

Lane Configuration Manual

1.0 Introduction

The Computer Score lane setup 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 Ball detectors while other 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 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.

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

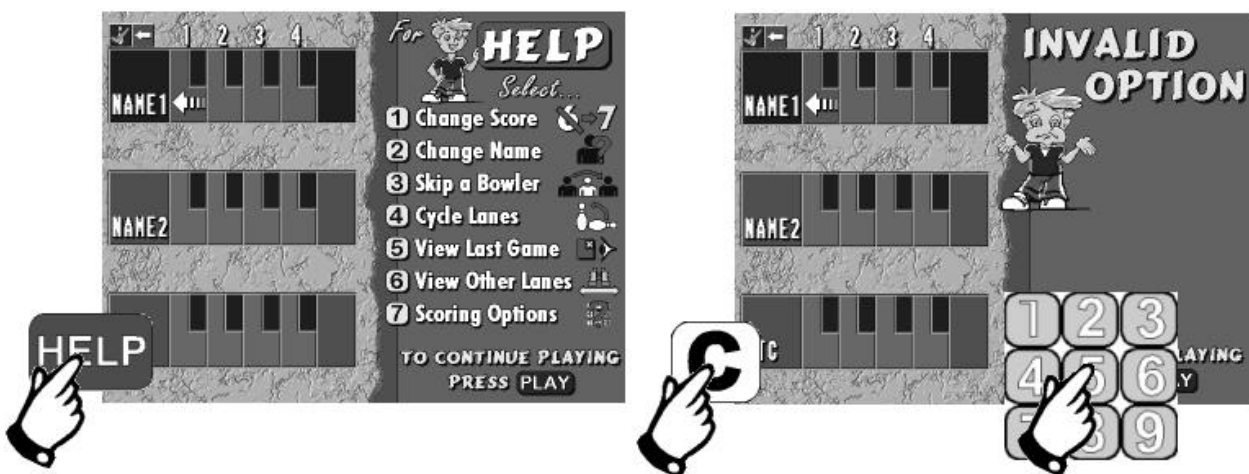


Figure 1. Entering the Option Menu

Pressing 'C' on the keyboard console will result in the Display of the Invalid Option Menu. This discourages the general public from proceeding further. To enter the

options menu type the system password which is set at the host computer (if connected) or enter the temporary password (known as the magic number) given by the Computer Score representative.

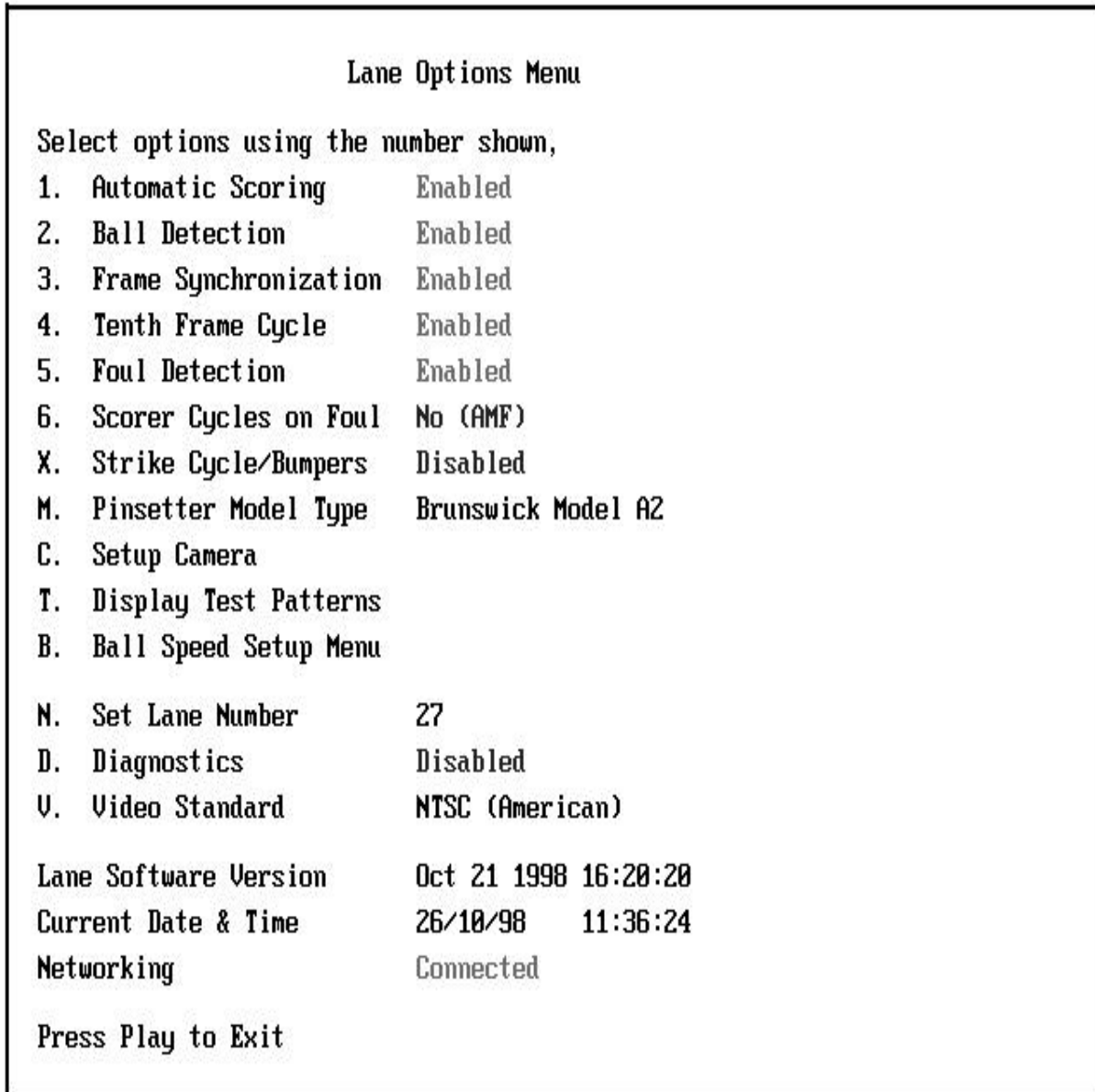


Figure 2. Options Menu

1.2 The Options menu

The option menu contains the following options,

1. Automatic scoring

Pressing 1 on the keyboard console will enable or disable automatic scoring. When 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 are other circumstances where management may choose to disable the automatic feature of the system, this option takes effect as soon as pressing PLAY on the Keyboard 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

Pressing 2 on the keyboard console while the Options menu is displayed will 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.

3. Frame Synchronisation.

Pressing 3 on the keyboard console while the Option menu is displayed will 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 (with the exception of GS-92+ machinery that has been set to table sense on second ball). 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 scorer on first or second ball of a frame). If the scorer 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 scorer and the machine as to which ball the bowler is bowling.

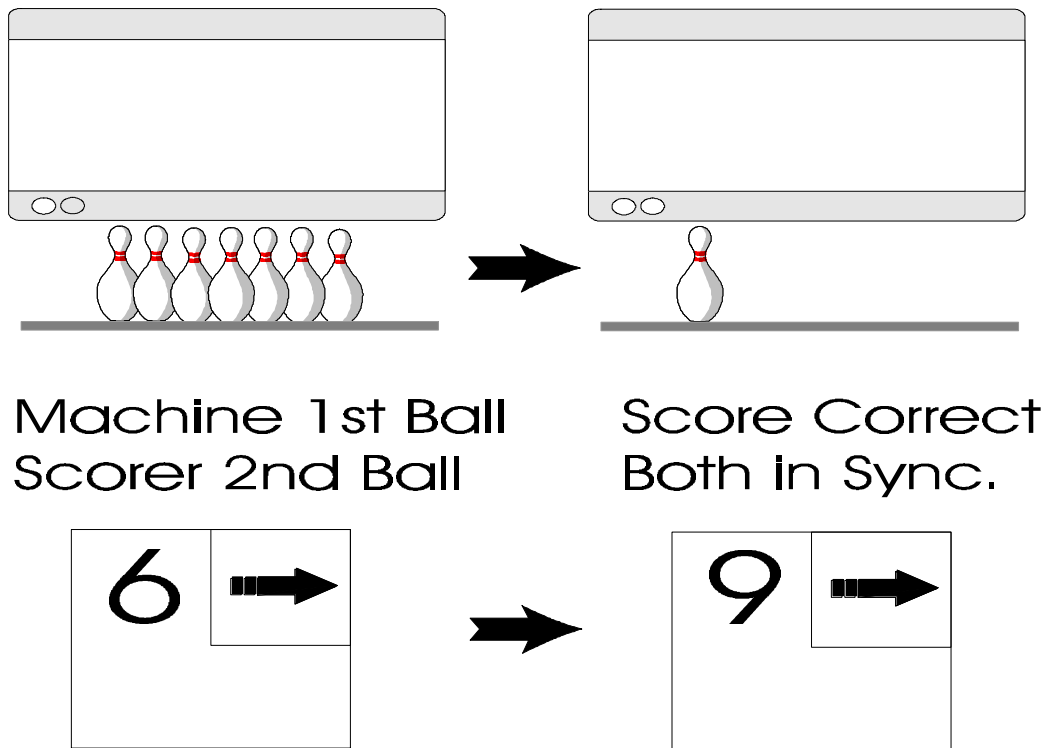


Figure 3 Frame Synchronisation Example.

This feature is useful in stopping the scorer from disagreeing with the machine over an extended number of frames and tends to reduce the level of staff involvement at the lanes. The exception in frame synchronisation is the case of the scoring system 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 will display 9 / instead of overwriting the 9 with a strike. This will, however, still result in the Scorer and machine being in synchronised i.e. both will be on first ball of the next frame.

4. 10th Frame Cycle

Pressing 4 enables or disables 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 was to be taken as a strike.
- 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 Display units will not command the machine interface module to cycle the machine until the automatic scoring verifies that the machine has returned to the idle

position (awaiting the next ball). The Automatic Scoring uses an empty deck as one of the methods for determining that a machine cycle has not yet finished a cycle. This results in the situation where the Scoring System will not cycle a machine that has an empty deck (no pins standing).

5. Foul Detect

Pressing 5 enables or disables the Foul Detect Option. 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 is 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.

6. Scorer Cycles on Foul

Pressing 6 enables or disables 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 lead 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. The option 5 Foul Detect has be enabled for this option to be effective.

X. Strike Cycle/Bumpers

Pressing X toggles 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

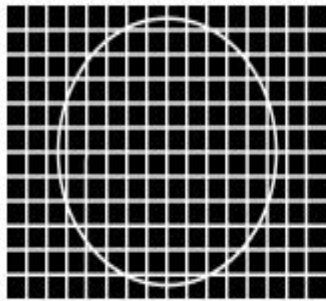
Pressing M will toggle the type of Pinsetter machine the system is to interface with. The software that determines the scores uses this option and the machine type selected will effect the manner in which the score is determined. It is, therefore, important that the correct pinsetter type is selected. 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

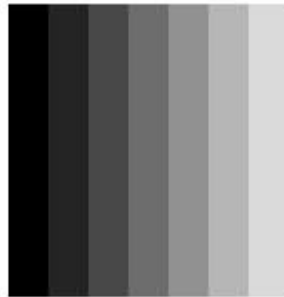
Option C is used to enter the Scoring Configuration / Status Screen. This is used to setup the automatic scoring parameters e.g. the position of the pins within the camera image. Press C to enter the Scoring Configuration / Status Screen. Refer to section 1.3 Scoring Configuration / Status Screen.

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



Crosshatch



Grey Scale

White Raster



Red Raster



Green Raster



Blue Raster

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 1.4 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 a Host computer is connected to select which lane is to be turned on, display a grid etc. Press N and a prompt with request that the new lane number is 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 computer score 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 lane pair are 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.

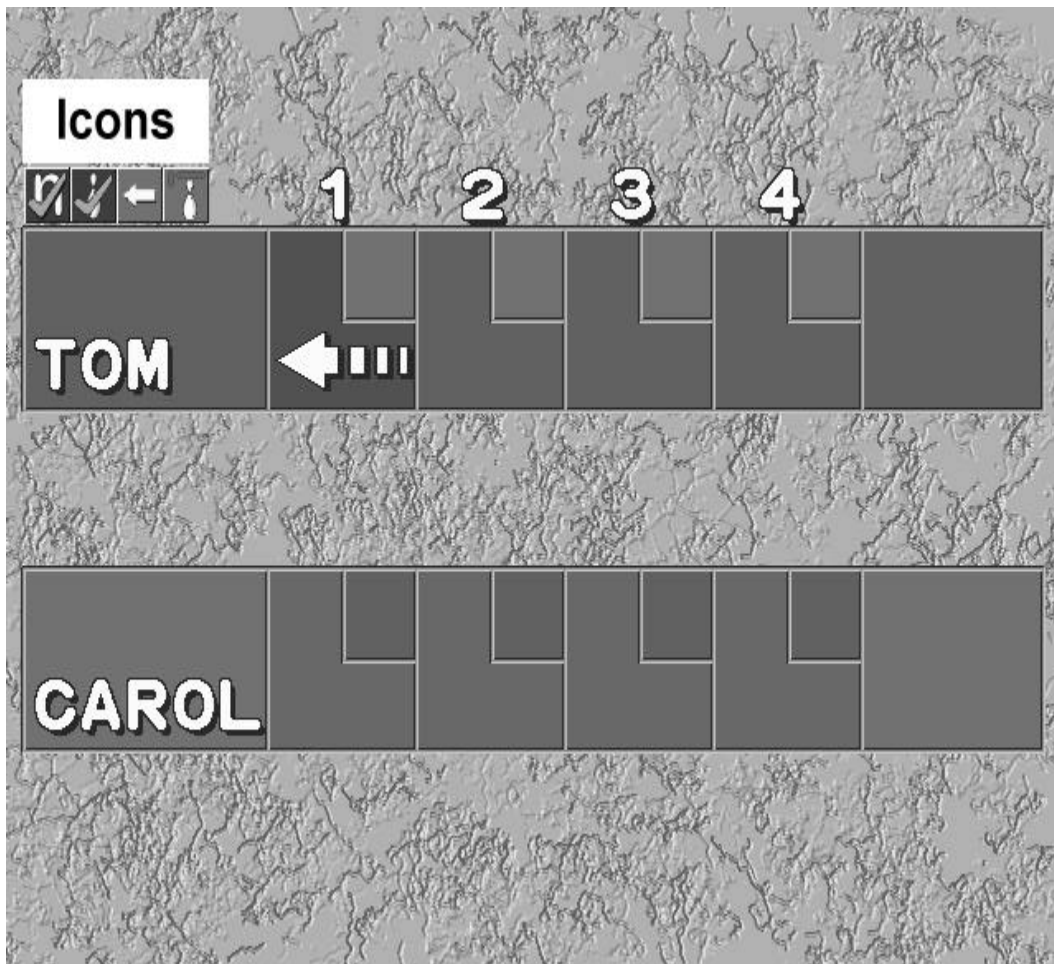


Figure 5. Diagnostic icons above the score grid

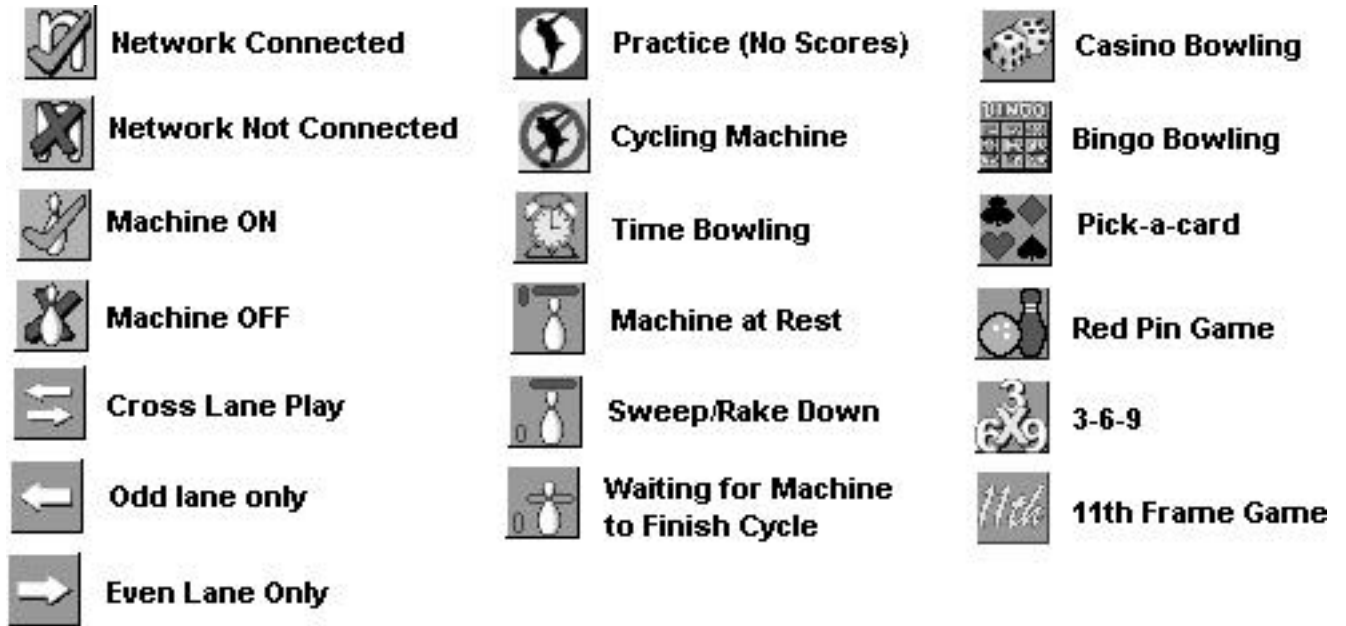


Figure 6. Available Icons

V. Video Standard

Pressing V toggles the video standard between PAL and NTSC. The display 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 display units have VGA monitors which operate at a different timings to either NTSC or PAL, therefore either signal is converted to match the VGA timings. Consequently there is no need to re-adjust the VGA monitors when changing the video standard selection.

Lane Software Version Date & Time

The date and time when the lane software version was produced is displayed in the options menu to allow the verification of updates. When a lane pair powers on it checks for the presence of the Host Computer on the network. If the Host Computer is present, the display units compare the age of their current software version with the age of that present in a directory of the Host Computer. If the Host Computer is found to have a more recent version, the display units will automatically update themselves 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 DVS chassis CMOS Bios Real Time Clock. This time and date is set by accessing utility programs that are beyond the scope of this manual.

Network Status

The option menu displays the status of the network connection to the Main Host Computer. If the display units detect the presence of a host computer it will display Network Connected, otherwise the option menu will display Network Disconnected. If the Network is disconnected the display units will operate in Stand-alone mode as well as display the network disconnected icon above the score grid. In stand-alone mode the score grid will stay on after each game, allowing a new game to begin upon the completion of the previous game. Stand-alone mode allows the Host Computer to be powered down without effecting the scores at the lanes. Each Display unit has non-volatile memory that is used to save scores even after a power out has occurred.

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.

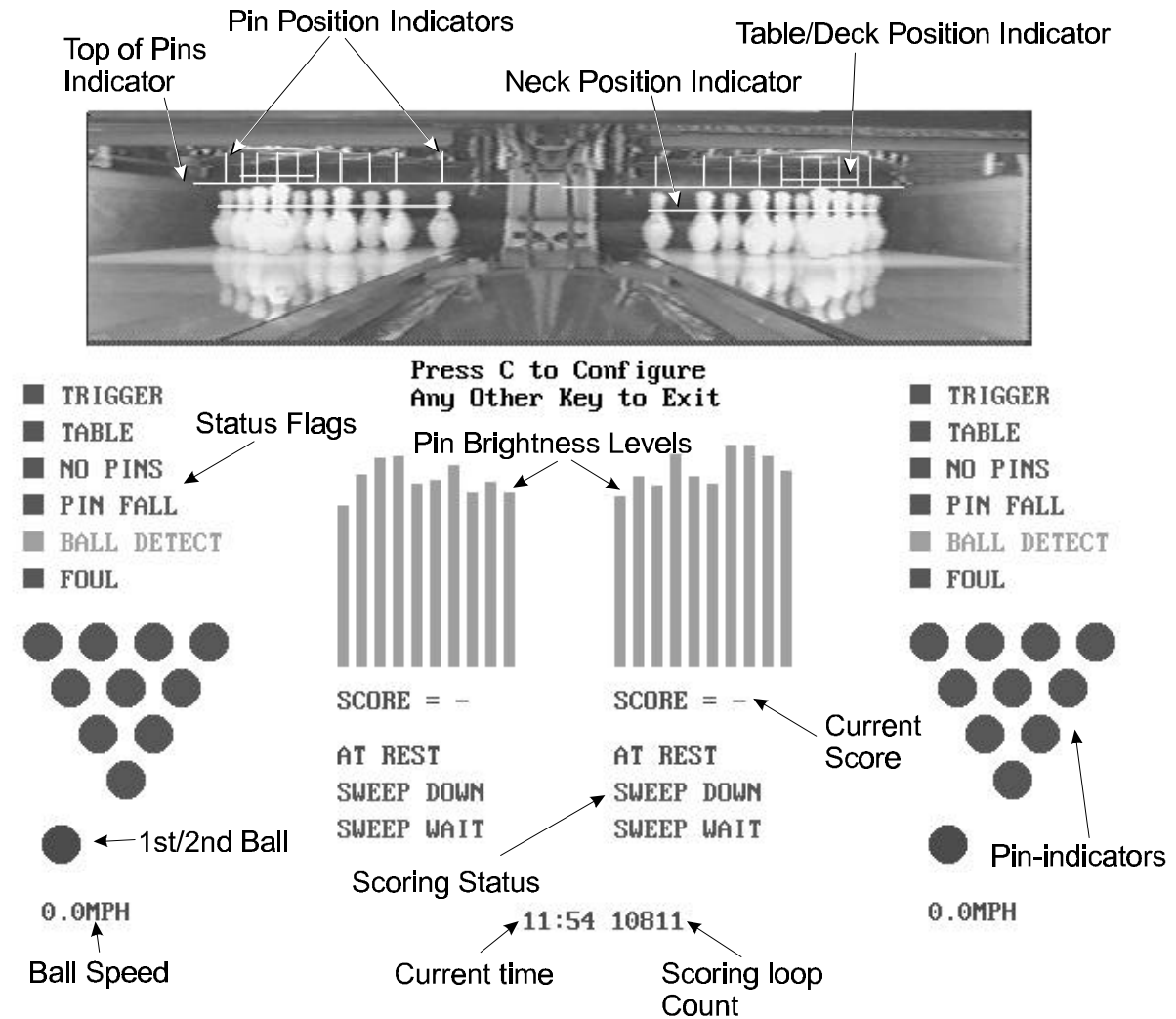


Figure 7 Scoring Configuration / Status Screen

1. Configuring the Lane Scoring Camera

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. An image of the pin deck will appear, including white vertical and horizontal lines indicating the following parameters.

A. Top of Pins Indicator

This is a horizontal white 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 indicates 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 bad focus of the scoring camera.

If there is an appreciable vertical gap between the Top of Pins indicator for the left and right lane, this indicates that the Scoring Camera is mounted on a tilt and steps should be taken to level the camera.

B. Neck Position Indicator

This is a horizontal white 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 white 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.

D. Pin Position Indicators

These are a series of vertical 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 there 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. (sometimes leads to two pin position indicators above the head pin).

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.

B. 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.

C. 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.

D. 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 as well as forming part of the trigger flag.

E. 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).

F. 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 pin position is referenced horizontally by the pin position indicator and vertically by the neck position indicator. 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 is set using as reference the pit brightness found at the neck position between the 6 & 10 pin for the odd lane and the 7 & 4 pin for the even lane.

4. Current Score

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. 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 2nd 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 and Scoring loop count.

The current time and scoring loop count are displayed to provide information about the efficiency of the scoring routine. The scoring loop count is the number of times per minute that the scoring routine checks the camera image for a change in the scoring status.

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 will be in the AT REST state. The scoring routine will move from the AT REST state to the SWEEP DOWN state when the Trigger status flag becomes green, indicating the start of a scoring cycle.

B. SWEEP_DOWN

The scoring routine will stay in the SWEEP DOWN state until 1). It has determined the score for the current machine cycle (it will then go the SWEEP WAIT) 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 SWEEP WAIT.

C. SWEEP WAIT

The scoring routine will stay in the SWEEP WAIT state, unable to start a new scoring cycle until all status flags (except Ball Detect and Foul) go inactive.

1.4 Ball Speed Setup Menu.

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

```
Ball Speed Setup Menu

■ To calibrate the left (odd) lane Ball Speed Sensor
  Press L as the Ball passes the Foul Line
  Completed 27.6 Km/h 17.1 M.P.H.
  Pulse Width 707 Kph Index 19548 MPH Index 12148

■ To calibrate the right (even) lane Ball Speed Sensor
  Press R as the Ball passes the Foul Line
  Timing Ball Travelling down Right Lane
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Press any other Key to Exit

Figure 8 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 Display Monitors for processing. The scoring routine translates the pulse width measurement to a speed (Km/h or MPH) using an Index, (i.e. $\text{Speed} = \text{Index}/\text{Pulse width}$). 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.

1.5 Exiting the option menu

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