



HAMILTON DIGITAL DESIGNS LTD.

OPERATION MANUAL  
2000 SERIES  
HOCKEY/BASKETBALL SCOREBOARD CONTROLLERS  
MODELS PR95019A & PR95022A

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<u>Revision</u>	<u>Date</u>	<u>Description</u>
00	1990 05 18	Initial Release
11	1995 08 04	Model PR95019A (other models are obsolescent)
12	1995 09 05	Additional Setup option, added model PR95022A
13	1996 09 12	Added support of Basketball Fouls displays.
14	1996 12 04	Minor improvements to several functions. Software rev. H.
15	1997 10 10	Changes to penalty handling.
16	1998 04 29	Added model PR95022A-003
17	1998 05 29	Added support for 'Mini' Scoreboard (model MSB-1)
18	1999 01 12	Team Fouls can now go to 99.
19	1999 03 17	Changes to section 3.8. Added security protection for setup & Time-of-Day, support for Volley-ball & Wrestling, option for serial printing.

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## 1.0 INTRODUCTION

This manual describes use of the model PR95019A (printing) and PR95022A (non-printing) scoreboard controllers with HDD's hockey/basketball scoreboards, including the 'Mini' scoreboard (model MSB-1). Although these scoreboards do not all offer the same features, the controllers and drivers have been designed so that, as far as possible, unused options can just be ignored. Where this is not possible, specific setup data can be entered into the controller to configure it for a particular scoreboard. Setup data need only be entered once, as they are retained when the power is turned off.

Many of the features described in this manual are optional, and will not be present on all scoreboards.

## 2.0 FEATURES

These scoreboards can have the following features, some of which are optional:

### 2.1 Displays Controlled

- Main Timer - 4 digits (optionally 6 digits) with 'last-minute-timing' feature
- Scores - to 99 per team (optionally to 199)
- Horn - 5 second horn at the end of the period  
- 2 second horn at the end of a time-out  
- auto-horn at any repetition rate  
- manual horn
- Period - either a numeric digit or a set of indicators
- Time-of-Day - 4 digits (can be separate or combined with Main Timer)

### Special Displays for Hockey Scoreboards

- Penalty Display - either 2 indicators per team or up to eight displays to 9:59 per team (optionally to 19:59)
- Player Number - 2 digits per penalty timer per team (optional)

Displays for dual-purpose Scoreboards (all optional)

- Bonus - one indicator per team
- Possession - one indicator per team
- Time-Out - one indicator per team
- Shots on Goal - 2 digits per team

Special Displays for Basketball Scoreboards

- Team Fouls - to 99 per team
- Player Number - 2 digits for most recent foul
- Player Fouls - one numeric digit for most recent foul

Volleyball and Wrestling

A Basketball board can be supplied with changeable captions for the above foul-related displays.

For Volleyball, **Team Fouls** become **Games Won** and **Player Fouls** becomes current **Game Number**. **Player Number** is blanked.

For Wrestling, **Team Fouls** become **Bouts Won**, **Player Fouls** becomes current **Bout Number** and **Player Number** becomes **Weight Class**.

Special Displays for Model PR95022A-003

This model has additional connectors to allow attachment of two count-down timers / auxiliary time-displays and a three-button control box for controlling them. The timer portion of these units copies the 'Main Timer' display (4 digits only), while the count-down portion shows 2 digits that can count down at 1 per second, and can be reset to a fixed value, normally 30 seconds. (Used in Basketball and often described as 'shot clocks'.)

Special Displays for 'Mini' Scoreboard model MSB-1

The MSB-1 scoreboard has four dual-purpose indicators. When the sport is Basketball, the indicators function as 'Bonus' and 'Possession'. When the sport is Hockey, the indicators function as Penalty lamps, 2 per team.

## 2.2 Horn

These scoreboards normally sound the horn for 5 seconds at the end of each period, and for 2 seconds at the end of every time-out, or at the end of a warm-up. In addition, the horn can be set to sound (for 2 sec) at a specified repetition rate during the period (the auto-horn feature - see section 3.5).

## 2.3 Keyboard

A keyboard is provided to allow the user to communicate with the controller. The keys are divided into three groups, as follows:

A 4x4 calculator-style numeric keypad (on the left). This allows the operator to enter data in response to functions started by other keys.

A 2x6 keypad (in the centre). This is used for general functions, such as control of the timer.

A 2x8 keypad (on the right). This is used for team-specific functions, such as scores, fouls and penalties.

Note that some keys may be omitted if the corresponding displays are not present. For instance there will be no 'Shots' keys if these displays are run by a separate controller, and no 'Foul' keys on a board used only for hockey.

## 2.4 LCD Display

A two-line LCD display is provided to allow the controller to communicate with the user. During entry of data, it provides prompts as to what is expected, and displays the new values for inspection before they are displayed on the scoreboard. At other times, a status display is provided.

## 2.5 Beeper

An audible beep should be emitted every time a key is pressed. A longer than usual beep is used to indicate a possible mistake. The beeper also sounds whenever the horn is activated.

## 2.6 Timing

Timing for the controller is provided by a high-frequency quartz crystal. This is divided down to give a signal at precisely 1000 times a second which is used for the timer, whether or not the scoreboard can actually display fractions of a second. The timer can be switched On or Off in three different ways:

1) By using the TIMER RUN and TIMER HOLD keys on the controller. (Note that, due to keyboard limitations, this method is only accurate to 1/50 second at best.)

2) By using an external switch connected to the optional switch input on the controller (P9 on PC95061). When this switch is closed, the Run/Hold status of the Controller is immediately toggled. The switch then has to be released and stay open for at least 50 milliseconds (1/20 second) before another closure will be treated as a separate event. A normally-open push-button is the most suitable type of switch.

3) By using a pair of external switches connected to optional inputs on the controller. One of the external switches is expected to be a photo-electric control, while the other would be a manual enabling switch. For details see the Installation Manual (91-12-013).

The timer can display either the elapsed time (count-up mode) or the time remaining in the period (count-down mode). Normally, minutes and seconds are displayed (unless the timer display has six digits), but a 'last-minute timing' option can be selected. This changes the display to seconds and hundredths during the final minute of a period in count-down mode. A setup option is also available to blank the last digit of the timer so that only tenths of a second are shown. Suitably equipped models can display a period, instead of the normal colon, between the seconds and tenths or hundredths, to show that last-minute timing is in effect. On scoreboards with a six-digit timer display, the effect of the 'last-minute-timing' option is to blank the hundredths until the last minute is reached.

The controller maintains a time-of-day clock, which can be shown on a separate 4-digit display, and also displayed on the main timer when no game is in progress. This clock is also based on a quartz crystal.

The scoreboard is updated about ten times a second (the actual rate depends on the complexity of the scoreboard). When the period timer is running, these updates are synchronized to the timer in order to minimize the delay before the horn sounds at the end of a period.

The penalty timers always operate in synchrony with the game timer seconds display, but they can be paused without stopping the game timer by using the PENALTY RUN/HOLD keys.

## 2.7 Serial Output

The controller may be optionally equipped with a 20 mA inverse RS-232 current loop normally operating at 2400 Baud (300 Baud to 28800 Baud is possible). This signal can be transmitted over at least 1000 feet of twisted pair cable at 2400 Baud. An optically isolated converter is available which will allow this current-

loop signal to be connected to a serial port on a data terminal or personal computer.

If the scoreboard has been set up for hockey, the serial signal consists of a string of 32 ASCII characters, repeated almost continuously. The format is:

```
Tmm:ssHmm:ssGmm:sshmm:ssgmm:ss<CR><LF>
```

where mm:ss indicates a time, usually in minutes and seconds. 'T' introduces the main timer, as shown on the scoreboard; 'H' is the first (shortest time remaining) home penalty; 'G' is the first guest penalty; 'h' and 'g' are the second home & guest penalties. If there are no penalties, the corresponding time fields (mm & ss) will be blank. <CR> and <LF> represent the standard ASCII control characters for carriage return and line feed. If last-minute timing is in effect, the 'T' field will show seconds and hundredths and the separator will be changed from a colon to a period.

If the scoreboard is set up for any other sport, penalty items are dropped and the string is just:

```
Tmm:ss<CR><LF>
```

If the serial-printing option is selected during setup, the above outputs are suppressed.

## 2.8 Data Protection

The game timer, time-of-day clock and most of the game data are protected by a 'supercap', which is similar to a rechargeable battery. This should last for 24 hours or more, and regains its charge within a few minutes once power is reconnected. The time-of-day clock will continue running under these conditions, but other functions, such as the game timer, are just frozen at their current value. Fractions of a second in the game time will be lost (set to zero). After a power outage, the game timer will be on hold and penalty count-downs are enabled.

The current sport, auto-horn duration, period and intermission lengths, and timer direction are stored with the configuration data in the setup memory. This memory is completely non-volatile and should not be affected by a power outage of any duration.

The setup data can optionally be protected by a 4-digit password (P.I.N.). If enabled, this password will also be required before the user can set the time-of-day clock.



## 2.9 Printing

The PR95019A controller is supplied with a 25-pin printer connector similar to that found on most Personal Computers ('Centronics' type interface). The software can detect that a printer has been connected, and if so, it produces a brief log of significant events in a game. These include:

- Controller power-up.
- Start of period.
- End of period (including the score at that time).
- Goal scored (including player number and any assists). This printout only occurs if the current sport is 'Hockey'.
- Penalty awarded (only relevant for Hockey).
- Timeout taken.

Printing can be in French or English, selected by a setup option. Only the standard 7-bit ASCII character-set is used, so almost any printer should be compatible.

Serial printing can be selected as a setup option for either controller model. In this case the default Timer (TV) output described in section 2.7 is replaced by an exact copy of the data sent to the parallel printer port. Note that, if the French language option is selected, the output data will include numerous backspace characters. These are required to create accented characters using only the 7-bit ASCII character set.

If the serial-printing option has been selected, the software always assumes that a printer is attached, and modifies the behaviour of the SCORE keys accordingly.

GUEST

--	--	--	--	--	--	--

HOME

--	--	--	--	--	--	--

SCORE

FOULS

BONUS

POSSESSION

TIME OUT

PENALTY

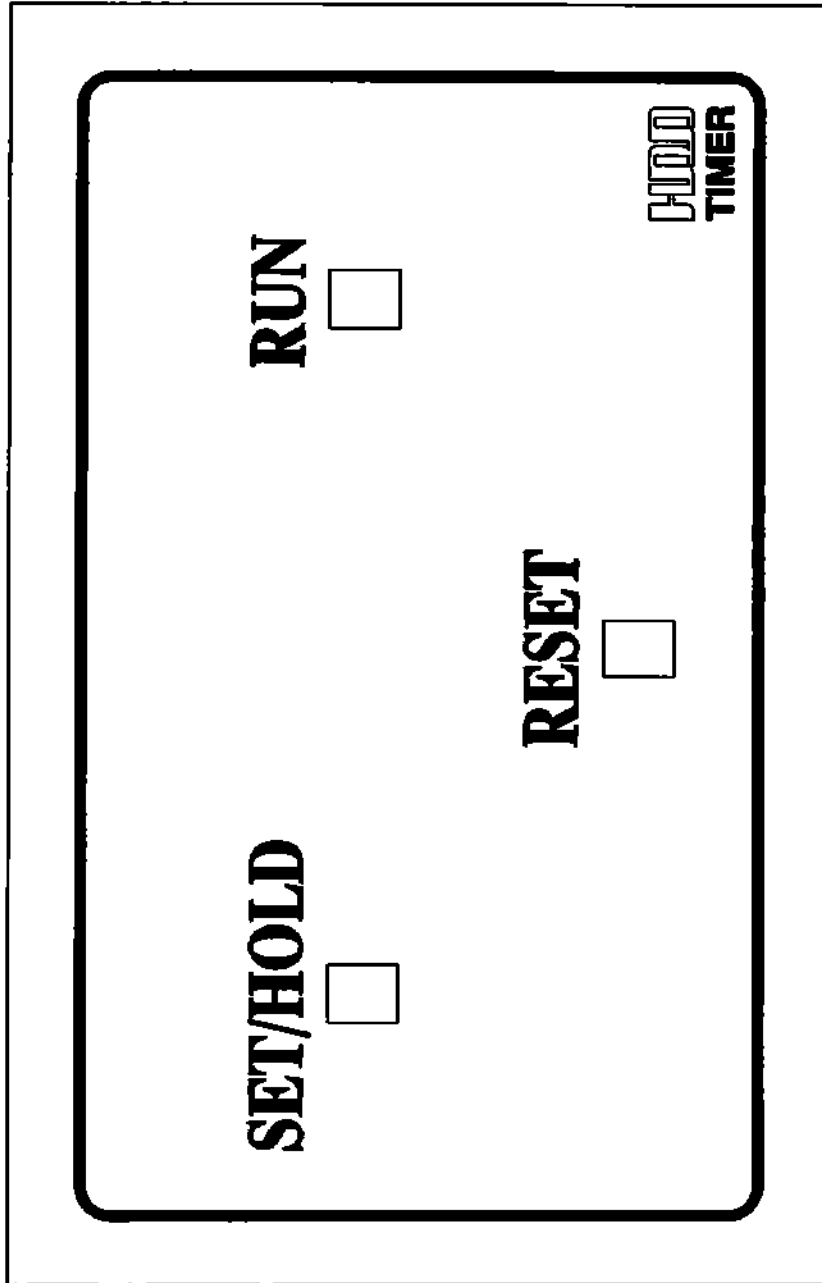
SHOTS

MAN. HORN	ABORT FUNCT.	SET TIMER	TIME OF DAY	PEN. HOLD	TIMER HOLD
-----------	--------------	-----------	-------------	-----------	------------

AUTO HORN	NEW GAME	INTER-MISS.	PERIOD	PEN. RUN	TIMER RUN
-----------	----------	-------------	--------	----------	-----------

7	4	1	HOLD PEN. MEM.
8	5	2	0
9	6	3	ENTER
+	-	CLEAR	RECALL

PR95022A-003 - Auxiliary Switch Box for Countdown Timers



### 3.0 OPERATING INSTRUCTIONS

#### 3.1 New game set up - operating instruction (sequence)

Key to Press:	Display on Readout:
1. NEW GAME CLEAR '1' (for Down) then proceed as for PERIOD below	New Game: Push CLEAR or + to change Sport Timer Direction? <u>D</u> Press 0=Up or 1=Down Period # <u>1</u>
2. PERIOD ENTER ENTER ENTER	Period # <u>1</u> Correct & push ENTER Period mins <u>15</u> (or as selected) Period mins <u>15:00</u> Game Timer <u>15:00.00</u>
3. TIMER RUN/TIMER HOLD	(Timer starts or stops)
4. SCORE These two keys are now 'instant action'. The score for the selected team is immediately increased by 1. Only if a printer is connected will the Controller pause and ask for the Player's number.	
5. (To correct a Score) RECALL, SCORE (Enter corrected score, e.g. '4') ENTER	H-Score <u>5</u> H-Score <u>4</u> (normal Game Timer display)
6. (To enter a new penalty) PENALTY (Home or Guest)  (Press HOLD PEN MEM key here for a ENTER (Player No. eg. 25) ENTER '2' (for 2 min.), ENTER (penalty secs if not zero), ENTER	H-Penalty at (Time) ENTER for Norm Run delayed penalty or misconduct) H-Player Number <u>00</u>  H-Penalty Time <u>0</u> H-Penalty Time <u>2:00</u> (penalty displayed)
7. (To cancel a penalty after a power-play goal) RECALL, PENALTY (Home or Guest)  CLEAR ENTER	H-Penalty Line <u>1</u> PN= <u>25</u> Norm Run m:ss (m:ss goes to 0:00) (penalty disappears)
8. (Switch to Time of Day display) RECALL, TIME OF DAY	Time-of-Day / hh:mm:ss pm
9. (Switch back to Game Timer display) RECALL, SET TIMER	Game Timer mm:ss.cc

### 3.2 Software Setup

This controller has a separate memory for setup data which is non-volatile (EEPROM) and should not change in normal use.

To change the setup, press **RECALL** at power-up (while the HDD software number is displayed). Setup is also forced if the exiting setup data are unreadable. In either case, the controller should display "Push ENTER for Setup". If a P.I.N. has been set, the user is required to enter it. The user is then asked to specify the following items:

Scoreboard type (LED or Lamp)

<sup>1</sup>Is this a 'Mini' Scoreboard? (Only if type is LED)

Is the period displayed as a digit? (NO assumes indicators)

<sup>2</sup>Number of penalty display rows (0 to 8)

<sup>3</sup>Does the board have Basketball Foul displays? (NO/YES)

Does the scoreboard have a 6-digit Main Timer display? (NO/YES)

<sup>4</sup>Does the Main Timer have a controllable decimal point? (NO/YES)

<sup>5</sup>Is the last-minute timing feature wanted? (NO/YES)

<sup>6</sup>Display 100ths of a sec. in last minute? (NO means show 10ths)

24-hour time-of-day clock format? (NO/YES)

Language for printing (English or français).

Is there a serial printer attached (see sect. 2.9)? (NO/YES)

Serial Baud rate (use '+' or '-' to change).

<sup>7</sup>Countdown Timer Reset value (seconds).

To set or change the P.I.N., press **RECALL** while the first prompt (Scoreboard type) is displayed. Any of the 16 keys in the left-hand block can be included in the PIN.

---

<sup>1</sup>If 'Yes', assumes a period digit, 4-digit main timer, no penalty timer or fouls displays, and shared indicators for Bonus+Possession and Penalties. These setups are skipped.

<sup>2</sup>The number required here is the number of penalty displays (time plus optional player number) for each team. For instance, the '4PT' models have 2 displays per team.

<sup>3</sup>For lamp boards this selection determines the wiring of some displays. For LED boards, the response determines whether Volleyball & Wrestling will be allowed as options (see **NEW GAME**).

<sup>4</sup>Only asked for Lamp displays with 4-digit Timers

<sup>5</sup>See section 2.6 for a description of this option

<sup>6</sup>Only if 4-digit Timer and previous answer was 'Yes'

<sup>7</sup>Only for PR90022A-003

### 3.3 LCD Operation and Status

The LCD display is used to guide the operator when new data are being entered or to show the status of the controller. When data are not being entered, the LCD display (when setup for hockey) will normally show:

```
Game Timer mm:ss.cc  
P-Run mm:ss mm:ss
```

On line 2, 'P-Run' may be change to 'P-Hld' if penalty count-downs are not enabled. (Normally, penalties will count down whenever the game timer is running.) The two 'mm:ss' combinations on line 2 of the LCD display are the time remaining in the first Home and Guest penalties. They will be blank if there are no outstanding penalties. On line 1, 'mm:ss.cc' is the time remaining (or elapsed time, if counting 'UP'). Note that the 1/100ths of a second are not accurate unless the timer is on Hold. Note also that if the scoreboard only has four digits for the main timer display and the timer is counting 'DOWN', the value displayed on the scoreboard will be rounded up. For example, 12:34.56 on the LCD display will become 12:35 on the scoreboard (and serial output).

If the controller has been set up for basketball, line 2 will show, instead of the penalties, something like:

```
H:12 G:34 Posn=H
```

where 'H:12' and 'G:34' are the current scores and 'Posn' shows which team has possession of the ball.

If the controller is set for Volleyball the time will normally be '0:00.00' and line 2 will be something like:

```
H:12 G:34 Game 5
```

For Wrestling, the timer is active and 'Game' becomes 'Bout'.

If the timer is counting up for an indeterminate time (period length = 0), then a different display will be shown:

```
Event Timer  
h:mm:ss.ccc
```

This display is similar to the normal game timer display, but includes hours and thousandths of a second, although these are not shown on the scoreboard. Millisecond timing is only meaningful if a photo-electric timer is being used (see section 2.6 - 'Timing').

If time of day is being displayed, the LCD will show:

Time of Day  
hh:mm:ss xm

('xm' is 'am' or 'pm', or blank if 24-hour format was selected during setup.)

During an intermission or time-out, the time remaining in the intermission or time-out will be displayed on the scoreboard and the LCD, as "mm:ss. "; the minutes 'mm' will also be blank during a time-out.

The controller should abort a function in progress and switch back to the status display if no keys are pressed for about 2 minutes.

On power up, or after a reset, the controller should display the software identification number<sup>8</sup> on line 1 of the LCD for about 2 seconds. It should then revert to the display that existed before it was switched off. If the down time has been too long, so that all data (except setup) have been lost, the controller will jump into the NEW GAME function, to ensure that all data are reset. If this happens, the time-of-day clock will probably also need resetting.

If the controller is not showing the normal status display, try pressing the ABORT FUNC key. If that fails, try re-setting the controller by temporarily disconnecting the control cable.

### 3.4 Left-hand Numeric Keys

These keys are used to enter values for the functions described below. Apart from RECALL, they are ignored if not preceded by a function key. Use of the HOLD PEN MEM key (bottom left) is described later under 'PENALTY'.

#### a) Numeric keys:

These keys are used to enter numbers for period number, scores, shots on goal, player numbers, and times. In all cases, an identifying phrase and a suggested new value is displayed on the LCD. "Correct & push ENTER" will normally be shown on the second line. For the period number, the suggested new value is one more than the current value. For scores and shots, see section 3.6. In other cases, the suggested value is either the current value or a suitable default value.

---

<sup>8</sup>"HDD-SW95015x", where 'x' is a version code, 'A', 'B' etc.

b) The '+' and '-' keys:

In most cases these keys merely add or subtract 1 from the current value, but they are also used to step through the penalty list for a team when editing penalties.

c) The **CLEAR** key:

This key changes the value to all blank or zero, whichever is more appropriate.

d) The **RECALL** key:

This key restores the original suggested value, or takes the function back to the previous number in a multiple number sequence like a time. If **RECALL** is pressed before **SCORE**, **SHOTS**, **BONUS** or **POSSESSION**, the entry mode for these keys is changed from 'instant action' to 'dialogue'. **RECALL** before **TIME OF DAY** or **SET TIMER** has the opposite effect; it allows a quick change of display mode with no dialogue.

e) The **ENTER** key:

This key makes any changes part of the displayed data, and moves on to the next entry in a multiple number sequence. Pressing any other function key (including **ABORT FUNC**) will abort the current function without changing the current value, and move immediately to the new function.

For some entries, such as timer direction, only two or three values are possible. In these cases the expected keys should be displayed on line 2 of the LCD, for example "0=Up, 1=Down". Not shown is the fact that the **ENTER** key will also be accepted; this just leaves the setting unchanged. (Useful, for instance, when skipping quickly through the Setup procedure).

### 3.5 Centre Function Keys

These keys allow the operator to select functions to be updated or changed that are not specific to a particular team.

**AUTO HORN** - Displays "Auto-horn secs nnn", where n is the current setting. Use the numeric key-pad, as described above, to enter a new value. The maximum value allowed is 240 seconds (4 minutes). A short (2-sec) horn will be sounded after every 'nnn' seconds of elapsed time. If the auto-horn setting is zero, the auto-horn feature will not operate, but there will still be a



short (2-sec) horn at the end of a time-out or warm-up and a long (5-sec) horn at the end of a period. If the auto-horn setting is CLEARED (to blank), all automatic horn functions are suppressed. The ENTER key completes this function. The auto-horn setting is held in non-volatile memory and restored at power up.

**MANUAL HORN** - Causes the horn to sound immediately, for as long as the key is pressed. The controller's beeper will sound at the same time.

**NEW GAME** - LCD display depends on board type:

For LED boards displays "New Game: Push CLEAR"  
"or + to change Sport".

For Lamp boards displays "New Game Clears All"  
"Press CLEAR or ABORT".

Press CLEAR to clear the period number, scores, shots, fouls, penalties and any incomplete intermission or time-out. The LCD should then show "Timer Direction? D" (or U)  
"Press 0=Up or 1=Down".

(This setting was part of the PERIOD function in previous versions of this controller.) Press '0', '1' or just ENTER to continue with the current setting. NEW GAME then runs into the PERIOD function, described next, with a suggested period number of 1.

For LED boards only (including the 'Mini' scoreboard), press the '+' key instead of CLEAR to change the sport from hockey to basketball, or vice versa. The LCD should show something like:

"Basket B: Push CLEAR"  
"or + to change Sport".

For boards with basketball Fouls displays, pressing '+' again changes the sport to Volleyball and then Wrestling, before returning to Hockey. For other boards Basketball and Hockey are the only choices. If Wrestling is selected, the user is asked to enter two digits for the weight class. This is displayed instead of the foul Player-Number on the board. Otherwise, unless the sport is Volleyball, which ignores the Game Timer, the next prompt will be "Timer Direction?", as described above for the normal (CLEAR) sequence.

To initiate a display-test sequence, press NEW GAME followed by RECALL. This should cause all the numeric digits on the scoreboard and LCD display to count upwards repeatedly from 0 to 9, at one count per second. The LEDs or lamps and relays should be

energized for one second in every eight seconds. To end the test, press any function key on the controller. Note that the horn relay is deliberately omitted from this test; if necessary, its operation can easily be checked using the MANUAL HORN key. A display test should not change any of the values stored in memory, such as the current scores.

**PERIOD** - Displays "Period # n", where n is the expected new period number (one more than current). (If the current sport is Volleyball or Wrestling, 'Period' becomes 'Game' or 'Bout'.) Press ENTER to accept this, or enter a new number (maximum allowed is 9). If a period number of '0' is entered, the controller will switch to entry of a warm-up. This feature is described under INTERMISSION below. In the normal case, the controller should display "Period mins nn", where nn is the suggested period length (same as the last time this function was used). Press ENTER to accept this, or change it using the numeric key-pad. The maximum allowed is 99 minutes. This model of the controller allows for optional entry of seconds, in case extra time has to be added to a period. Just press ENTER for the usual value of zero. The scoreboard should switch to game-timer display, with the value at either 0:00 (timer UP) or the period length (timer DOWN). This function does not actually start the timer, but any intermission or time-out is cancelled and the auto-horn timer is reset.

If the sport is Volleyball, the Timer is just set to zero. For either Volleyball or Wrestling, the scores are set to zero. For these sports, the Game or Bout is displayed on the Player-Fouls display digit, while the normal period display (digit or lamps) is blanked.

Open-ended timing can be selected by setting the period length to zero. In this case, timer UP mode is forced and there is no end to the period. The displayed time will cycle from 59 minutes to 0 minutes. The Controller LCD display is extended to include elapsed hours and milliseconds, although these are not displayed on the scoreboard. The milliseconds will usually be zero unless external timing is being used.

**ABORT FUNCT** - This key can be used to abort any other function without changing the values displayed on the scoreboard.

**INTERMISSION** - Displays "Intermission min mm", where mm is the suggested time in minutes (the same as when the function was last used). Change this if required using the numeric key-pad. The maximum value allowed is 99 minutes. ENTER to start the count-down. The display will switch to intermission time remaining. When the intermission expires, the controller will

continue to display "0:00" until a new period is begun. An intermission can be cancelled by entering a second intermission with a time of zero. The Period and New Game functions also cancel an intermission.

If the period number at the time of an intermission is zero, it is defined as a 'Warm-up'. These have a separate default duration. The end of a warm-up is marked by a short (2-sec) horn, whereas the end of an ordinary intermission is only marked by a beep from the controller.

**SET TIMER** - Puts the game timer on hold and displays "Game Timer nn", where 'nn' is the current timer minutes. (This may represent expired time or time remaining.) To change the timer value, enter a new time, using the numeric key-pad, ENTER, then enter seconds, ENTER, enter 1/100s of a second (if relevant) and ENTER again to update the display. Note that the time displayed by this function always includes 1/100s of a second, whereas that shown on the scoreboard or serial output may be rounded to the nearest second. Note also that the auto-horn timer is not affected by a change in the game timer once a period has started. There is no direct option to change the milliseconds, but if the 1/100s of a second are changed, the milliseconds will be set to zero, otherwise they will be unchanged.

To just select the game timer for display, press RECALL then SET TIMER.

**TIME OF DAY** - To protect against unintended changes to the time-of-day clock, this routine begins by displaying "Set the Clock?". Press '1' to confirm that you want to set the clock. If a P.I.N. has been set, this must be entered next. The Controller should then show "Time of Day hh", where hh is the current hour in 24-hour format. (12-hour or 24-hour format can be selected for the scoreboard display during setup, but 24-hour format is always used when setting the time-of-day.) To set the clock, enter a new value for the hours using the numeric key-pad, ENTER, enter the minutes, ENTER, enter the seconds (default value is zero), then ENTER again to update the display.

If you just want to set the clock forward or back by an hour, use '+' or '-' to change the hour, ENTER it, then press ENTER again without changing the minutes, and the seconds will not be reset.

To just select the time-of-day clock for display, press RECALL then TIME OF DAY (or TIME OF DAY, ENTER).

### 3.6 Timer Control Keys

The bottom four keys in the centre block are for timer control. They can be used at any time, even within another function and are effective immediately; no dialogue takes place.

**PENALTY RUN** - Allows penalties to count down provided the game timer is running. Line 2 of the LCD status display should show "P-Run".

**PENALTY HOLD** - Immediately stops all penalties from counting down. Line 2 of the LCD status display should show "P-Hld".

**TIMER RUN** - Immediately starts the game timer (unless in count-down mode and showing '0:00').

**TIMER HOLD** - Immediately stops the game timer and penalty count-down.

### 3.7 Right-hand Function Keys

These are team-specific keys and work in the same way for either the home team (H) or the guests (G). Home team is assumed in the following descriptions.

**SCORE** - these are now 'instant action' keys. The score for the selected team will immediately be increased by 1.

To correct a Score, press RECALL, then SCORE. The LCD should display "H-Score nn", where 'nn' is the current value. Enter a new value in the usual way (use the '+' & '-' keys for minor corrections) and press ENTER. The maximum value allowed is 199. (On scoreboards with 2-digit 'Scores' displays a score of 101 is displayed as "01", whereas a score of 1 is displayed as " 1".)

If a printer (either serial or parallel) is connected and the current sport is hockey, SCORE operation is changed. The team score is still increased, but the Controller then stops and asks for the player's number, for inclusion in the printed log. Once this has been entered, it asks for the numbers of players awarded assists on the play. Up to two can be entered. A blank player number (the default) is not printed, and ends entry of assists. Assists can also be entered after the score has been corrected using RECALL, SCORE. These will be given the time of the last normal SCORE entry.

**SHOTS** - these keys work in the same way as Score, including use of RECALL + SHOTS for corrections, except that the maximum allowed is only 99. Shots are not printed in the log, so this function is not changed by the presence of a printer.

**BONUS** - these are also 'instant action' keys. Normally, pressing a BONUS key immediately switches the state of the Bonus lamp for that team. To examine the state of the lamp without necessarily changing it, press RECALL + BONUS. The LCD should display "H-Bonus ON? Y" if the lamp is On or "H-Bonus ON? N" if the lamp is Off. Press '0' to force it Off, '1' to force it On, or ENTER to accept the current state.

The BONUS and POSSESSION keys are disabled if the scoreboard has been set up for Hockey.

**POSSESSION** - Works in the same way as BONUS, except that if Possession is set On for one team, it is automatically set Off for the other team.

**TIME OUT** - Puts the game timer on hold and displays "H-Time Out 30", where 30 is the suggested time in seconds. It can be changed to any other value (maximum 99) using the numeric keypad. Once ENTER is pressed, the appropriate lamp will come on, the time-out time will be displayed, and the count-down will begin immediately. When the count-down is completed, a short (2-sec) horn will sound (unless the auto-horn setting has been CLEARED) and the display will change back to the game timer. This will remain on hold until the TIMER RUN key is pressed. Entry of a new time-out replaces a current time-out immediately, so that an entry of zero can be used to terminate a time-out prematurely. The functions New Game, Intermission and Period also cancel a time-out.

**FOUL** (these keys cannot be used if the scoreboard has been setup for 'hockey', and are not normally present on a controller supplied for the 'Mini' scoreboard.)

Provided the current sport is Basketball, the Controller should display "H-Foul by Player # ". Enter the number of the offending player and the Controller will then display "H-Player Fouls n", where 'n' is the number of fouls by that player. This value can be changed, although it should normally be correct. Press ENTER and the team total will automatically be adjusted unless it has reached 99. (The limit is 19 for a lamp scoreboard or software produced in 1998 or earlier).

To correct the Team Foul total, press RECALL, FOUL (or FOUL, RECALL) and proceed as for any other number entry.

To blank the player-number and player-fouls displays, press either FOUL key, then CLEAR and ENTER.

If the sport is Volleyball or Wrestling, the Team-Fouls displays are used to show the number of games or bouts won by each contestant. For these sports, the FOUL keys act like the SHOTS keys described above.

**PENALTY** (these keys cannot be used unless the selected sport is Hockey, but penalty displays are not essential.)

This controller recognises four types of penalty:

- 1) Immediate (normal) penalties (major or minor).
- 2) Delayed (held) penalties. These do not start until a previous immediate penalty has expired.
- 3) Misconduct penalties. These count down like ordinary penalties, but their expiry does not release a delayed penalty.
- 4) Delayed misconducts. A misconduct may be awarded at the same time and to the same player as a normal penalty, in which case it must be delayed until the normal penalty has expired.

If two or more penalties are entered for the same player, the later ones will be delayed automatically, provided the player number is not zero. To ensure that a major penalty is served before a minor, just enter the major one first.

A maximum of 15 penalties can be entered for each team, although few scoreboards can display more than two or three. The penalty lists are kept sorted in the order given above. The order of the running penalties depends on time left, so that the normal penalty with the shortest time remaining should always appear at the top of the scoreboard. Delayed penalties are kept in their original entry order and this is the order in which they will be released to run.

If the scoreboard is equipped with penalty indicators rather than penalty timers, the indicators are turned On only if the penalties are of type 1 (normal, not misconduct or delayed). If the scoreboard is equipped with misconduct indicators, these will be turned On only if the penalty is a misconduct.

When a normal penalty expires (time = 0:00) or is cancelled, the first delayed penalty in the list for that team (if any) is released. The controller then checks for a misconduct for the

same player (using the player number). If found, this is also released to count down. When a misconduct expires, however, other penalties are not affected. In all cases the list is moved up one place and re-sorted.

#### Entry of a new penalty.

As soon as a penalty key is pressed, the controller should display:

```
"H-Penalty at m:ss"  
"ENTER for Norm Run"
```

where m:ss is the current elapsed time. If there are already two penalties for this team, the controller will show "ENTER for Norm Hld" instead. For a normal penalty (major or minor) just press ENTER, but if the penalty is to be one of the other types, press the HOLD PEN MEM key (bottom left) until the desired penalty type is shown, before pressing ENTER. The controller will then ask for the player's number. Enter this using the numeric key-pad, press ENTER, enter the total time for that player in minutes, press ENTER, enter the seconds, if not zero, then press ENTER again to display the penalty on the scoreboard. The controller can handle a maximum of 15 penalties per team at one time. An attempt to enter a 16th penalty for a team gives the message "Too many penalties!". The controller will wait for the next key-press, then abort the function.

If a penalty is entered with a non-zero player number and another penalty for the same number is already in the list, the new penalty is automatically delayed. It will not be allowed to run until the previous penalty for that player has expired.

If the scoreboard cannot display penalty player numbers, or if the player number is not immediately available, a quicker method of entering penalties can be used. Press a penalty key, as above; change the penalty type if necessary; then press a digit key, such as '2' for a 2-minute penalty. The controller will skip the player number (it will display as '00') and go straight to the time entry step. Multiple penalties to the same player will not be handled properly, however, unless a non-zero player number is entered.

#### Examining the penalty list for a team.

Press the RECALL key immediately after (or before) one of the PENALTY keys, and the controller will allow inspection of the current penalty list. In this mode the '+' and '-' keys can be used to move up or down the list of penalties for the selected team. Penalties may continue to count down (if so enabled and the timer is running), but expired penalties will not be removed

or processed, and no sorting of the list will take place, until you exit this option by pressing ENTER or the ABORT FUNC key.

#### Changing existing penalty data.

Proceed as described above until the penalty to be changed is displayed on the Controller's LCD. To cancel it, press CLEAR followed by ENTER. To change the penalty type, press the HOLD PEN MEM key one or more times, then ENTER. Note that in these two cases, you can cancel the operation by pressing '+' or '-' instead of ENTER. Cancellation of a penalty in this way is handled like a normal expiry, so that a delayed penalty may be released to count down. To stop this happening, change the penalty type to anything but 'norm run' before pressing ENTER.

To change the time or the player number, you must first make sure that the cursor (an underline) is under the item you want to change. If it is under the wrong item, press RECALL, which should switch the cursor from the player number to the penalty time or vice-versa. Then start entering the new value (penalty number or minutes) and the LCD display will change to either :

"H-Line l P-Num= n" or "H-Line l Time= m".

Where 'l' is the scoreboard line (counting from the top) on which the penalty is displayed. Complete entry of the new value in the usual way, and the normal status display should return as soon as you press ENTER.

#### Note on printing

If a printer is connected, details of a penalty are printed out when it is entered. If the penalty time is changed, in the way described above, a second print will occur. The 'Penalty at' time reported by a repeat print will be that of the most recently entered new penalty.



### 3.8 Control of Countdown Timers (PR95022A-003 only)

Press the RUN button to start the display counting down at one count per second (provided the counter is not already at zero). The SET/HOLD button pauses the count; RUN can then be used to re-start it without changing the value. The RESET button resets the display to the reset count, which is normally 30 seconds. If the display was counting down when RESET was pressed, it will begin counting down again as soon as RESET is released; while if it was paused, it will stay paused until the RUN button is pressed.

If the scoreboard Main Timer is stopped or reaches the end of the period, the countdown timers will also stop counting. They can be re-started by pressing the RUN button.

To correct the count: press and hold the SET and RUN buttons at the same time. This will make the display count upwards at one count per second. Release RUN before releasing SET, unless you want the display to start counting down immediately.

To 'undo' a reset: while holding down the SET/HOLD button, briefly press RESET. This should restore the count to its value before the most recent RESET.

The horn in these units is independent of the horn in the main scoreboard. It should sound for 2 seconds if the count reaches zero, provided the main timer is also running. To force the horn on for testing, press RUN and RESET at the same time.

The reset count can be changed as part of the 'setup' procedure described in section 3.2 .

The countdown timers can also be controlled from the main controller, provided the sport has been set to 'basketball'.

The **PEN RUN** and **PEN HOLD** keys can be used to start and stop the countdown timers in the same way as the **RUN** and **HOLD** buttons on the auxiliary control box.

Use one of the **SHOTS** keys plus the numeric keys to change the countdown value. (The countdown is automatically paused). Use **SHOTS + RECALL** to call up the normal reset value. Either way, the **ENTER** key must be used in the usual way to store and display the new value.

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