

Matrix Lane Configuration Manual

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1.0 Introduction

The Vantech Comscore lane set-up can be altered to accommodate different country, equipment and operating configurations. For example different countries support either NTSC or PAL video standards, some systems may be attached to Automatic Bumper Systems while others may not. The purpose of this manual is to show how to change and manage the various options as well as to explain their relevance. This manual will also explain the significance of the scoring configuration used to determine the scores.

1.1 Entering the Lane Option Menu.

The options for a pair of lanes are set at the Keyboard console for that pair. The options apply to both lanes so the keyboard on either lane can be used to change lane options. Note! Only the Odd Lane can be used to configure the Score Camera Settings.

The options menu is a hidden option inside the standard Lane Help menu system. It is also password protected. This discourages members of the general public from altering options.

To enter the options menu, a scoring grid must be present on the lane being used to change options. The lane must be in play mode, i.e. names entered and the Play button pressed.

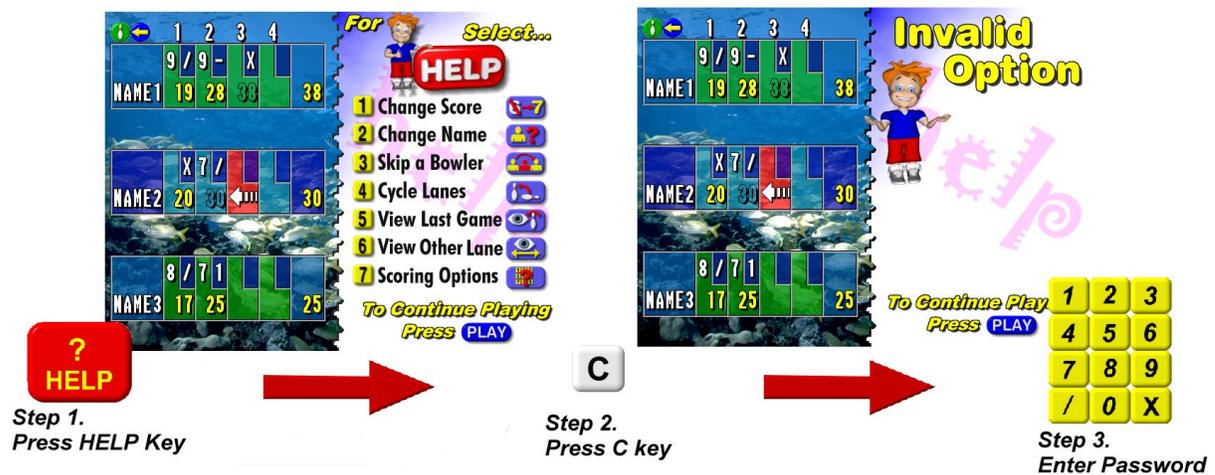


Figure 1. Entering the Lane Option Menu

Press the Help key at Keyboard console and the normal Help menu will appear on the right hand side of the screen.

Press 'C' on the keyboard console and the Invalid Option Menu will display. This discourages the general public from proceeding further. To enter the Lane Options Menu, type the system password. This password can be set at the main comscore computer (if

connected). If the main comscore computer is not connected, enter the password given by the Vantech Comscore representative.

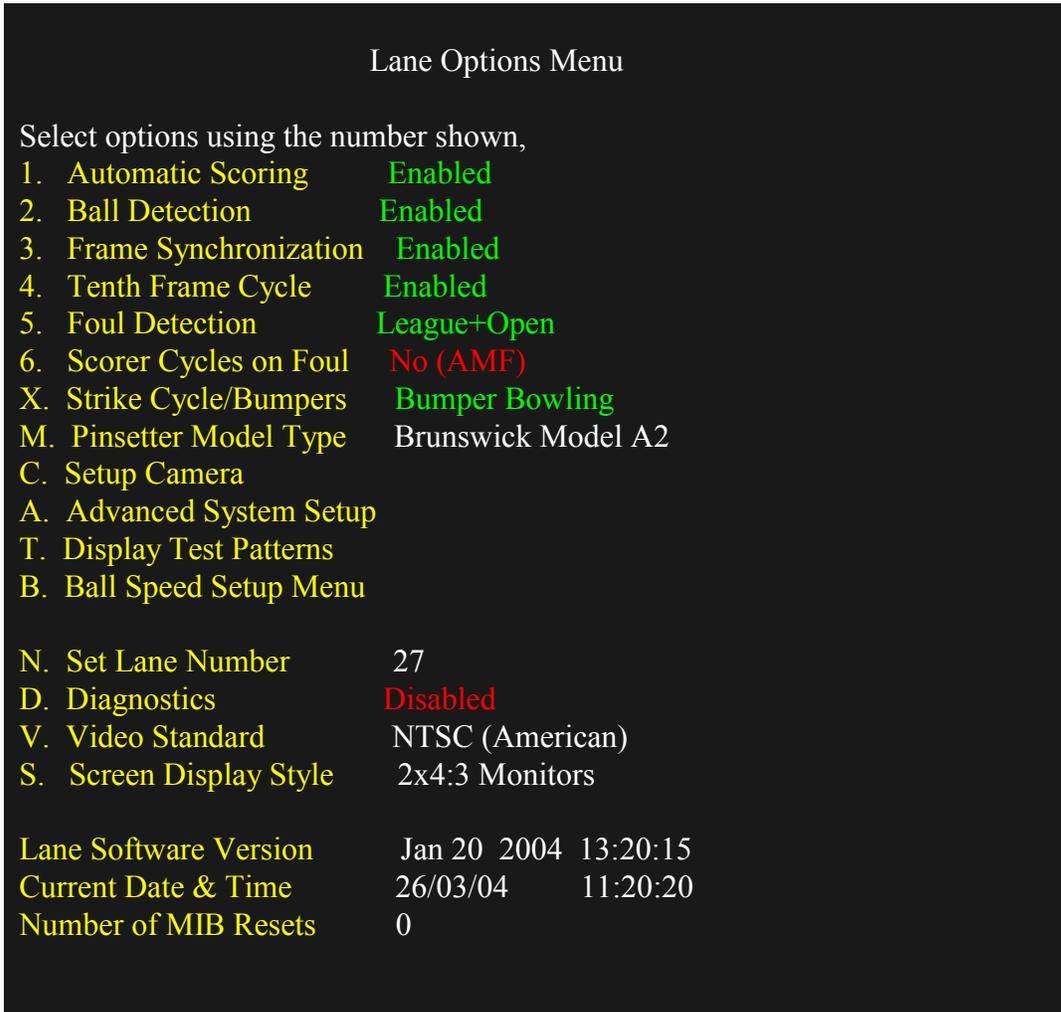


Figure 2. Lane Options Menu

1.2 The Lane Options menu

The Lane Options Menu contains the following options,

1. Automatic Scoring

Press 1 on the keyboard console to enable or disable automatic scoring. If enabled valid scores will be displayed on the score grid automatically. If disabled, the bowlers have to enter their scores manually using the number keys on the keyboard console. This option is used in cases where a camera malfunction or other external circumstance (e.g. machine or lighting fault) is causing consistent incorrect reporting of scores. There may be other circumstances where management may choose to disable the automatic feature of the system. This option takes effect as soon as the Play button is pressed on the keyboard, which returns the score grid to the screen. If a pair of lanes exhibits the fault of no scores being displayed automatically it may be that the Automatic Scoring option has been accidentally disabled.

2. Ball Detection

Press 2 on the keyboard console while the Lane Options Menu is displayed to enable or disable the ball detection option. Only systems that have been fitted with ball speed sensors are able to utilise this feature. Refer to the Lane Hardware Manual for information regarding ball detection. If fitted and enabled, ball detection is used to distinguish between machine operations that were due to a ball being bowled as opposed to those from the cycle button, the technician or a machine fault. This feature reduces the number of times that the bowlers need to remove scores that were not bowled. If the ball detection option is enabled and ball speed sensors are not connected to the Computer Score System, scores that were bowled will not be displayed.

The scoring software uses ball detection to move the scoring state from At Rest to Cycle Started if ball detection is enabled. If ball detection is disabled the scoring software relies instead upon the Trigger Status Flag (derived from interpretation of the scoring image).

The scoring software will operate with and without Ball Detection enabled, however it is advisable to enable ball detection if the ball detectors are operating correctly. This option is generally used to temporarily disable ball detection to allow bowling to continue until a convenient time when the ball detectors for the lane pair can be re-adjusted or replaced.

3. Frame Synchronisation.

Press 3 on the keyboard console while the Lane Options Menu is displayed to enable or disable the frame synchronisation option.

The automatic scoring is able to detect whether a score is from a first or second ball machine cycle. If the frame synchronisation option is enabled, the system will use the first or second ball information determined from the automatic scoring to synchronise the scoring to the machine (both machine and score grid on first or second ball of a frame).

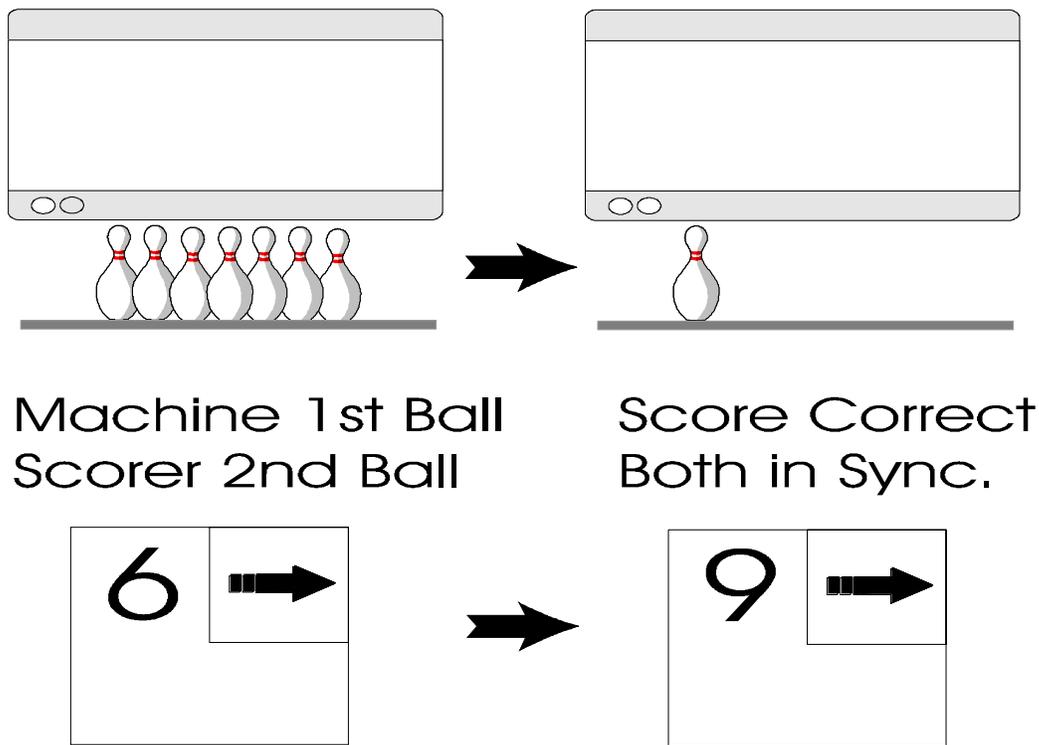


Figure 3 Frame Synchronisation Example.

If the score grid is displaying a first ball score and the next score is also a first ball score, the scoring system will overwrite the first score so as to maintain agreement between the score grid and the machine as to which ball the bowler is bowling.

This feature is useful in stopping the score grid and the machine differing over an extended number of frames and tends to reduce the level of staff involvement at the lanes. The exception in frame synchronisation is when the score grid is displaying a score in the first ball position of a frame (e.g. 9) while the machine is on first ball and the bowler bowls a strike. In this case the score grid will display 9 / instead of overwriting the 9 with a strike. This will, however, still result in the score grid and machine being synchronised i.e. both will be on first ball of the next frame.

Should the situation occur where the scoring system is incorrectly overwriting the first ball score with the second ball score it is possible to disable frame synchronisation temporarily until it can be determined why the scoring system is misinterpreting the second ball score as a first ball score.

4. 10th Frame Cycle

Press 4 to enable or disable the 10th Frame Cycle Option. The cycle relay hardware of the machine interface module has to be connected to the machine for this option to be effective. This option enables the automatic cycling of the machine in the following situations.

- To re-rack ten pins after the third ball of the tenth frame.
- To re-rack ten pins in a No-Tap enabled frame where the first ball score is to be taken as a strike. E.g. 7 No-tap and the bowler bowls a 7.

- When bowler uses the cycle machines option in the help menu to re-rack the machine, e.g. if the machine did not stand ten pins on first ball.
- After a first ball Foul when the following options are enabled, Foul Detect & Scorer Cycles on Foul (see below).
- When the control counter requests a machine cycle.

The Matrix unit will not command the machine interface module to cycle the machine until the scoring software verifies that the machine has returned to the idle position (awaiting the next ball, scoring state equals At Rest). The Automatic Scoring uses an empty deck as one of the methods for determining that a machine cycle has not yet finished a cycle. As a result the scoring system will not cycle a machine that has an empty deck (no pins standing).

5. Foul Detect

Press 5 to cycle through the options for Foul Detection. These are disabled, enabled for League and Tournament bowling but not Open bowling or Foul enabled for all types of bowling.

The output of the foul units needs to be connected to either the Machine Interface or Keyboard Module (depending on whether the foul unit outputs 12-24VAC/DC or a voltage free contact) for this option to be effective. When the system detects a signal from the foul units it will display Foul upon the receipt of the next valid score, provided the foul signal has not been removed or the foul has not timed out. Unfortunately, there are a large percentage of foul units within the Bowling Industry that are not functioning or adjusted correctly. Badly operating foul units can result in a high number of false foul scores that require correction. This option can be used to disable foul detection on a lane pair should the foul units be unreliable. This option also allows foul detection to be enabled for League and Tournament bowling but to be disabled for Open bowling. This can be useful to allow the fouls lights to be on and sound a warning to open bowlers not to cross the foul line without effecting their scores.

6. Scorer Cycles on Foul

Press 6 to enable or disable the foul re-racking option. Some types of bowling machines do not automatically set ten pins on second ball after a first ball foul cycle. The most common examples are the Brunswick A and A2 machines. This option is to accommodate these machines. All other type of machines should be used with this option disabled. When this option is enabled and the cycle outputs from the machine interface module are attached to the machine, the system will cycle the machines to set ten pins then cycle the machine again after the next ball is bowled to set ten pins for the next bowler. Even if the machines are Brunswick A or A2s this option should not be used if the foul units for the lane pair are unreliable. False foul signals will result in the machines cycling after a score, which leads to a degree of confusion for the bowlers. As a result, caution is urged. Do not enable this option until due consideration is given to consequences of this feature. The alternatives for a Brunswick A or A2 machines would be for the bowlers to manually re-rack the machines from the Help option 6 “Cycle Machines” or using the Reset button at the ball return (only if Ball Speed Sensors are

fitted). In many cases these alternatives may be judged to be preferable. Option 5, Foul Detect, has to be enabled for this option to be effective.

X. Strike Cycle/Bumpers

Press X to toggle three different options for the Strike/Bumper Relay Contacts located on the Machine Interface Module. Refer to Lane Hardware manual Section *Machine Interface Module 5. Strike/Bumper Contacts* for details.

Disabled – Select the disabled option if the contact pairs are not being used for either Strike Cycle or Automatic Power Bumpers. This ensures that the relays are not working unnecessarily.

Strike Cycle – If this option is selected, the relay contacts will open and close depending on whether the current score is a strike or not. This option can be used with AMF 82-70 Machines to recover the machine strike cycle in certain situations.

Bumper Bowling – If this option is selected, the relay contacts will open and close depending on whether the current bowler requires bumpers. This option must be selected when the system has been interfaced to automatic power bumpers.

M. Pinsetter Model Type

Pressing M will toggle the type of Pinsetter the system is to interface with. The scoring software uses this option and the machine type selected will effect the manner in which the score is determined. It is, therefore, important that the correct pinsetter type is selected. Note Brunswick Model A is for Brunswick brand pinsetters with no-free falling rake (Rake does not drop as the ball hits the back cushion).

C. Setup Camera

Option C is used to enter the Scoring Configuration / Status Screen. This is used to setup the automatic scoring parameters e.g. the position of the pins within the camera image. Press C to enter the Scoring Configuration / Status Screen. Refer to section 1.3 Scoring Configuration / Status Screen.

A. Advanced System Setup

Option A is used to enter the Advanced System Setup Screen. This is used to alter some the systems advanced features e.g. Take Data Delay. Press A to enter the Advanced System Setup Screen. Refer to section 1.4

T. Display Test Pattern

Option T is used to display a number of different test patterns that are used to test and adjust the display unit monitors. Press T to display the first test pattern. Press T to display the next pattern. Press any other key on the keyboard to return to the Options menu

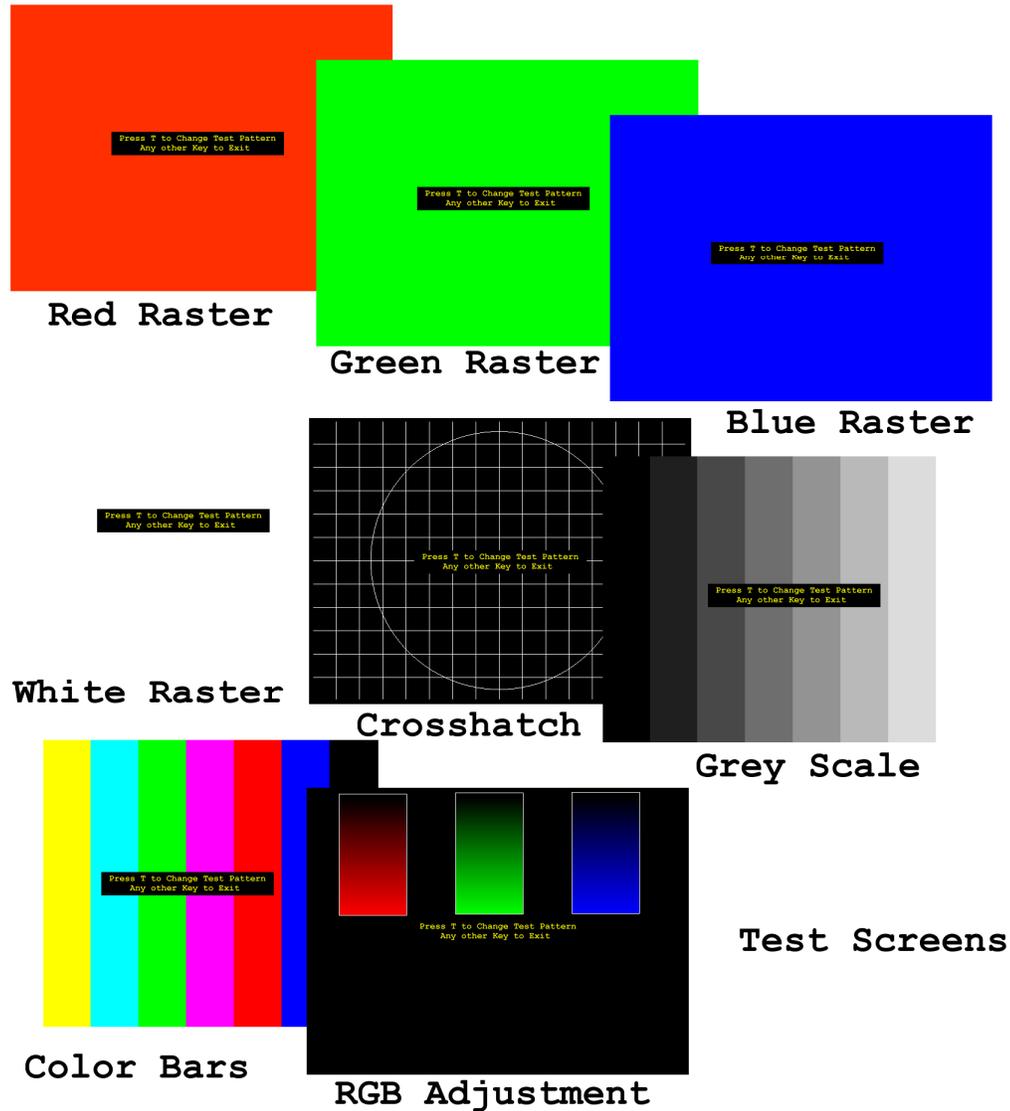


Figure 4 Test patterns.

B. Ball Speed Setup Menu

Option B is used to enter the Ball Speed Setup Menu. This menu is used to calibrate the ball speed sensor for either lane in the pair. Press B to enter the Ball Speed Setup Menu. Refer to section 1.5 Ball Speed Setup Menu for more information.

N. Lane Number

Option N is used to set the lane number of the lane. Each lane has a number, which matches the lane number of the machine. This lane number is used, when the main comscore computer is connected, to select which lane is to be turned on, display a grid etc. Press N and a prompt will request that the new lane number be typed in. The lane number of the other lane in the lane pair will be set accordingly by the system on the assumption that the left lane (when facing the pins) is the odd numbered lane. The Vantech Comscore system assumes left to right lane numbering. The lane numbers will be updated for the lane pair only after the option menu has been exited (return to the score grid display) and the corresponding Matrix chassis powered Off and On again.

D. Diagnostics

Pressing D will enable or disable the display of the diagnostic icons. These icons appear above the score grid and indicate various system states e.g. Network Connection, Machines On, Practise etc. A number of these icons are displayed regardless of the Diagnostics option as they provide information to the bowlers. Diagnostics also performs a number of diagnostics tasks, so is generally left disabled under normal operating conditions.

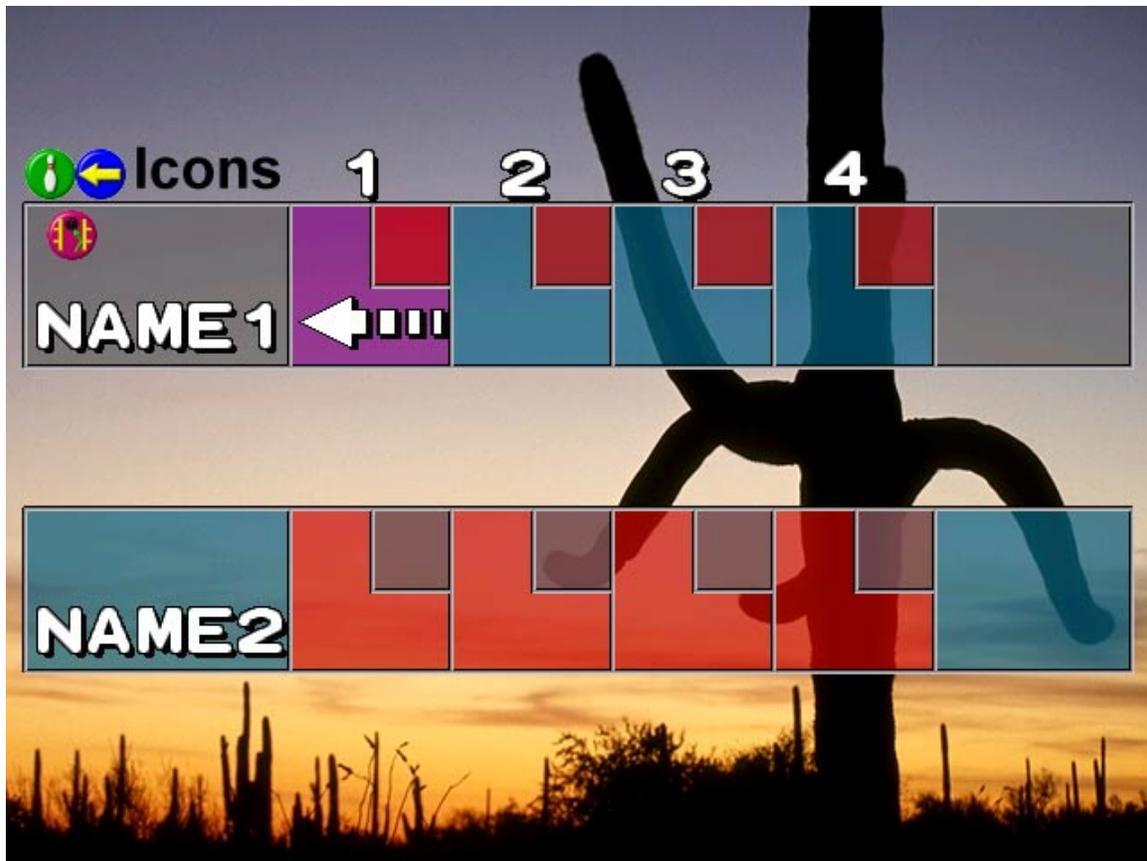


Figure 5. Diagnostic icons above the score grid



Figure 6. Available Icons

V. Video Standard

Press V to toggle the video standard between PAL and NTSC. The Matrix units are capable of accepting an AV video input for display of VCR or decoded TV channel images. The video standard option is used to select which standard this video signal is. NTSC is the standard used in North American as well as large parts of Asia. PAL is the video standard for Great Britain, Australia, New Zealand and selected Commonwealth nations.

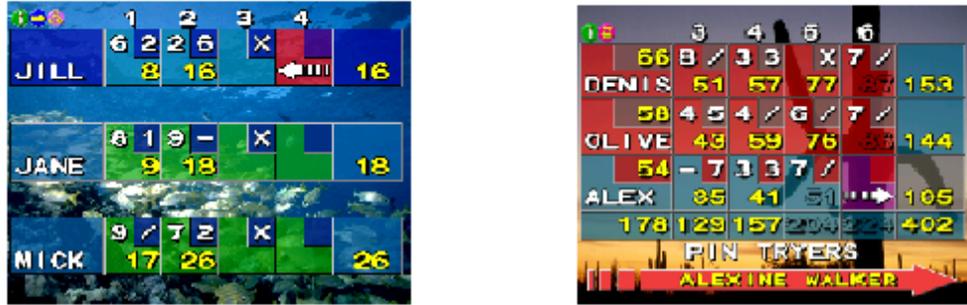
The both NTSC and PAL video signals have different scan rates to the display unit's VGA monitors. Both type of signal is converted to match the VGA scan rate. Consequently there is no need to re-adjust the VGA monitors when changing the video standard selection.

S. Screen Display Style

Press S toggle between the two screen display styles. If the option labelled "2x4:3 Monitors" is selected, the score grids will be displayed on an individual monitor for each lane. This mode is designed for connection of each lane to a standard "square" (4:3 – horizontal/vertical ratio) CRT.

If the option labelled "1x16:9 Monitor" is selected, the score grids for each pair will displayed together on the even numbered VGA output of the Matrix chassis. This mode is designed for connection of two lanes to the one wide screen (16:9 – ratio) monitor or projector.

Screen Display Styles



2x4:3 Monitors



1x16:9 Monitor

Figure 8 Scoring Configuration / Status Screen

Lane Software Version Date & Time

The date and time when the lane software version was produced is displayed in the lane options menu to allow the verification of updates. When a Matrix unit powers on, it checks for the presence of the main comscore computer on the network. If the comscore computer is present on the network, the Matrix unit compares the age of its current software version with the age of the software version in the p:\matrix directory of the comscore computer. If the comscore computer is found to have a more recent version, the Matrix unit will automatically update itself to the later version. The entire system software is upgraded very easily.

Current Time & Date

This displays the current time and date as per the Matrix units CMOS Bios Real Time Clock. During the process of connection to the main comscore computer, the Matrix unit will update its Real Time Clock to match the time, date and region set on the comscore machine. The current time and date on the Matrix units should, therefore, match the time and date set on the comscore computer.

Number of MIB Resets

Each time a Machine Interface Module (MIB) is powered down or resets itself due to faulty operation this reset is logged by the Matrix Chassis. The number shown on the Lane Options Menu is the number of times that this has occurred since the scoring system has been powered on. This display helps to diagnose a problem with the communication to the machine and camera control hardware located at the machines. Excess levels of MIB resets should be reported to your Vantech Comscore Agent.

1.3 Scoring Configuration / Status Screen.

The Scoring Configuration / Status Screen is used to configure the automatic scoring parameters as well as display status information.

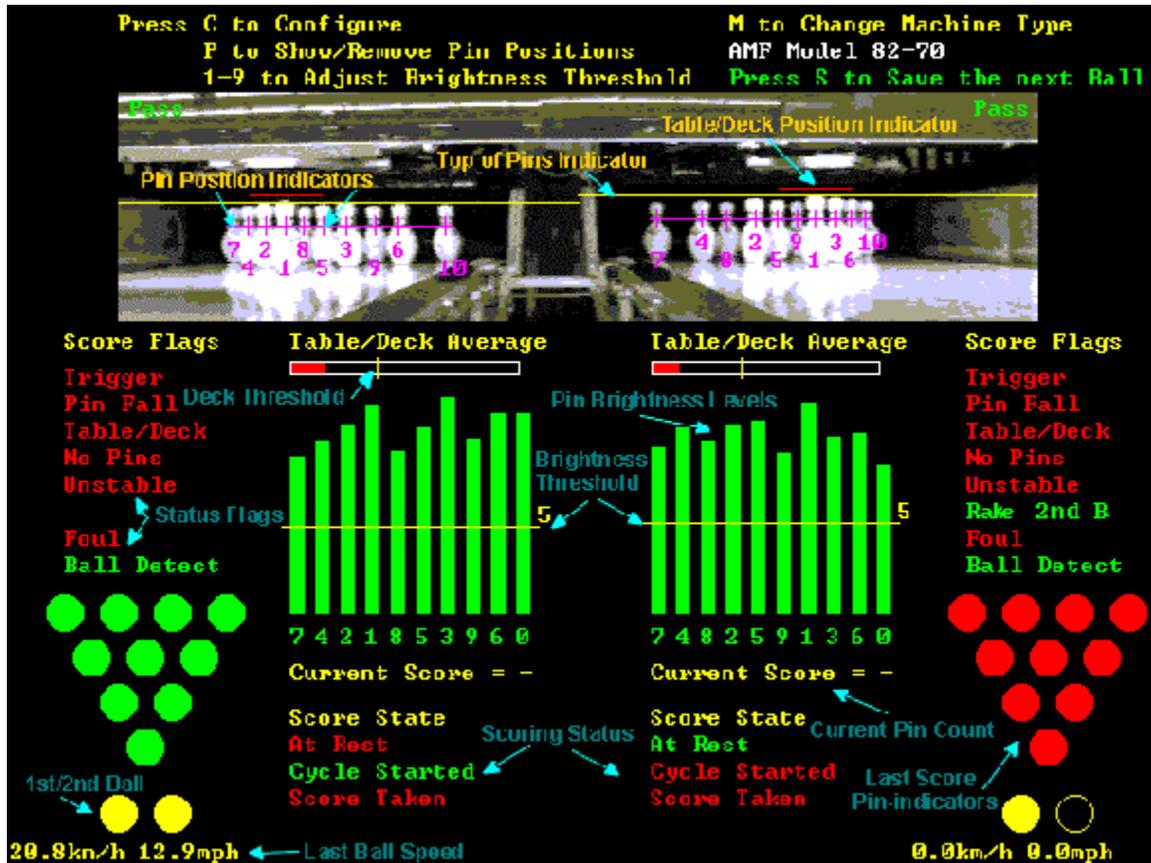


Figure 8 Scoring Configuration / Status Screen

The Scoring Configuration / Status Screen displays a real time image of the Lane Scoring Camera. If this image is not present, rolling, too bright, too dull, out of focus or not stable, then the scoring software may not determine a correct score. Refer to the Lane Hardware manual for information relating to the Lane Scoring Camera. Also note that the setting of the Camera Present options in the Advanced Setup may effect the appearance of the Lane Scoring Camera image (refer Section 1.4).

C. to Configure (Configuring the Lane Scoring Camera)

Only press C, while in the Scoring Configuration / Status Screen, if you wish to re-configure the camera. It is often useful to inspect and interpret the current configuration before re-configuring the image again.

The camera should only be configured when both lanes are set to first ball with the pit lights illuminated and ten pins standing. This is because the configuration software needs to be able to locate all ten pins standing in their correct spotting positions. Do not attempt to configure the camera with pins missing or with colored pins standing on the

deck. Press C to configure the camera. Indicators will appear over the camera image, including a yellow line indicating the top of the pins on each lane, magenta colored pin position lines and a red colored table/deck position indicator.

P. to Show/Remove Pin Positions

Press the P key while in the Scoring Configuration / Status Screen to toggle the Configuration Indicators On and Off to allow inspection of the current configuration indicators or a full view of the image minus the indicator lines, as required.

1-9 to Adjust Brightness Threshold

Press the 1 to 9 buttons on the keyboard while in the Scoring Configuration / Status Screen to adjust the Brightness Threshold up or down. The brightness threshold is the yellow colored horizontal line through the Pin Brightness Levels. A pin is recognised to be present (pin brightness level green) or absent (pin brightness level red) depending on whether the pin brightness is high or lower than the brightness threshold. Adjusting the brightness threshold (5 is the middle and default position) is a handy way of compensating of subtle variations in light conditions, Example 1: A shiny curtain will have a higher brightness than a dull curtain and may therefore lead to pins being detected when they are actually absent. In this case increasing the brightness threshold may help. Example 2: Damaged, old dirty pins or dull pit lighting may cause pins to be judged as absent when they are actually present. In this case decreasing the brightness threshold may help the pins to be displayed as green instead of red.

Note that the brightness threshold is used to determine the table/deck so changes to the brightness threshold will effect the scoring software's sensitivity to the table/deck also.

M. to Changes Machine Type

Pressing the M key while in the Scoring Configuration / Status Screen will toggle the Machine Type as per section 1.2. Note that some of the results of changing machine type will only come into effect when a new camera configuration is done.

Press S to Save the next ball

This option is a diagnostic feature. Each time the S key is pressed while in the Scoring Configuration / Status Screen the Matrix unit will store a series of diagnostic images of the next ball bowled (on either lane) which can be retrieved as an AVI movie using the RemoteConfig program on the comscore main computer. This AVI movie gives a frame by frame interpretation of the scoring software's processing of the image to determine the score and is therefore very useful when debugging errors.

1. Configuration Indicators

A. Top of Pins Indicator

This is a horizontal yellow line extending across the top of the pins for each lane. The Top of Pins Indicator should just touch the top of the head pin.

This is the first parameter that the configuration routine determines i.e. the vertical

position of the pins in the camera's field of view. This parameter is used to reference the following two parameters (Neck Position Indicator, Table/Deck Position Indicator).

If, after configuration, the Top of Pins Indicator is not located just on the top of the head pin, the configuration routine has not been able to correctly distinguish between the head pin and the pit curtain. This may be due to poor lighting, a reflective pit curtain, a damaged head pin, a low iris setting or a badly focused scoring camera.

If there is an appreciable vertical gap between the Top of Pins indicators for the left and right lane, then the Lane Scoring Camera may be mounted on a tilt and steps should be taken to level the camera. It is important to try to present a level image to the scoring software.

B. Neck Position Indicator

This is a horizontal magenta line extending across the neck of the pins for each lane. The configuration routine analyses the brightness levels across this line to determine the pin positions for use by the scoring routine when determining the score.

C. Table/Deck Position Indicator

This is a short horizontal red line above the head pin of each lane. The scoring routine will analyse the brightness in the position indicated by this line to determine the presence of the table/deck during a machine cycle. This is used by the scoring routine to determine when a valid score is to be produced. The average brightness across this line is displayed as the Table/Deck Average. The table/deck is determined to be present or absent depending on whether the average is greater or lower than the deck threshold.

D. Pin Position Indicators

These are a series of vertical magenta lines located above the middle of each pin. It is important that, after configuration, every pin has a pin position indicator above it. This is because they indicate (along with the neck position indicator) the position within the camera image where the scoring routine looks for the presence or absence of a pin. If they are incorrectly placed, the scoring routine will be looking in the wrong position for a pin. The score will, therefore, be wrong. The following factors can result in the incorrect placement of the pin positions.

1. Missing Pins during configuration
2. Dark or Damaged Pin
3. A reflective pit curtain (results in the configuration finding extra pins in the pit)
4. White kickbacks (results in the configuration finding an extra pin to the outside of the pins).
5. Bad focus or incorrect iris on the scoring camera. (can lead to two pin position indicators above the head pin).

Note, the configuration software is responsible for determining the pin positions. The configuration software starts from the outer end of the neck position (i.e. the far left for the odd lane and the far right for the even lane) and works its way inwards (towards the ball chute). As the configuration finds a peak in pin brightness it marks it as the next pin in its set sequence (i.e. starting with the 7 pin on the odd lane and the 10 pin on the even lane). If, after configuration, the last pin is displayed next the ball chute it is not because the ball chute was too bright. It is because the configuration routine could not find all the pins until it reach the ball chute. This is usually because the pins were too dull, out of focus or badly off spot.

If, after configuration, the first pin position indicator is on the outside of the first pin (i.e. to the left of the 7 pin on the odd lane or to the right of the 10 pin on the even lane), then the image may be too bright for the configuration routine to operate correctly.

E. Pass/Fail Indicators

After configuration, the scoring software will display either pass or fail for each lane. This indicates whether the configuration routine believes it has completed the configuration correctly. Unfortunately, it is still necessary to manually check the position of all indicators as it is possible that the scoring routine maybe have misinterpreted the Lane Scoring Camera image.

2. Status Flags

The status flags are displayed in a column for each lane, located under the camera image. These flags indicate the real time status of key factors for the scoring routine. If the flag is written in red it is not active (e.g. no table present), if the flag is written in green it is active. (e.g. No Pins goes green when all pins are knocked over). If any of the status flags (other than foul and ball detect) display green while the machine is at rest then there is a problem with the camera configuration.

A. Trigger

The Trigger status flag displays green when the scoring routine considers that the machine has started a scoring cycle. This may be due to pins falling over, the table/deck falling or the sweep/rake falling. The trigger flag is essentially the combination the next three flags. If ball detection is disabled this flag is used to advance the scoring state from At Rest to Cycle Started. If ball detection is enabled then this flag is ignored and the ball detect flag is used instead. In either case the trigger flag is used to determine when the machine has finished a cycle and, therefore, when the scoring state moves from Score Taken back to At Rest.

B. Pin Fall

The Pin Fall status flag displays green when the number of pins standing changes by more than one. This flag is used to determine whether the machine has finished its cycle. It also forms part of the trigger flag.

C. Table

The Table status flag displays green when the scoring routine determines the presence of the table/deck above the pins. This flag is used to initiate a first ball score as well as to determine whether the machine has finished its cycle. The table/deck is determined to be present (the Table status flag displayed green) when the average brightness of the line indicated by Table/Deck Position Indicator exceeds the deck threshold. This is displayed as the Table/Deck average. Increasing or decreasing the brightness threshold will effect the sensitivity of this flag. Example 1. If the table flag is flashing green at a time that the machine is not cycling (At Rest), increasing the brightness threshold may help stop this occurring (false table/deck detection). Example 2. If the table flag is not being set when the table/deck is actually over the table/deck position indicator, then lowering the brightness threshold will make the scoring routine more sensitive to the table/deck. Note that in this event, including Glow bowling, it is far better to make the table/deck more visible (brighter) by taking the steps outlines in the Hardware Manual than changing the brightness threshold as it also effects the pin count.

D. No Pins

The No Pins status flag displays green when there are no pins standing on the deck. This flag is used to initiate a second ball score as well as to determine whether the machine has finished its cycle.

E. Unstable

The unstable status flag will display green when there is a large change in the brightness of any of the pins. It forms part of the trigger flag.

F. Ball Detect

The Ball Detect status flag displays green when the system detects a closure at the ball speed sensor. It will stay green until the end of the next scoring cycle. It is used for the ball detect function of the system (refer section 1.2).

G. Rake

The Rake status flag will only appear in green when the Machine Interface Module hardware senses a Rake Down signal when a Rake Down switch is fitted. This flag is used to determine the Scoring Status if it is enabled in the Advanced Options Menu.

H. 2nd Ball

The Second Ball status flag will only appear in green when the Machine Interface Module hardware senses a Second Ball light input. Particular brands of

pinsetter/pinspotter connection rely upon a physical to the second ball light to sense the whether the current score cycle is first ball or second ball. Machine types currently requiring Rake Switch and Second ball light connections are

- i. Brunswick GS96..98 (Second Ball Only)
- ii. AMF Model 8290XL (with the Advanced Option set to Pinspotter Connection via APS plug)
- iii. AMF 8230, AMF 8270, Brunswick A, A2, A, A Bright., A2 Bright., Odin and Other (BUT only when Rake Switches Present option is selected in the Advanced Options).

I. Foul

The Foul status flag displays green when the system detects a foul either via the keyboard or the Machine Interface Module foul inputs. It will stay green for the duration of the foul pulse. It is used to determine whether the current scoring cycle was a foul (refer section 1.2).

3. Pin Brightness Levels

Pin brightness level indicators are displayed for each pin on each lane under the camera image. These are real time representations of the level of brightness at each pin position. The position of each pin is represented by the intersection of the vertical and horizontal magenta indicators. If the Pin Brightness level is drawn in green then it will be counted as a pin. If the Pin Brightness level is drawn in red, it will not be counted as a pin. The level required for a pin to be drawn in green (and deemed present) is set by the brightness threshold, which can be adjusted up or down. It also takes into account variations in the average brightness of the image.

4. Current Pin Count

The number of pin standing at any time (as opposed to the last valid score) is displayed under the Pin Brightness levels for each lane.

5. 1st/2nd Ball, Ball Speed and Pin-indicators

The 1st/2nd Ball, Ball Speed and Pin-indicators information are displayed for each lane and relate to the last valid score (the last score displayed on the scoring grid, not the score at any instant). After each score is determined, this information is updated and remains until the next score. One circle is displayed if the last score was from a first ball cycle, while two circles represent a second ball score. Ball speed is determined from the Ball Speed Sensors and is displayed in MPH or Km/h depending on the value of the Video Standard (MPH for NTSC, Km/h for PAL refer section 1.2).

6. Current Time.

The current time is displayed at the bottom of the screen

7. Scoring Status

There are three states for each lane that the scoring routine acknowledges the pinspotter/pinsetter machine is in. These states are listed in a column below the Pin Brightness levels for each lane. The current machine state is written in green.

A. AT REST

When the machine is not cycling (i.e. picking up pins or setting a new set of pins) the scoring routine should be in the AT REST state. The scoring routine will move from the AT REST state to the CYCLE STARTED state when the Trigger (Ball Detection disabled) or the Ball Detect (Ball Detection enabled) status flag becomes green, indicating the start of a scoring cycle. If Rake Switches Fitted is set in the advanced option menu then the Scoring status will only change from AT REST to CYCLE STARTED when a rake switch down signal occurs at the Machine Interface Module hardware (indicated by the Rake flag).

B. CYCLE STARTED

The scoring routine will stay in the CYCLE STARTED state until 1). It has determined the score for the current machine cycle (it will then go to SCORE TAKEN) or 2). There has been no activity from the pinsetter/pinspotter (in which case there had been a false trigger. The scoring routine will return to the AT REST state).

The score is determined and processed when the Table flag becomes active or the No Pins flag becomes active. If the Table status flag is active first the score is interpreted to be a first ball score. If the No Pins status flag is active ahead of the Table status flag the score is interpreted to be a second ball score. At this time the Ball Detect and Foul flags are processed and the scoring state moves to SCORE TAKEN.

If Rake Switches Fitted is set in the Advanced Options Menu then the score will be taken and the Score Status advanced to SCORE TAKEN after the Take Data Delay for that lane (Set in the Advanced Options Menu) expires (e.g. after 4.0 seconds).

C. SCORE TAKEN

The scoring routine will stay in the SCORE TAKEN state, until all status flags (except Ball Detect and Foul) go inactive or the Ball Detect flag goes green, in which case, a new score will commence.

If Rake Switches Fitted is set in the Advanced Options Menu then the Score Status will stay at SCORE TAKEN until the Rake flag disappears.

While in the SCORE TAKEN state, the scoring software will neither attempt to cycle or turn off the machines as it believes the machine is still cycling.

1.4 Advanced Options Menu.

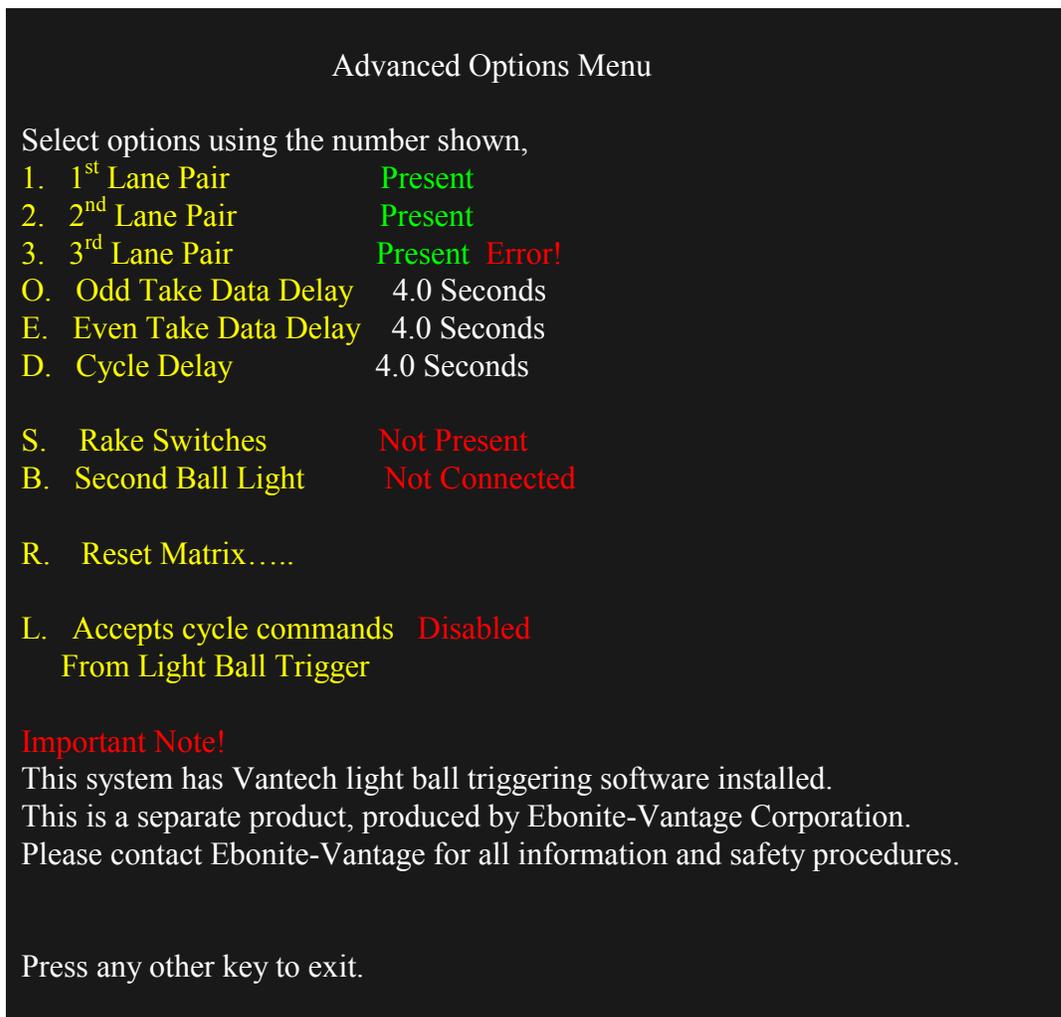


Figure 9 Advanced Options Menu

1st Pair / 2. 2nd Pair / 3. 3rd Pair

The Matrix system has a Matrix unit per a maximum of three lane pairs. Up to three Lane Scoring Cameras can be connected to each Matrix unit. The Matrix unit switches each camera image in sequence. If there are only one or two cameras present in the switching sequence (either because the Matrix unit is connected to less than 6 lanes or a camera is faulty) then it is necessary to use these options to select which of the cameras are present or not. If these options are not set correctly, the camera image of a particular lane may be effected and consequently its scoring, e.g. if all camera are set as present and two are missing or faulty, then the third camera image may roll or flutter. Example, if the Matrix chassis controls lanes 13-16. Then the 1st Camera should be set as present (lanes 13 & 14), the 2nd camera should be set as present (lanes 15 & 16), and the 3rd camera should be set as not present.

Note that if the Machine Interface Module for a pair is not connected, addressed incorrectly or having communications difficulties then the word Error!, will appear to the right of the particular Pair. Should this occur, contact your Vantech Comscore Agent.

O. Odd Take Data Delay

This option allows the setting of the Take Data Delay for the Odd lane, which in simple terms is the time from the machine cycle starting to the score being taken. The scoring software's routine is more complex than a simple time delay. It takes into account other factors, including the detection of the Deck/Table. The exception to this rule is if the Rake Switches Fitted Option is set below. Under these circumstances the score will occur the Take Data Delay period after the Rake down Switch has been sensed (e.g. 4.0 seconds after the rake drops, the score is taken). This option is rarely changed from the default set when the Machine Type option is altered but can be used to account for variations in the operating speed of the Pinsetter/Pinspotter.

E. Even Take Data Delay

This option is as above, except it relates to the Even lane.

D. Cycle Delay

The Matrix scoring software does not use this option. It is merely passed onto a separate Light Ball Triggering software program, if one is present and operating on the system. Press the D key and the system will prompt you to type in the delay time.

Example: To select 4.5 seconds type D then the 4 and 5 key on the keyboard.

S. Rake Switches

The Machine Interface Module hardware is capable of sensing input from a Rake down switch. Certain Pinsetter/Pinspotter types can make use of rake switches to simplify the scoring software (at the expense of complicating the machine wiring). To enable and disable Rake Switch detection press S to toggle between the options of Rake Switches Not Present and Fitted. If Rake Switches are fitted the Scoring system will use the Rake down switch, the second ball light connection and the Take Data delay to determine when to take the score.

If pinspotter model type AMF 82-90XL is selected in the Options Menu then this option will change to Pinspotter Connection. This option then allows the selection between an 8290 and 8290XL chassis. If the option Pinspotter Connection via the APS Plug is selected then the Scoring System will use the Rake Switch and 2nd Ball inputs and an APS output to score and control the pinspotter. An AMF 8270 MP chassis pinspotter can use this option to perform short cycle function but rake switches, 2nd ball light and APS connections must be made to the Machine Interface Module.

If the option Pinspotter Connection via Scoring Plug is selected then the Scoring System will communicate directly with pinspotter via the auxiliary serial port of the Machine Interface Module (this option is for an AMF 8290XL small box chassis).

A. Second Ball Light

This option selects whether a physical connection to the second ball light is present or not.

R. Reset Matrix

Pressing the R key while in the Advanced Options Menu will halt access to the Matrix chassis internal watchdog timer. The watchdog timer is a system safeguard, which will reset the Matrix unit if it is not accessed regularly. This provides a convenient way to reset the lane hardware, instead of turning the power Off and On. Should this option be set accidentally, press the R key again before the system resets and no reset will occur.

L. Accepts cycle commands from Light Ball Trigger & Important Note!

Pressing the L key while in the Advanced Options Menu will enable and disable this feature. If this option is enabled the Matrix chassis will accept cycle commands from a separate Light Ball Trigger program, which needs to be present and operating in the system. This program (VantechTrigger.exe) is loaded into the c:\comscore\matrix directory. It is told of ball detect signals by the Matrix software. The Light Ball Trigger program determines itself if and when it wants to cycle the machine and then commands the Matrix to set the cycle output of the Machine Interface Modules. VantechTrigger.exe is a separate program produced by Ebonite-Vantage Corporation. A message appears on the Advanced Options Menu if VantechTrigger.exe is present on the system so that users are fully aware of whom to contact for information and safety advice regarding this program's operation. This program is in no way required for the scoring function. Refer to the Lane Hardware Manual for further details.

1.5 Ball Speed Setup Menu.

The Ball Speed Setup Menu is used to calibrate the Ball Speed Sensors.

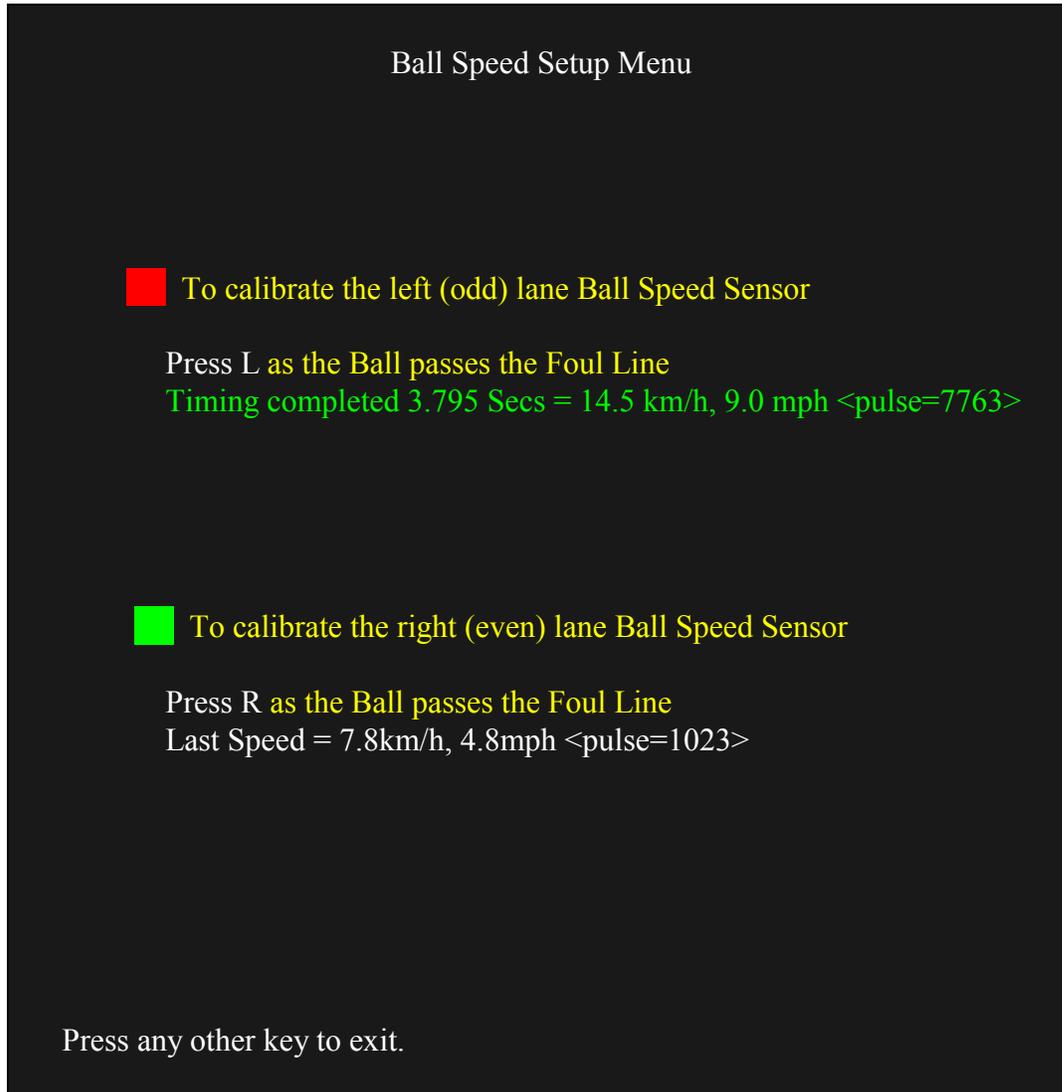


Figure 10 Ball Speed Setup Menu

The Ball Speed Sensors on each lane are a retroflective photo-electric switch and matching reflector located at a set position down the lane (4.01m from the end of the pin deck). As a ball passes past the Ball Speed Sensor the photo-electric beam is broken. The period of time that the beam is broken relates to the speed that the ball is travelling. This width of time is measured by the Machine Interface Module, which transmits this pulse width value to the Matrix unit for processing. The scoring routine translates the pulse width measurement to a speed (Km/h or MPH) using an Index, (i.e. Speed = Index/Pulse

width). Determining the appropriate calibration index to use is the purpose of the Ball Speed Setup Menu.

To calibrate the Ball Speed Sensor for the left (odd) lane press the L key on the Keyboard Module precisely as a ball (bowled by an assistant) passes the foul line (the use of a ramp will increase accuracy). The software will then record the time for the ball to pass from the foul line to the ball speed sensor. Knowing this time and the set distance from the Foul line to the Ball Speed Sensor, the software is able to calculate the speed of the calibrating ball. The software uses this known speed and the pulse width returned from the Machine Interface Module to calculate the calibrating index. This index will then be used by the scoring routine to determine ball speed for all subsequent balls bowled. An identical procedure is used for the right (even) lane, except the R key is used in place of the L key.

1.6 Exiting the option menu

Press PLAY on the keyboard to exit the options menu and return to the score grid display.