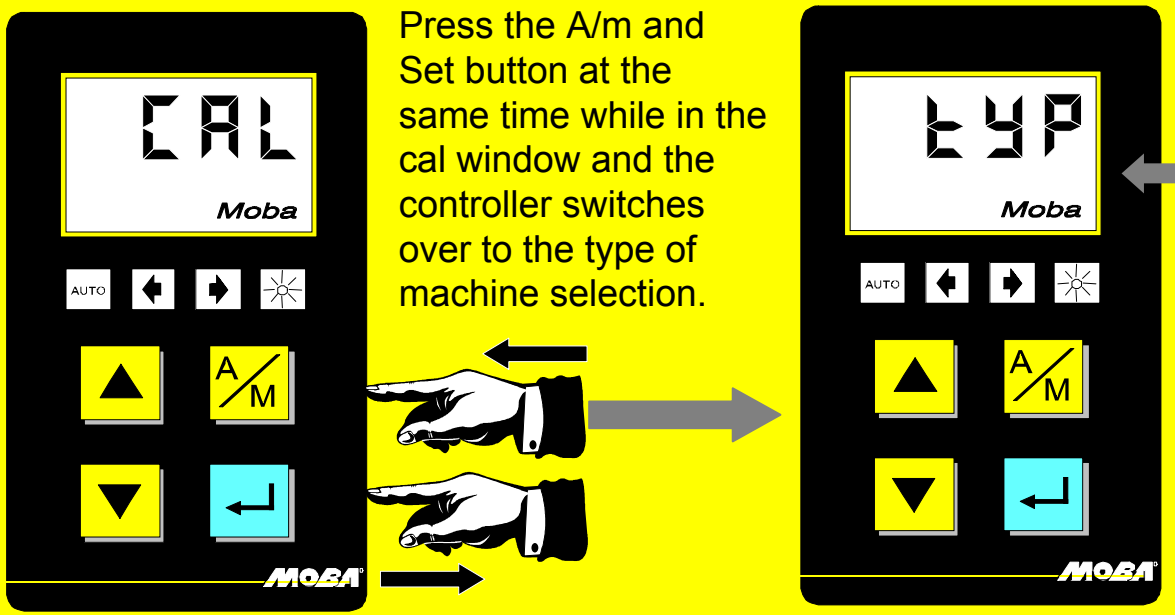
Use the UP/DOWN buttons to adjust the Units of Measurement from Centimeters to inches to feet. The resolution of the units of measurement are:

*Centimeters.Millimeters I.e. 5.4=5 Centimeters + 4 Millimeters

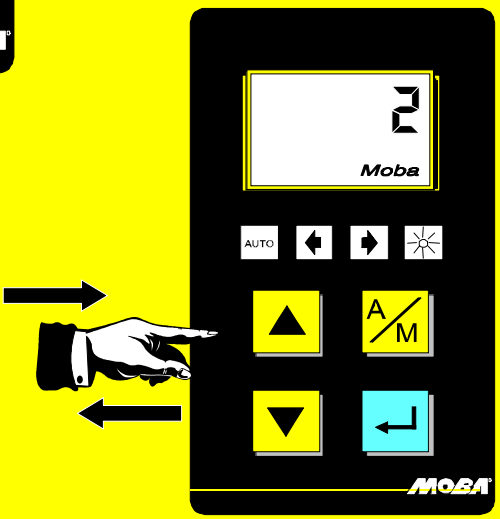
*Inches.Decimal inches I.e. 6.2=6 Inches + 2 tenths of an inch~¼”

*Feet.Decimal feet I.e. 0.49=0 feet + 49 hundredths of a foot~½’

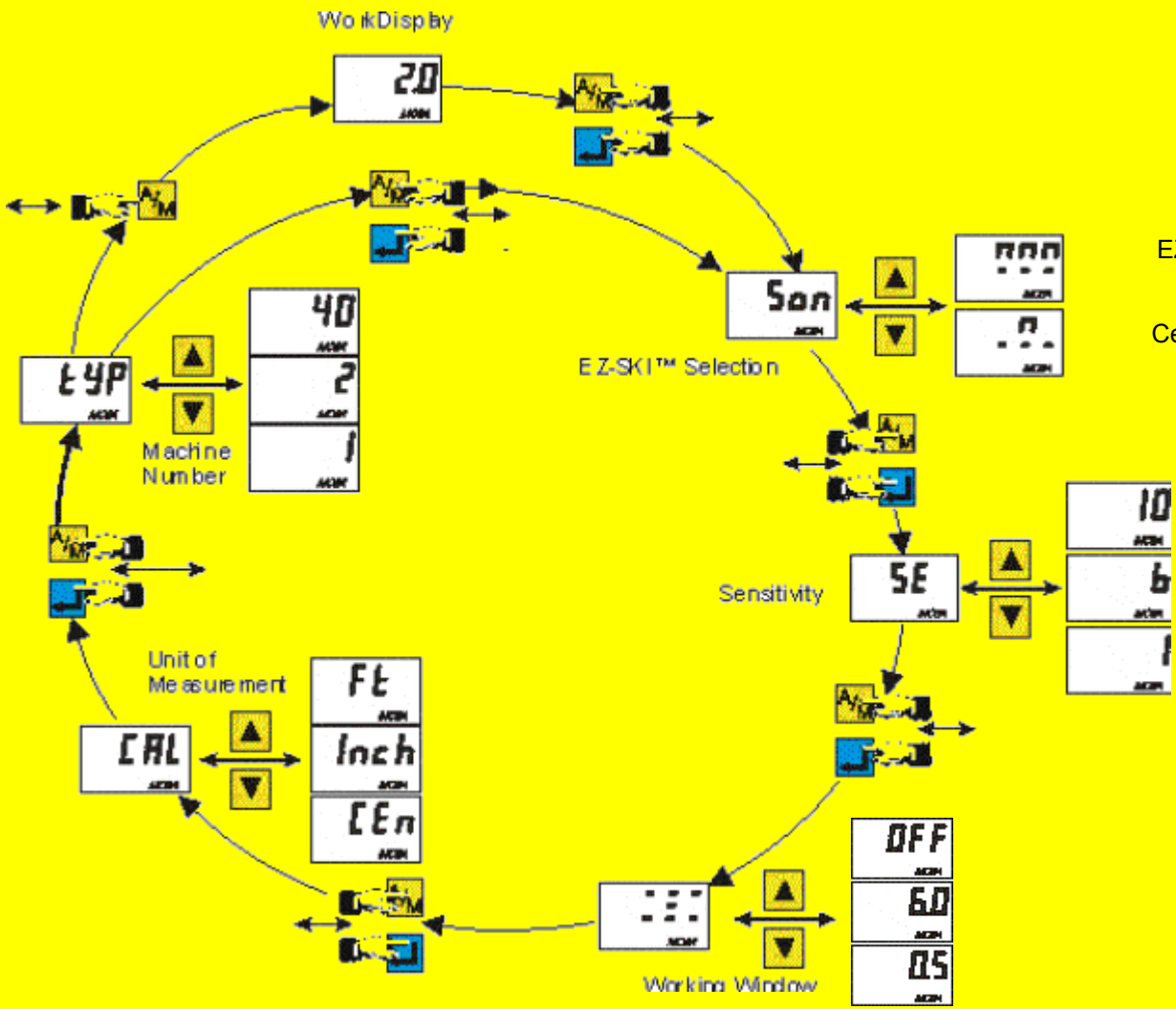
OPERATORS MENU (Machine Setup) SONIC-SKI™



Use the UP/DOWN buttons to select the machine type. The EZ-PAV™ controller can be set up to work at 40 different stations. A authorized technician can preset the controller so that it will work on the left or right side of the paver even if the hydraulic characteristics are different. It can also be field programmed to work with several types of machines with different hydraulic valves altogether. All the operator has to do to switch from machine to machine is select the number for that machine from the TYP menu.



OPERATORS MENU EZ-SKI™

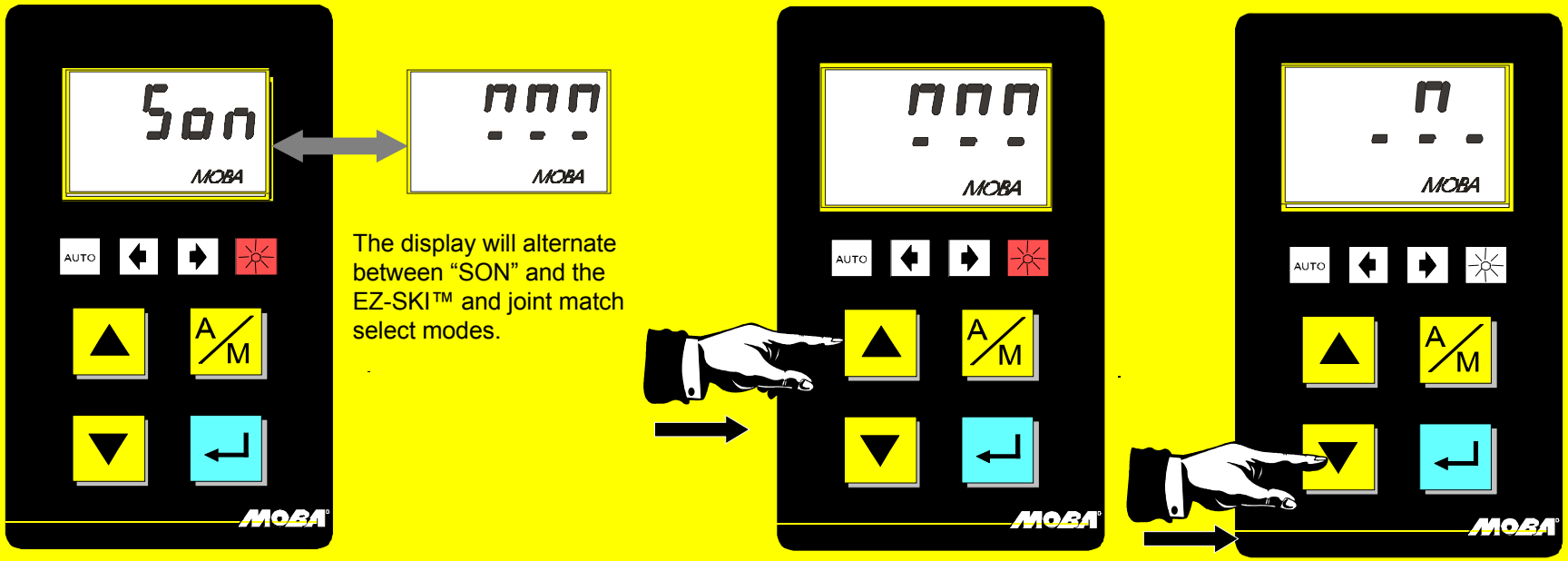


OPERATORS MENU EZ-SKI™

- The operators menu is an easy to access set of functions that allow the operator to change the sensitivity of the elevation or slope sensor, change the working window of the elevation sensors, change the unit of measurement of the elevation sensor and change the controller from one machine to another.
- Access to the operators menu is achieved by pressing the A/M and SET buttons at the same time and then release.
- Switch from one function to the next by pressing the A/M and SET button again.
- Adjust the menu option by pressing the UP/DOWN buttons.
- Exit the operators menu by pressing the A/M button or waiting 5 seconds.

ACCESS THE OPERATORS MENU BY PRESSING THE A/M AND SET BUTTON AT THE SAME TIME AND THEN RELEASE. "SE" WILL APPEAR IN THE DISPLAY

OPERATORS MENU (Mode Select) EZ-SKI™



The display will alternate between “SON” and the EZ-SKI™ and joint match select modes.

EZ-SKI™ MODE

JOINT MATCH MODE

MODE SELECT, EZ-SKI™
When the EZ-SKI™ is connected the controller will recognize it and the switch to the work display. The EZ-SKI™ mode select menu item will now be the first item in the operators menu. The only time you will see this display is when the EZ-SKI™ is connected to the controller. The operator has the ability to select the EZ-SKI™ mode or the joint match mode.

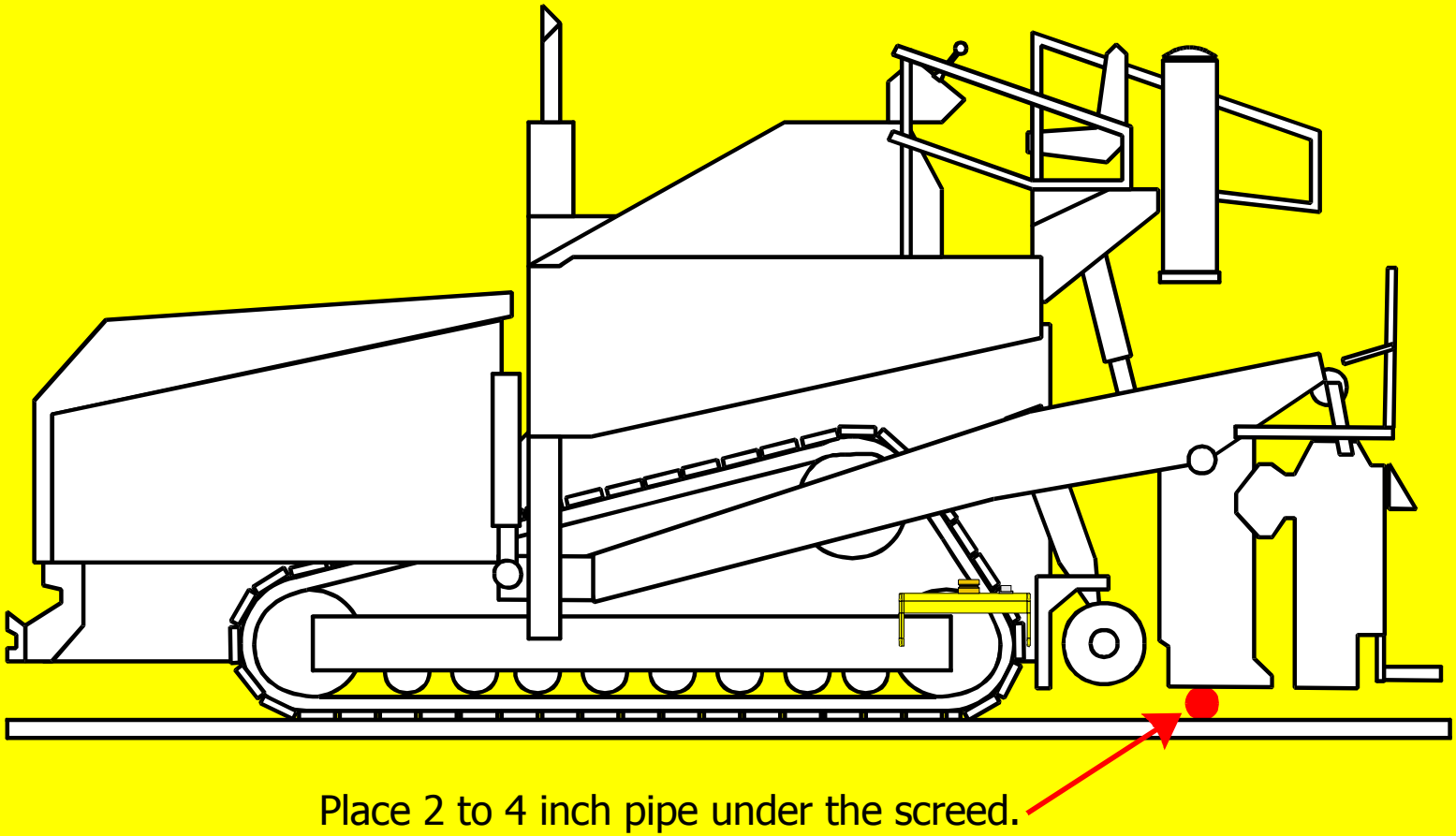
In the EZ-SKI™ mode the string line lamp will be on. In the joint match mode the string line lamp will be off.

The next four menu items are the same as the Operators Menu for the Sonic-Ski™

Checking the Paver System

- Paver
  - Machine power on.
  - Engine running and hydraulics at operating temperature.
  - Paver switches in proper position for manual operation.
  - Are the hydraulics working?
    - The tow point cylinder should move with the jog switch.
  - Make sure all switches that relate to automatic grade control are in the proper position.
- Automatic Grade System Function Checks
  - Is the controller connected?
  - Does the controller have power?
  - Is the sensor connected to the controller?
  - Has controller acknowledged the sensor?
  - Is the sensor in the proper position?
  - Is the sensor at the proper height?
  - Are the mounting brackets secure?

Machine Set-up for System Test



- Place a 2 to 4 inch diameter pipe under the screed.
- Center the tow point.

System Test

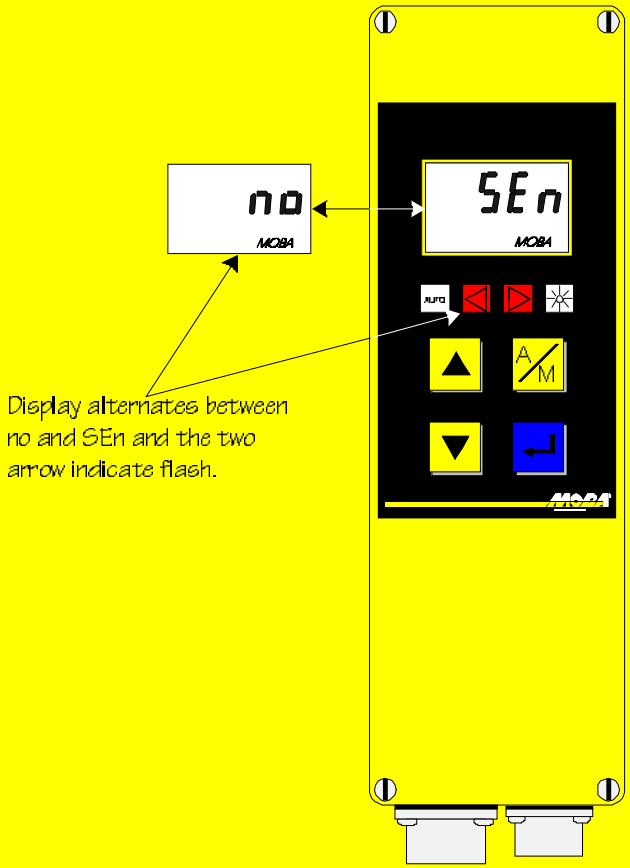
- Controller ON
  - Press the “UP” button on the controller, tow point should move up.
  - Press the “DOWN” button on the controller, tow point should move down.
- Center Tow Point
- Null Sensor
  - Press the “SET” button on the controller.
    - “SET” is displayed in the LCD.
  - Release the “SET” button.
    - “0.0” is displayed in the LCD.
  - Press and release the “A/M” button.
    - The “AUTO” lamp should be on.
- There should be no tow point movement at this time.
- Press and release the “UP” button.
  - Display reads “0.1”
  - The tow point may move up and stop.

System Test (cont.)

- Press and release the “DOWN” button two times.
  - Display reads “-0.1”
  - The tow point may move down and stop.
- Press and release the “UP” button three times.
  - Display reads “0.2”
  - The tow point should move up and stop.
- Press and release the “DOWN” button four times.
  - Display reads “-0.2”
  - The tow point should move down and stop.
- Continue to increase and decrease the set point in increments of 0.1 until a change in the set point of ±1.0 inches has been achieved.
- If the tow-point is overshooting (oscillating) the controller sensitivity might need adjusted.
  - Sensitivity could be too high.
  - Min pulse or current could be set wrong.
  - Differential pulse or Max current could be set wrong.

Self Diagnostics

- The controller has its own diagnostic system. It will shut the automatic functions off and display an alarm condition if there is trouble detected. For example, if a sensor cable is caught in the augers and broken the controller will shut the automatics off.



Fault Indications

FAULT INDICATION	DIAGNOSIS	CONTROLLER ACTION	REPAIR ACTION
nO Sen	Controller does not acknowledge the sensor.	No Valve outputs in the automatic mode.	•Connect Sensor. •Check Sensor Cable. •Change Sensor.
Son out slo out pot out lost out	The grade reference is outside the working range of the sensor.	No Valve outputs in the automatic mode.	•Check the sensor position if it is improperly positioned (too far or too close) change positions . •Make sure the Sonic-Ski™ is in the proper mode. (Ground or String). •Change sensor.
Son def slo def	Defective sensor or a bad cable.	No Valve outputs in the automatic mode.	•Connect Sensor. •Check Sensor Cable. •Change Sensor.
Epp 2	Memory Problem.	No Valve outputs in the automatic mode.	•Change Controller
Epp 3 epp 4 epp 5	Memory Problem.	No Valve outputs in the automatic mode.	•Change Controller

System Maintenance

- Controller
  - No user serviceable components.
  - Clean with any paste hand cleaner.
  - Use damp cloth to remove hand cleaner.
  - Use extra care around display area.
- Sonic-Ski™
  - No user serviceable components.
  - Clean with any paste hand cleaner.
  - Use damp cloth to remove hand cleaner.
- Cables
  - Keep plugs free of debris.
  - Inspect for cuts, breaks or damage.