

Touch Score 1
ALS Board

Installation and Reference Guide
for Version 4.33

By A.K.Microsystems International

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1. Overview

Touch Score 1 is a versatile ten pin bowling scoring system that can be installed in a number of configurations.

- As an upgrade to AMF Magicscore or Accuscore I systems
- As a keypad based system
- As a Touch Screen based system

The heart of the system is A.K.Microsystems' ALS board. This board contains the scoring software, and the various interface circuits needed for the keypads, pin sensing, front desk communications, etc.

In addition to the ALS board you will require various standard computer parts such as motherboards, video cards and power supplies. Depending upon your specific installation, you may also require a standard computer case, or custom mounting hardware, a touch screen and a custom players' console.

This manual describes the ALS board in detail, and how it is used in such a system. For information on the other components in the system, refer to the manuals supplied with those components.

All Touch Score systems require an A.K.Microsystems Lane Control System as a front desk.

2. Installation

2.1 Requirements

You will require the following items to build a Touch Score System. Each item should be tested with an ALS board to ensure compatibility. Each item listed is required for each pair of lanes. See the chapter on *Cabling Specifications* for more information on the cables.

Required for All configurations:

- ALS board with appropriate software, either Touch Screen or Keypad.
- PC Motherboard. 486 or better, 2 x PCI slots, 1 x ISA slot, 4 Meg of Ram or better. More RAM will allow more graphics to be held on board. A faster processor will give faster screen updates.
- Video Cards. Two per unit for keypad systems, three for Touch Screen. These cards must be a supported type. See you supplier or contact A.K.Microsystems for details.
- Overhead monitors or TVs, one per lane. Monitors must be either VGA compatible (640x480 mode) or have an S-Video or composite input. In order for the scorer to automatically switch between TV and score, the monitors should sense when a signal is present and switch automatically. Alternatively, a 12 volt signal on P12 (Lamps) can be used for switching. If neither of these are possible, it may be necessary to use the remote control to switch a monitor from TV to score and vice-versa.
- Overhead monitor mounting brackets and cabling

For systems with AMF APS that require on-screen indication:

- One serial port, either on the motherboard or a separate card, configured as COM1.
- Cable connecting this port to P1 & P4 on AMF APS unit

OR

- The APS can be fitted with modified firmware in a chip. The extra COM port connection is then not required.

For Touch Screen systems only:

- One serial port per pair of lanes, either on the motherboard or a separate card, configured as COM 1.
- One Microtouch or compatible serial touch screen and monitor
- One Players Console
- Cabling to connect the Touch Screen to the computer.

For Magicscore conversions:

- Suitable base plate and chassis for mounting the motherboard and components in a Magicscore console.
- PC power supply
- Keypad extension cables.

For systems mounted on the curtain wall:

- Standard PC case and power supply
- One serial port per pair of lanes, either on the motherboard or a separate card, configured as COM1, for connection to an A.K.Microsystems Bowler Terminal Card for the keypads.
- Suitable cables for APS connection, front desk communications connections, monitors, touch screens and keypads.
- A.K.Microsystems COMMS protection card.

2.2 Assembling the Computer

Assemble the motherboard, ALS cards, PCI cards, any extra serial cards into either a standard medium tower case for mounting onto the curtain wall, or onto a suitable mounting plate for fitting to an AMF Magicscore console.

For curtain wall systems, fit the COMMS protection card to a vacant 25 way D cut out in the case. Ensure that the COMMS protection card has power connected to it.

Connect a keyboard and two standard computer monitors or S-Video TVS to the two video cards using the adapters provided with the cards. If you are building a touch screen system, connect the touch screen to the third video card and connect the serial port on the touch screen to COM1, as per the touch screen manufacturer's instructions.

Ensure that all switches on the ALS board are off.

Power up the unit. Normal BIOS start up messages should appear on one screen. Enter the motherboard's setup mode. Ensure that the system is configured to start without a keyboard connected, without floppy or hard drives present, etc. Other

options should be set to the default. See your motherboard manual for more information.

Note that the ALS board contains COM2. If your motherboard has on board ports they must not be set to COM2.

Reboot the computer without the keyboard. You should see normal startup of the motherboard, followed by a green **Testing Wait....** message on the two screens, followed by the appearance of a scoring grid on both screens. If you have a touch screen connected you should also see the normal touch display on the third screen.

If the unit fails to behave as expected, try the following procedures:

- Try the video cards in different slots, some motherboards do not support video cards in all slots.
- Check for any BIOS messages like *keyboard not found*, or *hard disk error*. Setup the BIOS so that these tests are not performed on startup.
- Try clearing the ALS battery backed RAM by closing switch S1-6 while the unit is running. Reopen the switch when a score grid appears
- If the self test fails, see the section on troubleshooting at the end of this manual.
- Try a different motherboard or video card. This particular type may not be compatible.

Once the unit is functioning correctly, proceed to setting the switches.

2.3 Setting the Switches

There are several switches on the ALS board which must be set correctly.

- | | |
|----|---|
| S1 | 1-5 Lane Number (see next page) |
| | 6 On to clear battery backed RAM, off for normal operation |
| | 7 On for manual score, off for auto |
| | 8 On for test mode |
| S2 | 1 Reserved, leave off |
| | 2 On for SVGA (computer) monitors, OFF for S-Video (TV) |
| | 3 On for single markII keypad, off for three keypads |
| | 4 On for Extended Score input, OFF for normal APS input (see below) |

S2-2 should be off for connection to an AMF APS chassis running original APS firmware. If the APS is fitted with A.K.Microsystems modified firmware, or if you are connecting to an A.K.Microsystems camera interface unit, set the switch to ON. This enables the extended pinfall data, which includes pindication information, rather than just the total pinfall.

Lane number switches are set for each pair of lanes as follows:

Lane	SW5	SW4	SW3	SW2	SW1 (0=open 1=closed)
1-2	0	0	0	0	0
3-4	0	0	0	0	1
5-6	0	0	0	1	0
7-8	0	0	0	1	1
9-10	0	0	1	0	0
11-12	0	0	1	0	1
13-14	0	0	1	1	0
15-16	0	0	1	1	1
17-18	0	1	0	0	0
19-20	0	1	0	0	1
21-22	0	1	0	1	0
23-24	0	1	0	1	1
25-26	0	1	1	0	0
27-28	0	1	1	0	1
29-30	0	1	1	1	0
31-32	0	1	1	1	1
33-34	1	0	0	0	0
35-36	1	0	0	0	1
37-38	1	0	0	1	0
39-40	1	0	0	1	1
41-42	1	0	1	0	0
43-44	1	0	1	0	1
45-46	1	0	1	1	0
47-48	1	0	1	1	1
49-50	1	1	0	0	0
51-52	1	1	0	0	1
53-54	1	1	0	1	0
55-56	1	1	0	1	1
57-58	1	1	1	0	0
59-60	1	1	1	0	1
61-62	1	1	1	1	0
63-64	1	1	1	1	1

Once all the switches are set, the unit is ready for installation.

2.4 Connecting Monitors

Each overhead monitor must be connected to its VGA video card. There are several ways of doing this depending upon your installation. You will need

appropriate cabling. See the chapter on *Cabling Specifications* for more information on the cables.

- Standard U.S. TV's

The cable adapter provided with the VGA cards has a standard S-Video output. Connect this to the TV's S-Video input using standard cables. Set switch 2-2 to OFF.

- Standard U.S. RGB Monitors

RGB monitors can be connected directly to the VGA card's RGB output. Set switch 2-2 to OFF.

- Standard SVGA computer monitors

Connect to the normal VGA connector. Set switch 2-2 to ON.

When using TVs, it is desirable for the ALS board to be able to switch the TV monitor between score display and normal TV display. There are two ways to achieve this.

1. Some TVs automatically detect the presence of a signal on the S-Video input, and will switch accordingly. This is the ideal solution as no extra connections are necessary.

2. The Lamps connection on the ALS board (P12) can be used to supply a 12 volt switching signal. Pins 2&4 are always at 12V, and pins 1&3 are grounded when the TV is to be displayed. This can provide a 12 volt signal as per a SKART connector (see the section on connecting a SKART monitor for details), or a relay can be connected and interfaced to the TV as required. Note that any relays should have diode spike protection across the coil to avoid damaging the ALS board.

If neither of these solutions is practical, then it will be necessary to use the TV's remote to switch from TV to score display.

2.5 Connecting Keypads

For Magicscore upgrades, the existing keypads will connect directly to the connectors on the ALS board. You may need to extend the existing cables. See the chapter on *Cable Specifications* for details.

The ALS board can use either the three keypads as used in early Magicscore, or a single keypad as used in later models. You must set switch 3 on switch bank S2 on the ALS board to the correct type:

S2-3 ON for single keypad, OFF for three keypads

2.6 Connecting a Bowler Terminal Board

When the ALS is mounted on the curtain wall in a keypad system, it is necessary to use an A.K.Microsystems Bowler Terminal board at the players console to interface with the keypads. Connect the bowler terminal board to the scoring computer's COM1 as shown in the Bowler Terminal manual.

2.7 Connecting a Touch Screen

The touch screen has two cables, a video cable and a communications cable. Both can be connected to the computer using standard computer cables. You will need a VGA extension cable, and a serial extension cable.

2.8 Connecting Front Desk Communications

For Magicscore upgrades, simply connect the existing 9 way plug from the I/O card to P2 on the ALS board.

For curtain wall installations, you will need to connect each socket on the COMMS Protection board to the front desk in a daisy chain manner. Ie: Front desk to lane1-2, lane 1-2 to 3-4, 3-4 to 5-6 etc.

See the chapter on *Cabling Specifications* for more information on the cables.

2.9 Connecting an APS, including pindication

For Magicscore upgrades, simply connect the existing 6 way plug to P3 on the ALS board.

For curtain wall installations, you will need to connect P3 on the ALS board to the 3 way connector on the APS using a suitable cable.

The normal APS provides total pinfall data only, and does not specify which pins have fallen. In order for the on-screen pindication display to work, the ALS needs to know which pins have fallen. There are two ways to overcome this problem.

- 1) Fit A.K.Microsystems modified APS firmware to the APS chassis, and close switch 2-4 on the ALS board. The APS will now send sufficient data to the ALS board to allow on-screen pindication
- 2) Connect an additional cable from COM1 on the scoring computer to the P1 & P4 connectors on the APS. The ALS now uses the machine data to determine which pins have fallen.

See the chapter on *Cabling Specifications* for more information on the cables.

2.10 Connecting the Pinspotters

The ALS board has the capability of cycling the pinspotters.

This will occur automatically when in no-tap mode and a no-tap strike is bowled, or in the tenth frame when the second ball score is not required. Also, with touch screen systems, the bowlers can request to reset the pins.

P9 and P10 on the ALS board (marked RT M/C and Left M/C) should be connected across the cycle switch at the bowlers console (Magicscore Upgrades) or at the machines themselves (curtain wall installations). Note that it should be wired in such a way that the ball will be scored when the machine cycles.

3. Using Touch Score with Keypads

This chapter details the use of Touch Score when keypads are used. The system will operate very much the same as a Magicscore or Accuscore system, but there are a few differences.

Many of the features are controlled by the *Lane Control System* front desk. Refer to the *Lane Control System* manual for more information on these features.

Throughout this chapter, the symbol **LEFT** is used to refer to the large L key used for selecting the left lane, rather than just **L** which could be confused with the L key in the alphabetic section. Similarly, **RIGHT** is used for the large R key.

3.1 Selecting League or Open

Normally the selection between league and open play is done by the *Lane Control System*. However, it is possible to change modes by pressing the **LEAGUE** or **OPEN** buttons.

Note that the *Lane Control System* has the ability to lock the mode so that the bowlers cannot change it. Normally when the *Lane Control System* sets the mode, it also locks the mode.

3.2 Entering a Bowler's Name

To enter a bowlers name, press **LEFT** (for the left lane) or **RIGHT** (for the right lane) then **BOWLER** then the bowler's position from **1** to **6**. A cursor will appear

at the bottom of the screen. Enter the bowlers name. To fix a mistake, use the **ERASE** key.

3.3 Bringing up the Arrows

Once all the bowlers' names are entered, the arrows must be brought up so that play can commence. The arrows indicate which bowler should bowl next.

On single keypad systems, Press **L-SCORE**, or **R-SCORE** then **BOWLER** then the bowlers' position from **1 – 6**. For example, **L-SCORE BOWLER 2** will bring the arrows up waiting for bowler number 2 to bowl.

On systems with three keypads, press the bowler number from 1-6 on either the left or right keypads.

The arrows will not appear if the scorer is in practice mode, or if the arrows have been inhibited by the *Lane Control System*.

Once the names have been edited, and the arrows are up, bowling can commence.

3.4 Removing a Score

At the end of the game, the score should be removed so that another game can commence. When a score is removed, the names remain unchanged, only the scores are cleared.

Press **LEFT** or **RIGHT** then **REMOVE-SCORES**.

Note that the *Lane Control System* has the ability to prevent the bowlers from removing their score.

3.5 Clearing a Score

At the end of the bowlers' last game, the score should be cleared. All names and scores will disappear.

Press **LEFT** or **RIGHT** then **CLEAR**.

Note that the *Lane Control System* has the ability to prevent the bowlers from clearing their score.

3.6 Getting a Team from the League Secretary

When a League Secretary program is being used, such as *CDEs BLS-X*, it is possible to download a team from the front desk, rather than type in the bowlers' names and handicaps. Often the names will appear automatically prior to the start of play, but sometimes it may be necessary to manually request the team. To request a team, you must enter the team code. Consult the *Lane Control System* manual for details on which codes to enter.

To enter a team code press **LEFT** or **RIGHT** then **TEAM** and enter the code. When the last letter of the four digit code is entered, the word **WORKING** will appear on the screen as the scorer gets the team from the front desk.

3.7 Removing a Bowler

To remove a bowler prior to start of play, press **LEFT** or **RIGHT** then **BOWLER** then the bowlers position from 1-6. The bowler's name will now appear. Press **ERASE** until the name has been removed.

3.8 Entering a Bowlers Handicap

To enter a handicap for a bowler press **LEFT** or **RIGHT** then **BOWLER** then the bowler's position form 1-6. Then press **BOWLER-HANDICAP**. Enter the handicap using the numeric keys at the bottom of the keypad. To fix any mistakes, use the **ERASE**key.

3.9 Adding a Blind Bowler

To enter a blind score for a bowler press **LEFT** or **RIGHT** then **BOWLER** then the bowler's position form 1-6. Then press **BLIND**. Enter the blind score using the numeric keys at the bottom of the keypad. To fix any mistakes, use the **ERASE** key. You can not make a player blind if they have already started bowling.

To return a player to normal when they were accidentally entered as a blind, bring up the player (**LEFT** or **RIGHT**, then **BOWLER** then the bowler's position from 1-6) then press **BLIND**.

3.10 Adding a Pacer

To make a player a pacer, press **LEFT** or **RIGHT** then **BOWLER** then the bowler's position form 1-6. Then press the **PACER** key. A pacer is a player whose score is not included in to the teams score.

3.11 Entering a Team Name

To enter a team name, press **LEFT** or **RIGHT** then **TEAM**. Enter the team's name. Use the **ERASE** key to fix any mistakes.

3.12 Entering a Team Handicap

The team handicap will normally default to being the sum of the players handicaps. However it is possible to enter a different handicap. Press **LEFT** or **RIGHT** then **TEAM-HANDICAP**, then enter the new handicap. Use **ERASE** to remove any existing handicap or to fix mistakes.

3.13 Bowling Out of Turn

If the arrows are pointing to a particular bowler, and this is not the bowler who will bowl next, then the arrows must be moved to the correct bowler.

To move the arrows with a single keypad system, press **L-SCORE** or **R-SCORE**, then **BOWLER** then the bowler's position from **1** to **6**.

On systems with three keypads, press the required bowler key on the left or right keypad.

3.14 Manual Scoring

On systems which do not have automatic pinsensing, the bowlers will need to enter each pinfall manually.

To enter a pinfall on a single keypad system, press **L-SCORE** if the ball was bowled on the left lane, or **R-SCORE** if the ball was bowled on the right lane, then enter the number of pins knocked down, or use the **STRIKE**, **SPARE**, **MISS**, or **FOUL** key. You may also press the **SPLIT** key if the ball is a first ball and the pins left standing form a split.

On system with three keypads, you do not need to press **L-SCORE** or **R-SCORE**, simply use the correct left or right keypad to enter the score. You should use the left keypad for balls bowled on the left lane, even if the bowler's name is on the right lane. Similarly use the right keypad for balls bowled on the right lane.

Manual scoring will need to be enabled, either by the Lane Control System, or by a switch on the ALS board.

3.15 Redisplaying the last pin fall

On system with automatic scoring and on-screen pindication, you can redisplay the last pinfall. The screen will show the position of the pins that are still standing. To redisplay the pinfall, press **LEFT** or **RIGHT** then **P**.

3.16 Correcting a Score

To correct a score that has been entered incorrectly on single keypad systems, press **L-SCORE** or **R-SCORE** then **CORRECT**. A flashing cursor will appear. Use the arrows keys to move the cursor to the score to be corrected. Then enter the correct score.

On three keypad systems there is no need to press **L-SCORE** or **R-SCORE**, simply use the correction and scoring keys on the left or right keypad.

Note that edited scores are shown underlined.

Sometimes it may be necessary to edit both balls in a single frame in order for the score to be valid. For example if you scored 5 then spare, and you change the 5 to a 6, then the score may read 6 5 which is not a valid score. Change the second ball to a 4.

To restore a corrected score to its previous value, press **RESTORE**.

To remove a score so that it can be re-bowled, touch **RESTORE**. Note that the newly bowled score is underlined, to show that it was not the original score but that it has been changed.

3.17 Viewing another Lane

To view another lane, press **LEFT** or **RIGHT** then **V** then enter the lane number. For example, to view lane 12 on the left screen, press **LEFT V 1 2**. The word **WORKING** will appear while the system gets the score. To return to your own score, press **LEFT V**.

3.18 Changing the Score Grid Size

There are several types of score grids available. The type used depends upon the number of players entered, and the size of text your require. Normal score grids are

either 4 or 6 players by 10 frames. Large text grids show only 4 frames and can display only up to 4 players.

You can select which size grid you wish to use by pressing **LEFT** or **RIGHT** then **G** to change between small and large text.

If there are more than four players entered, then the large text grid cannot be used. If the lane is in league play, then the same type of grid is used for both lanes. You may not be able to display large text grids on your lane, if there are more than 4 players on the other lane.

3.19 Getting Help

The system can display instructions on the screen to assist first time users. These instructions are displayed under the score grid.

To turn the help instruction on or off, press **LEFT** or **RIGHT** then **H**.

4. Using Touch Score with a Touch Screen

Using Touch Score with a touch screen is simplicity in itself. Generally you simply touch what you want to do. The menus and screens are designed to be very easy to use. The following instructions are intended for reference purposes only.

At the bottom corners of the touch screen are two buttons, one for each lane. These buttons are used for many purposes.

Prior to bowling, these buttons are labelled **ENTER NAMES** . Touching these buttons brings up the bowler entry screen.

During play, these buttons show which bowler is to bowl next on each lane. Touching the button advances the arrow to the next bowler. If manual scoring is being used, touching these button will bring up the score entry screen.

At the end of the game, these buttons will show **END OF GAME**. Touching the button will clear the score either ready for the next game, or ready for the next bowlers.

Between these two buttons is a green area label **TOUCH HERE FOR MENU**. Touching this button brings up the main menu.

Note that the *Lane Control System* has the ability to prevent the bowlers from using the touch screen.

4.1 Selecting League or Open Play

Normally the selection between league and open play is done by *the Lane Control System*. However, it is possible to change modes by touching the **LEAGUE** or **OPEN** buttons on the main menu screen.

Note that the *Lane Control System* has the ability to lock the mode so that the bowlers cannot change it. Normally when the *Lane Control System* sets the mode, it also locks the mode.

4.2 Entering a Bowlers Name, Handicap, Blind Score and Pacer

When there are no bowlers entered on a lane and the lane is in open or social mode, the buttons at the bottom of the touch screen will show **ENTER NAMES** . Simply touch the left or right **ENTER NAMES** button and enter the first bowler. Press **NEXT** to enter more bowlers. Press **OK** when all bowlers have been entered.

If bowlers have already been entered, or the lane is in league mode, then the **ENTER NAMES** buttons will not be present. To add another bowler or change an existing bowler, touch the **MENU** button, then touch **EDIT NAMES OR CHANGE NAMES**, then touch the bowler position that you wish to change. Once a bowler is selected, there are three choices.

Touch **EDIT** to change this bowlers details. Once the edit screen appears, touch the item that you wish to change. You can change the name, handicap, blind score or make the bowler a pacer. If the lane is in open play, then the **BLIND** and **PACER** options will not be present.

Touch **REMOVE** to remove this bowler.

Touch a new bowler position. This will move the bowler to this new position. If there is already a bowler in this position, they will be moved to the original bowlers original position.

4.3 Bringing up the Arrows

In Open play, the arrows appear as soon as the names have been entered.

In League play, touch the **LEFT BOWLER** or **RIGHT BOWLER** button to bring up the arrows.

Note that the *Lane Control System* has the ability to prevent the arrows from appearing.

4.4 End of Game

At the end of the game, an **END OF GAME** button will appear at the bottom of the screen. When this button is touched, a screen will appear asking if these bowlers want another game. If you answer yes, the score will be removed but the names will remain. If you answer no, then both the score and the bowlers names will be cleared.

Note that the *Lane Control System* has the ability to prevent the bowlers from removing or clearing their score.

4.5 Getting a Team from the League Secretary

Normally teams will appear on the screen automatically prior to a league's start time. However it is sometimes necessary to manually request a team to be sent. To request a team, touch **MENU** then **LEAGUE MENU** (the lane must be in league), then **DOWNLOAD A TEAM**. Touch the left or right **Team Code** box, then enter the team code. See the *Lane Control System* manual for details on which team code to use. Once the code is entered, press **DOWNLOAD**. The bowlers names will appear shortly.

If the **DOWNLOAD** button does not appear, then you have not entered a valid team code.

4.6 Entering a Team Name and Handicap

Team names can only be entered in league mode. To enter a team, touch **MENU** then **LEAGUE MENU** then **EDIT TEAM DETAILS**. Touch the item that you wish to edit, either a team name or a handicap and enter the new information.

If no team handicap is entered, the team handicap will default to the sum of the bowlers handicaps.

4.7 Bowling Out of Turn

If a bowler is to bowl out of turn for one frame only, then you can shift the arrows to the next bowler by touching the bowler arrows at the bottom of the screen.

If you are using manual scoring, then a score entry screen will be displayed first. Touch **NEXT** to advance the arrows.

Note that the *Lane Control System* has the ability to prevent the bowlers from advancing the arrows.

If the bowling order is to be changed for all frames, then you can move the bowlers names to the correct position. Touch **MENU**, then **EDIT NAMES OR CHANGE NAMES**, then touch the bowler to be moved. Now touch the new position for this bowler. The bowlers name and other details including their score will be moved to the new position.

4.8 Manual Scoring

If automatic pinsensing is not fitted, then the bowlers must score each pinfall manually. Touch the buttons at the bottom left or right of the screen with the bowler's name and arrows on it. Then touch the score that was bowled.

Note that manual scoring must be enabled, either by the *Lane Control System* or via a switch on the ALS board.

4.9 Redisplaying the last pin fall

On system with on-screen pindication, it is possible to redisplay the position of the pins still standing.

Simply touch the **PINS** button on the left or right score grid.

4.10 Correcting a Score

To correct a score, touch **MENU**, then **CORRECT A SCORE**. A score grid will be displayed. If the wrong lane is displayed, press **OTHER LANE**.

Touch the frame that you wish to correct. The red cursor should move there. Select the ball that you wish to correct by touching **1st BALL**, **2nd Ball**, or **3rd BALL** (tenth frame only). Now touch the correct score.

You may have to correct both balls in a frame for the score to be valid.

Corrected scores are shown underlined.

To restore a corrected score to its previous value, touch **RESTORE**.

To remove a score so that it can be re-bowled, touch **RESTORE**. Note that the newly bowled score is underlined, to show that it was not the original score but that it has been changed.

4.11 Resetting the Pins

To reset the pins, touch **MENU** then **RESET PINS**. There are two option, with or without scoring. If you select **WITH SCORING**, then the pinspotters will cycle and will score the pins standing. If you select **WITHOUT SCORING**, then the pinspotters will cycle but the ball will not be scored.

4.12 Viewing another Lane

To view another lane,s score, touch **MENU** then **VIEW ANOTHER LANE**, then touch the lane number that you wish to view.

4.13 Changing the Score Grid Size

There are several types of score grids available. The type used depends upon the number of players entered, and the size of text you require. Normal score grids are either 4 or 6 players by 10 frames. Large text grids show only 4 frames and can display only up to 4 players.

You can select which size grid you wish to use by touching **MENU**, then touch **SELECT TV or SCORE**. You can now select between the normal and the large text grids.

If there are more than four players entered, then the large text grid cannot be used. If the lane is in league play, then the same type of grid is used for both lanes. You may not be able to display large text grids on your lane, if there are more than 4 players on the other lane.

4.14 Selecting Television

Some systems have the ability to switch between TV and score display on the overhead monitors. You can watch a TV picture on the overhead, while scoring on the touch screen.

Touch **MENU** then **SELECT TV OR SCORE**. Touch either **TV** for TV display, or select a score grid type to display the score. Some systems will also have the option of changing TV channels.

4.15 View League Information

On systems using A.K. Microsystems' League Secretary, the current league information can be displayed. This information includes the bowlers high games and series, team high games and series, points awarded so far for the match in progress, and a summary of the league rules.

To view this information, touch **LEAGUE INFO** on the main screen, or touch **MENU, LEAGUE MENU**, then **LEAGUE INFORMATION**.

4.16 Download Open Codes

On systems with A.K. Microsystems' League Secretary, open bowlers can download their average and handicaps, and have their open score recorded. To download open codes, enter the bowlers names as usual, or enter their bowler id code as their name, then touch **DOWNLOAD OPEN CODES**.

5. Graphics

This chapter deals with producing graphics for display at the lanes.

These graphics can be stills or animations, and can be used for a variety of purposes. Some graphics are displayed after events on the lane, such as a strike. Others can be used for messaging or promotions. Others are used for games such as *Casino Bowl*.

A program called *Pack* is supplied with the ALS board (and is available for download from www.touchscore.com.) and is used to convert industry standard GIF files into the format used by Touch Score. Any program that produces 320x200 256 colour GIF files can be used to produce the graphics. Autodesk Animator is a suitable program that produces both stills and animations, and supports the GIF file format.

5.1 Preparing your GIF files

To produce your GIF files, refer to the documentation for the program that you are using (eg. Autodesk Animator). The following points should be noted.

A still will require only one GIF file, but an animation will require several GIF files, one for each frame. The name of these files should follow a sequence as shown below.

```
name00.gif (or just name.gif)
name01.gif
name02.gif
.... etc
where name is any name you choose.
```

The number of frames required for an animation varies considerably. Animations where not much detail changes may have up to 80 frames. Animations where lots of detail is changing may have only 10 or so frames. Animations should **not** last more than a few seconds, as this delays bowling. The packed animation file is also limited in size to around 200K.

All frames in an animation should share the same palette, as the palette of the first frame will be used for the entire sequence.

5.2 Special Effects

Various special effects are available, and these can be selected when the sequence is packed. However, these special effects require your GIF files to be prepared in a special way. Each effect is discussed below.

5.3 Display with Grid

A graphic may be displayed with the current score grid, rather than on a blank screen. Special effects such as a transparent grid are also possible with careful colour manipulation.

In its simplest form, a graphic can overlay the grid. Where the graphic is colour 0, the grid will show through. Such sequences may only use the first 64 locations in the palette, as the top two bits are used by the score grid. In Animator, use the SQUEEZE option in the palette menu to reduce the number of colours to 64. If you then view the palette you will see that only the first 64 locations in the palette have been used, the remainder should be blank. The palette consists of 8 rows of 32 colours, numbered from left to right, and top to bottom. Although only 64 colours are used, each colour can still be chosen from the 256K colours available. Ensure that all frames in the sequence use this new palette.

When the sequence is packed, select the *Palette Copy* option, and the first 64 colours will be copied to the remaining colours in such a way as to make the graphic overlay the grid.

Special effects such as a transparent grid, or a graphic that appears in front of the grid but behind the scores, or moves in and out of the grid, can be achieved by manually setting the palette in your GIF file. Palette copying in *Pack* should NOT be used in these cases.

To achieve such results, it is necessary to understand how the grid is drawn over the graphic.

Each pixel contains eight bits, giving 256 colours. The top two bits are used for the score grid, the remaining six being set by the graphic. This allows 64 colours for the graphic, and 4 for the grid. The four grid colours are 0 for the background, 1 for scores, 2 for names, and 3 for the grid.

Therefore, the colour that a pixel will appear when it overlays the background is just the colour of the pixel in the graphic. But when the pixel overlays a score, it will appear as the colour of the pixel plus 64 (bit 6 set). When it overlays a name it will appear as the pixel colour + 128 (bit 7 set), and when it overlays the grid as pixel colour + 192 (bit 6 and 7 set) .

The whole graphic will appear in colours 0-63 when overlaying the background, 64-127 when overlaying the scores, 128-191 when overlaying the names and 192-256 when overlaying the grid. When palette copying in *Pack* is used, these four groups of colours are identical, and thus the graphic appears in the same

colour regardless of the grid, and therefore appears to be opaque and in front of the grid.

If colours 192-256 were set to a slightly lighter shade than 0-63, then the graphic would appear to be transparent to the grid, but opaque to the names and scores. Many special effects can be achieved by manually setting the palette in this way.

Special effects can vary for an object from frame to frame, for example an object can move in and out of the grid. This is achieved by changing the colour in which the object is drawn from frame to frame. For example, colour 1 and 2 could be blue, but colours 65,66 (1 or 2 + 64), 129,130(1 or 2 + 128), 193,194 (1 or 2 + 192) may be set differently to provide different special effects for colours 1 and 2. By changing an object between colours 1 and 2 in different frames, the special effect will vary, but the object will still appear as a blue object.

Note that there are four colours over which the graphic has no control, these are colours 0,64,128, and 192. These colours are set by the scorer when the graphic is displayed, and represent the colours that the score grid will appear in when overlaid by the background (colour 0) of the graphic. This is done so that the grid does not change colour when the graphic is displayed.

When creating a graphic for use with a score grid, ensure that none of the colours used will disappear when displayed with any of the background colours used by the scorer. Note that the grid colours change with different league games on Touch Score, and are different again for open play.

5.4 Inserted Name

When a graphic is displayed, the name of the current player (who has just bowled) can be inserted into the graphic. This is very useful for *Casino Bowl* and *Pick-a-Player* graphics, as well as general purpose graphics such as a strike graphic.

The name will appear in large text, as used for *Large Text Grids* and *Full Page* messages. The name will be centred in a 16 character space, each character being 16 pixels wide by 32 pixels high. Thus the name will occupy a space 256 pixels wide by 32 pixels high.

The position of the name is determined by the uppermost and left most position of a pixel of colour 128 or higher. Thus the graphic must be drawn in colours 0 to 127 only. As only the upper left most point is known, animated sequences may have the name moving in or out of the right side of the screen (but not the left) and up or down over the bottom of the screen (but not the top) .

If the name is to appear in a single colour, then the following procedure should be used.

Draw the graphic in colours 0 to 127 only. Then mark the upper left most point of where the name is to appear in any colour above 128. Set colour 128 to the colour you wish the name to appear in. Use the palette copying option when packing the sequence.

If the position of the name is marked with a box of say colour 130, then this box will appear on the final sequence in colour 2 (130-128). If this box is required to be invisible, use the same colour as exists at that point, plus 128. If the picture is complex at this point, use only one pixel, and use a colour which stands out. For example, if the colour at the point which represents the upper left most point of where the name is to be positioned is colour 7. Set this pixel to colour 135 (128+7), and set colour 135 to a colour which stands out on the picture. This pixel's position is then clearly marked, but when displayed at the scorer, this pixel will be converted to colour 7 (top bit set to 0), which is its original colour, and will not interfere with the graphic.

It is possible to display the name in different colours, depending upon the colour of the graphic at that point. This is done by setting the colours in the range 128-255 manually, and NOT using the palette copying option when packing the sequence.

The colour of the name is determined by the colour of the graphic at the point of display, plus 128. For example, a simple two colour graphic has colour 1 as red, 2 as blue. If colour 129 (1+128) is set to yellow, and 130 (2+128) to green, then the name will appear in yellow over the red parts of the graphic, and green over the blue parts.

Special effects such as transparent names can be achieved in a similar way to the use of score grids as described above.

5.5 Casino Bowl

A special type of graphic called a Casino Bowl graphic is used to display a poker machine with spinning wheels. In addition, standard Inserted Name type graphics can be used for prizes.

To produce a Casino Bowl graphic, you require the following files.

name00.gif
name01.gif
....etc

name.gif

Where name is the name of the sequence.

name??.gif is a animated sequence that is displayed prior to the wheels spinning, such as a poker machine with the handle falling. The sequence should allow for three symbols, each 80 pixels by 80 pixels, to be displayed spinning in the centre of the screen.

name.gif is a file of the symbols to be displayed on the wheel. It consists of 8 symbols (4 across by 2 down) each 80 pixels by 80 pixels. The first symbol (top left hand corner) should be the wild symbol. The other symbols can be anything, but you may wish to give them a name in the configuration file. See the section on *Special Configurations*.

5.6 Using Pack

The *Pack* program is a DOS program that packs the individual frame files into one sequence file.

A frame file is a single frame graphics file in the GIF format.

A sequence file is the file which is sent to the Touch Score system for display.

Invoke the Pack program by typing **pack** .

The program will prompt for :

1. The name of the sequence
2. The type of Touch Scorer
3. The type of the sequence
4. The title of the sequence
5. Whether palette copying is to take place

Alternatively, *Pack* may be invoked with these responses on the command line, allowing *Pack* to be used from within a batch file.

eg. **PACK myfile 2 4 "My first attempt" 2**

Each parameter is discussed below.

5.7 Sequence Name

The name of the sequence is the file name used for the frame files, and will be used for the output file. The frame files are GIF files (created by Autodesk Animator or similar).

For example: Frame 0 is file "myfile.gif" (or "myfile00.gif")
 Frame 1 is file "myfile01.gif"
 Frame 2 is file "myfile02.gif"

To *Pack* this sequence, enter pack **myfile.gif** or just **pack myfile**. The resultant sequence will be named myfile.frm .

GIF files must be in 320 by 200, 256 colour format, otherwise an error will result. If in doubt as to the format, use Autodesk Convert (or similar) to ensure the format is correct.

The first frame number must be 0, but the zero may be omitted for the first GIF frame, and must be omitted for single frame sequences.

Pack will pack as many frames as there are files. If a file is missing from the sequence, Pack will not proceed past the missing file.

5.8 Type of Touch Score

The type of Touch Score is always 2, for VGA systems. Type 1 is for older EGA systems no longer supplied.

5.9 Sequence Type

The type of sequence is one of the following :

1. Without grid, Single frame, 256 colour
2. Without grid, Multi frame, 256 colour
3. With grid, Single frame, 64 colour
4. With grid, Multi frame, 64 colour
5. Inserted name, Single frame, 128 colour
6. Inserted name, Multi frame, 128 colour
7. Casino Bowl

A display may be either a sequence of frames, or a static single frame. The frames may be displayed over the score grid, or without the grid. The current player's name may be inserted into the frame. Casino Bowl is a special type of graphic for use with Casino Bowl. See the various sections above for information on using grids, names and Casino Bowl graphics.

5.10 Sequence Title

The sequence title is simply a string (maximum 30 characters) which is used to describe the sequence. Sequences to be used by the Lane Control System for downloading to the scorers will be given a specific name, eg all 2 bagger sequences will be named **bag2.?** . It is then difficult to identify a sequence. Therefore this title string should be a brief description of the sequence. See the section on *Pre-programmed* displays for a list of sequence names.

If *Pack* is being invoked with the title as an argument, then ensure the title is surrounded by quotes if any spaces appear in the title.

For example:

This is legal:	pack myfile 2 4 "An orange butterfly" 2
This is NOT legal:	pack myfile 2 4 An orange butterfly 2
This is legal:	pack myfile 2 4 butterfly 2

5.11 Palette Copying

If the sequence is to be drawn over the score grid, or has a player's name inserted, then the palette may be optionally copied to provide the correct colours.

For score grids, the colours in the range 0 to 63 will be repeated at 64 to 127, 128 to 191, and 192 to 255. This has the effect of making the sequence appear in front of the grid, and to be opaque. For other special effects, eg. a transparent grid, you should specifically set the colours in the range 64 to 255 in the GIF file.

For sequences with a name inserted, colour 128 will be copied to all colours from 129 to 255. Thus the name will appear in this colour, regardless of what it may overlay.

See the chapters on special effects above for information on using palettes.

5.12 Using your graphic

Your graphic must be copied to the Lane Control System picture directory, usually \usr\lcs\pict.. Once in this directory, you can use *Display a Picture*, or *Pre-programmed Displays* to view and test your picture. See the appropriate section for information on using these menu items.

If your graphic is a Casino Bowl, or a prize graphic, enter the name in the appropriate prize setup screen. The graphic will automatically be downloaded, and then used appropriately.

Before viewing your graphic, check the *Picture Queue* to ensure that the graphic is not still being downloaded when you attempt to view it.

6. Troubleshooting Guide

This chapter is a brief guide of what to check if the unit fails to function normally. It also describes the built in testing and diagnostic routines of the ALS board.

6.1 ALS Diagnostics

The ALS board has two main diagnostic features. The first is the group of four red lights on the ALS board. The second is the self test mode.

The lights are numbered L1 to L4 and behave as follows:

- L1 – flashes whenever the ALS program is running
- L2 – changes state whenever a valid score is received from the APS
- L3 – changes state whenever a valid poll is received from the front desk.
- L4 – changes state whenever a key is pressed.

When the ALS is powered up, it will perform various tests while the **Testing Wait...** message is displayed. If it encounters any errors, it will stop processing. Approximately 20 seconds later it will attempt to restart again.

The ALS board also has a self test mode. When in this mode the program will test various parts of the hardware and display the results. The ALS board will go into this mode if switch 8 on dip switch S1 is closed on the ALS board, or due to a command from the *Lane Control System*.

The tests performed are:

- RAM test. All system ram is tested. The amount of RAM reported may be slightly below the amount installed in the motherboard due to some being used for shadowing ROMS.
- CMOS test. The battery backed CMOS RAM on the ALS board is tested.
- Timer Test. The timer should count down 5 seconds.
- Switch Display. The position of each dip switch on the ALS board is displayed.
- ROM test. The software is contained in ROM, and each group of ROMs has a checksum to determine if its contents have been corrupted. If a ROM or group of ROMS fails this test they should be replaced.
- CMOS checksum display. The displayed checksum represents the contents of the battery backed RAM. This contents should not change if the unit is switched off then on again (still in test mode, s1-8 closed). If it does change, then either the CMOS ram is faulty, or the backup battery on the ALS board is flat. This battery will charge while power is connected to the board.

- Last pinfall, Last Key. The last pinfall received from the APS is displayed, as is the last key pressed.

There are also a number of test screens which can be used to check the display quality of the overhead monitors. Use the **L** and **R** keys to step through the screens.

On touch screen systems, a grid will be displayed on the touch screen during testing. You can use this grid to test the accuracy of the touch screen. If the touch screen is not accurate (that is you touch the screen and a button other than the one under your finger is activated) then the touch screen requires calibration.

To calibrate the touch screen, press the **CAL** button, then touch each box as prompted as accurately as you can.

There are also four sensitivity levels for the touch screen, **SENS-0** to **SENS-3**. Touch **SENS-0** to use the lowest sensitivity, as this is suitable in most cases.

6.2 Computer BIOS will not start

When the computer is switched on, you should see the normal BIOS startup of the motherboard. This may include memory tests, copyright messages etc. If this does not appear, try removing all the cards except one video card and try again.

If this fails then you have a faulty motherboard or video card. Check the motherboard configuration. Consult the motherboard manual for more information.

If the motherboard now starts, try reinserting each card one by one. Check the configuration of each card. Try the video cards in different slots. Check the BIOS configuration, ensure no on board I/O on the motherboard conflicts with any cards.

If the motherboard still will not run, try a different motherboard or video cards. The type you have may not be compatible.

6.3 ALS program will not start

If the BIOS startup messages appear as normal, but the TESTING WAIT startup message from the ALS board does not appear, then the ALS program has not started.

Ensure that the BIOS has not halted due to an error, such as no keyboard present. You must setup the BIOS so that it will still start without keyboards, hard drives etc being attached. See the BIOS manual for more information.

Watch each screen as the computer starts, if you do not see the VGA bios startup message on each screen in turn, then try your video cards in different slots. Not all slots on all motherboards support video. See the motherboard manual for more information.

Try exchanging each part with a known good unit. Once the faulty part is found, check its configuration, dip switches etc.

6.4 TESTING WAIT.... Fails

When the ALS first starts, it performs a self test. The message **Testing Wait...** will appear on both overhead monitors. If this self test fails for any reason, you will see the message **FAILED AT ?**.

To find out more information on this failure, close switch 8 on dips switch S1 on the ALS board and restart the computer. The ALS will bypass the power up test, and go directly to the self testing screen. Here it will perform a number of self tests. See the previous section on *ALS Diagnostics*.

6.5 Computer Locks Up

If the computer randomly stops running during operation, then you have a faulty piece of hardware. The only reliable way to pinpoint the problem is to replace each component in turn with a known good component until the problem is eliminated.

6.6 Overhead is blank

There can be several reasons for the overhead monitors being blank.

They may have been turned off by the *Lane Control System*. Even if the power is turned off then on again, the monitors will still go off. Use *the Lane Control System* to turn them on again. If a *Lane Control System* is not connected, enter a name for that lane. The monitors should come on.

The colours may have been set to all black, or the monitors may have been set to TV. Check all these possibilities at the *Lane Control System*.

Try disconnecting the front desk communications, and closing switch 6 on dip switch S1 on the ALS board. This will reset the battery backed ram to default. The screens should now come on with default colours and settings.

Check that power is connected to the monitor, that it is not in stand by mode, that all cables are connected. If it is a TV, check that it is set to the correct input source, S-Video, RGB or whichever.

6.7 Overhead is distorted

Check the condition and wiring of the cables.

6.8 Keypads don't work

Check that the keypads have not been disabled from the Lane Control System.

Check that the switches on the ALS board are correct. Switch 3 on S2 should be ON for a single keypad, OFF for three keypads.

Check that the correct keypad is connect to the correct socket on the ALS board. Sockets are labelled LEFT, RIGHT and CENTRE for three keypad systems, and MARK II for single keypad systems. Ensure that pin one on the cable is aligned with pin one in the socket. This is the end nearest the closest end of the ALS board.

6.9 Touch Screen is blank

Check that the overheads are on, if not switch them on with the Lane Control System.

Check power to the touch screen, the brightness control and the cable.

If the touch screen has never worked, check that you have touch screen software in the ALS board. Keypad software is marked with a K. eg . PIK

Try the touch screen video card in a different slot.

6.10 Touch doesn't work

If the touch screen appears ok, but touching the screen has no effect, then check the communications cable from the touch screen to the computer. Is it correctly wired?

Check that it is connected to a port on the computer which is configured as COM1. Check that there are no other ports on the computer conflicting with COM1.

Connect the touch screen to a normal computer which is loaded with the Microcal diagnostic program supplied with the touch screen. Consult the Microcal manual

for details on testing your touch screen. The touch screen should be set to 9600,n,8,2. Try entering terminal mode and typing **CTRL-A R ENTER CTRL-A RD ENTER**. This will reset the touch screen controller.

6.11 Touch is out of alignment

If when you touch the touch screen, a button next to the one you touch is activated, then the touch screen is out of alignment and needs calibration.

Put the scorer in test mode by closing switch 8 on S1, or using the *Lane Control System*. Once the tests are completed, touch the **CAL** button. Touch each corner of the screen as prompted as accurately as you can. When the grid of buttons returns, test the calibration over the entire screen.

Touch the **SENS-0** button. This sets the touch screen sensitivity to its lowest level, which is suitable for most cases.

Ensure that the controls on the monitor which vary the position of the picture (horizontal and vertical position and size) are not adjusted after calibration, or the calibration will need to be redone.

6.12 No Pindication

If when a ball is bowled the score is being displayed correctly, but there is no on-screen pindication, then there are several things to check.

Check that the correct pindication mode has been set by the *Lane Control System*.

If you are using an APS, check that the pindication cable has been installed correctly. It must be connected to a serial port on the computer that is configured for COM1. No other port should be using this address or IRQ, although the same port can be used for the touch screen

6.13 No Autoscoring

If the unit will not autoscore, check the cabling from the ALS to the APS.

Watch L2 on the ALS board while a ball is bowled. If it changes state then the score signal has been received. Even if the signal is received, the score will not appear if the arrows aren't up, if the unit is in practice mode, or if it is expecting a first ball when the machine is in second ball (or vice versa).

Note that if an unmodified APS is being used, pindication will still appear even if the main APS signal is disconnected. However the ball will not be scored.

Check that S2-4 is set correctly for your APS type.

6.14 No front desk communications

Check that the unit is set to the correct lane number. Switches 1-5 on S1 set the lane number. Check that no other unit is set to this number.

Check the cabling from the unit to the front desk. Check that the cable shield is grounded at one end.

If you are using a COMMS protection board, check that the board is connected to the ALS board correctly, and that the board is connected to the PC power supply.

If you are using a Magicscore installation, check the I/O card and the connections to it.

7. Cabling Specifications

This chapter details the cabling specifications. Many cables are standard computer cables and are not detailed here.

These specifications are a guide only, and depend upon the exact equipment used.

7.1 Monitor cables

7.1.1 RGB Monitor

RGB monitors will generally have 5 co-ax type connectors- one each for RED, GREEN, BLUE, HORIZONTAL SYNC, and VERTICAL SYNC. Each needs to be connected to the 15 pin VGA connector as detailed below. Note that some monitors may not work with the signal levels generated from a VGA card. Good quality RGB multicore cabling will give a very good picture over the length of a bowling lane. Some cheaper types may give acceptable results.

15 Pin Male VGA connector

- 1 – RED
- 2 – GREEN
- 3 – BLUE
- 6 – Red Return
- 7 – Green Return
- 8 – Blue Return
- 13 – Horizontal Sync
- 14 – Vertical Sync
- 5 & 10 – ground for sync

7.1.2 SKART Monitor

The connections for a monitor or TV fitted with a SKART or PERI-TV connector are given below. Note also the connection from P12 on the ALS board. This connector provides a 12V signal that is used to switch the monitors between TV and the score grid.

4 Core RGB cable should be used. One core each for R,G,B and sync. The resistors and diodes can be mounted in the VGA plug body. The sync core will then connect to one end of these components. The sync shield should be ground (pins 5&10). Note the orientation of the diodes, stripe to the VGA plug.

Figure eight cable can be used for the 12V switching signal.

15 Pin Male VGA

20 Pin SKART Connector

1 RED -----	-----	15
2 GREEN -----	-----	11
3 BLUE -----	-----	7
6 RED RETURN -----	-----	13
7 GREEN RETURN -----	-----	9
8 BLUE RETURN -----	-----	5
5&10 Ground -----	-----	18

13 ---[100R] -----		
13 ---[1N4148 Diode]-----		
		----- 20
14 ---[100R] -----		
15 ---[1N4148 Diode]-----		

P12 on ALS board

1 ---[390R]-----		
		----- 8 (Left Hand TV)
2-----		
3 ---[390R]-----		
		----- 8 (Right Hand TV)
4 -----		

A 100uf capacitor may be required across pins 8 (+) and 14 (-) of the SKART connector in some TVs. This eliminates noise on the switching signal.

7.1.3 S-Video Monitors

Some ATI VGA cards have a standard S-Video socket on the card, other are supplied with an adapter. Use a standard cable to connect this to the S-Video input on the TV.

The output of the video card is either 640x480 VGA, or NTSC.

7.2 Keypad Extension Cables

When using the ALS board as a MagicScore upgrade, it may be necessary to extend the keypad cables by a foot or so.

Extension cables can be easily and quickly made by using some flat ribbon, and male and female IDC connectors. These connectors are simply clamped onto the ribbon cable, the contacts pierce the cable and make a connection.

For the three keypad systems, you will require 20 way plugs, sockets, and ribbon cable.

For the single keypad system, you will require 26 way connectors and cable.

7.3 Touch Screen Cable

The touch screen is supplied with a standard serial cable, ready for connection to a standard serial port. Likewise the monitor the touch screen is fitted to will be supplied with a standard VGA connector ready for direct connection to a video card.

If your system is mounted on the curtain wall, then you will require extension cables for both the video and the serial cable. You can purchase standard cables for this purpose.

There are two standards of serial connector, 9 pin and 25 pin. Adapters are readily available if your touch screen or the computer is fitted with mismatching types.

7.4 Front Desk Communications

When the ALS is used as a Magicscore upgrade, the front desk communications are connected by connecting the original 12 way plug from the I/O board in the Magicscore leg to P2 on the ALS board.

If the ALS is mounted on the curtain wall, then the following connections must be made.

Each curtain wall computer should be fitted with a COMMS Protection Board. This board has a 4 way AMP connector. Each pin on the connector should be connected to the same pin on the next lane. The same pin on the Lane Interface Board at the front desk should also be connected at one point in the chain. 4 Core shielded data cable should be used.

For example, you might run the cable from the front desk to lane 19/20, then from 19/20 to 17/18, then from 17/18 to 15/16 etc.. Connect pin 1 to 1, 2 to 2 etc. The shield in the cable should be connected to pin 4.

7.5 APS Cable

The APS must be connected to the ALS board in order for pinfalls to be scored.

If the ALS is being used as a Magicscore upgrade, then simply connect the original 6 way plug from the I/O board in the Magicscore leg to P3 on the ALS board.

If the ALS is mounted on the curtain wall, then a cable must be used to connect the ALS board to the APS. The wiring for this cable is as follows:

ALS P3	3 Way AMP connector on APS
1	3
4	2

Shielded data cable should be used, with the shield connected to pin 1 at the APS

7.6 Pindication Cable

In order for pindication to appear on the screen on systems using an APS, an additional cable must be connected between the APS and the ALS board. Alternatively, the firmware within the APS can be changed. See the chapter on connecting an APS for more information

The cable must connect to a serial port on the computer that is configured for COM1. The port may have either a 25 pin or a 9 pin connector. The other end of the cable connects to P1 and P4 on the APS.

25 Pin Serial or 9 Pin Serial	P1	P4
6 -----6-----		7
5 -----8-----		8
8 -----1-----		7
22 -----9-----		8
7 -----5-----	A-F	A-F
1 -----5 -----	Shield	

If MP chassis are not being used, insert diodes (|| denotes stripe on diode) and connect pins H & K as shown.

25 Pin or 9 Pin Serial	P1	P4
6 -----6 -----[1N4148]-----		7,H
5 -----8 -----[1N4148]-----		8,K
8 -----1 -----[1N4148]-----		7,H
22 -----9 -----[1N4148]-----		8,K
7 -----5 -----	A-F	A-F
1 -----5 -----	Shield	

Also connect 2K2 1/4 watt resistors between pins at the serial connector as shown below:

For 25 Pin:

6-----[2K2]----- 4
5-----[2K2]----- 4
8-----[2K2]----- 4
22 -----[2K2]----- 4

For 9 Pin:

6-----[2K2]----- 7
8-----[2K2]----- 7
1-----[2K2]----- 7
9-----[2K2]----- 7

These components can be fitted easily into the backshell of the serial connector.

7.7 Pinspotter Switches

The ALS board can be connected to the pinspotter cycle switches so that the ALS board can cycle the pinspotters. The connection should be made so that the system scores the ball during the cycle. The relays on the ALS board are limited to 24 VAC, 400ma. Do not connect directly to mains voltages !

Pins 1 and 4 on P9 should be wired across the s witch for the left lane.

Pins 1 and 4 on P10 should be wired across the right switch.